

Grades: 3-5 **Course Name: DC Recycles!**
Unit *Reducing Plastic*

Overview and Goal of the Lesson:

The goal of these lessons are to encourage students to reduce and reuse plastic in their everyday life. By teaching students more about the types of plastics and what happens when it's recycled students will better understand the importance of reducing and reusing. Washington, DC and other cities across the country are working to reduce the use of plastic in the city. Students will learn more about these reducing practices and form opinions on their effectiveness and design recommendations for the future.

Essential Question(s):

Why is it important to reduce and reuse along with recycling? How do these actions impact our environment, wildlife, and well being?
What can we do to tell others about the importance of the three R's and preserving our world?
What can we learn from the reducing practices currently being implemented?

NGSS Emphasized and Addressed in this Lesson Sequence:

Performance Expectations	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Students will be able to obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1)</p>	<p>Obtaining, Evaluating, and Communicating Information</p> <p>Obtaining, evaluating, and communicating information in 3-5 builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.</p> <ul style="list-style-type: none"> Obtain and combine information from books and/or other reliable 	<p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things 	<p>Systems and System Models</p> <ul style="list-style-type: none"> A system can be described in terms of its components and their interactions. <hr style="border-top: 1px dashed #ccc;"/> <p style="text-align: center;">Connections to Nature of Science</p>

	media to explain phenomena or solutions to a design problem.	to help protect Earth's resources and environments.	Science Addresses Questions About the Natural and Material World. <ul style="list-style-type: none"> Science findings are limited to questions that can be answered with empirical evidence.
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Common Core Standards:

ELA/Literacy -

- [RI.5.1](#) [Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. \(5-ESS3-1\)](#)
- [RI.5.7](#) [Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. \(5-ESS3-1\)](#)
- [RI.5.9](#) [Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. \(5-ESS3-1\)](#)
- [W.5.8](#) [Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. \(5-ESS3-1\)](#)
- [W.5.9](#) [Draw evidence from literary or informational texts to support analysis, reflection, and research. \(5-ESS3-1\)](#)

Mathematics -

- [MP.2](#) [Reason abstractly and quantitatively. \(5-ESS3-1\)](#)
- [MP.4](#) [Model with mathematics. \(5-ESS3-1\)](#)

Materials

Item	Quantity	Purpose
Various plastic items		Monday- students should sort items that can or can not be recycled
Buckets/Bins	Enough for each small group	To create "ocean"
Trash pieces (coffee grounds, plastic bags, paper, food, soil, oil, etc)	Enough for each "ocean"	To simulate The Great Pacific Garbage Patch
Clean-up tools (plastic fork/spoon, Ziploc bag, paper bag, etc.)	Enough for each small group	To simulate ocean clean up

Small clear cups	Enough for each small group	To pull out the cleaned water to determine which group achieved the cleanest water
TV/Computer/Internet	1	Various videos and articles throughout lessons

5E Lesson Sequence

Total Duration: 60 minutes-MONDAY/WEEK 1				
5E Model Stage	Duration	Teacher and Student Actions		Notes
Engage	10 minutes	What Teacher Does	<p>Say: <i>Today we are going to begin to learn about the problems plastics are causing to the environment. Large amounts of plastic are used by humans all across the world each day. Unfortunately so much of it is not recycled properly and ends up in the ocean causing many problems for the animals that live there.</i></p> <p>Show video "How Much Plastic is in the Ocean?"</p>	<p>https://www.youtube.com/watch?v=6xINyWPpB8</p> <p>https://www.youtube.com/watch?v=YFZS3Vh4IfI</p>
		What Students Do	Watch video and listen for extreme facts about the damage plastic does in the ocean.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explore	15 minutes	What Teacher Does	<p>Provide students with various items (plastic bag, plastic bottle, plastic wrapper, Styrofoam egg carton, ziploc bag, food, paper plate, etc.)</p> <p>Say: <i>As you learn more about plastics and the damage they are doing to the environment, it's important to understand more about what can be recycled. Scattered here are many items made from plastic. As you look at them, decide which you think can be recycled and why.</i></p>	<p>*gather these materials from home or school beforehand</p> <p>*this activity can be varied depending on the items – all plastic, mixed paper/plastic/glass/aluminum</p>
		What Students Do	Students should sort these items into recyclable or not--focusing on the plastic items.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explain	5 minutes	What Teacher Does	<p>3 R's: Reduce, Reuse, Recycle</p> <p>*Rethink, Repair, Refuse</p>	



Say: America is a disposable nation. Each person on average produces more than 1,600 pounds of trash each year. 70% of the trash that makes its way to landfills could be recycled. We often here of the reduce, reuse, recycle process. However, there are 3 other R's that we can do – rethink, refuse, repair. Can you think of ways you might rethink? Refuse? Repair?

In small groups or as a whole class students could analyze scenarios (such as the following) to decide what might need to be rethought or could be refused or repaired.

-Students at Amidon Bowen Elementary School have hamburgers once a week for lunch. Each hamburger is placed on a cardboard tray and wrapped in plastic. At the

			<p>end of lunch, this wrapping goes in the trashcan with all the food trash.</p> <p>-Students at Van Ness Elementary are given the option to take a plastic fork, spoon, and straw each day no matter what is being served at lunch. Often one or more of the tools are unused but they all go in the trash with all the food at the end of lunch.</p> <p>-Each week the plastic serving bowls, utensils, and buckets used for early childhood lunches in the classroom are thrown away due to wear and tear and cleanliness issues. For this reason, new bowls and utensils are bought for 6 classrooms each week of the school year.</p>	
		What Students Do	Students will be able to analyze scenarios to determine how they might rethink, refuse, and/or repair.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Elaborate	10 minutes	What Teacher Does	<i>Say: This week we will focus on reducing plastic. While recycling is important, if people reduced the amount of plastic they use, recycling could be less of a focus. This is also important because many people are not recycling or recycling improperly. From the items we sorted above, let's consider ways these items could be reused.</i>	Ideas include: -plastic bottle as a container for various items -plastic bags as rugs
		What Students Do	Students share out ways the plastic items could be reused.	-toilet paper tubes as a way to wrap cords
5E Model Stage	Duration	Teacher and Student Actions		Notes
Evaluate	20 minutes	What Teacher Does	<i>Say: Today you've begun to learn about how much plastic impacts our Earth, in particular the oceans. You've also</i>	

			<i>started to think about the ways common plastic items can be reused so that we reduce our use of plastic overall. In closing, write a letter to your family telling them about the importance of reducing plastic use and one thing you are going to begin reusing at your home.</i>	
		What Students Do	Students will write a letter to their family about one thing they can begin reusing at home.	

5E Lesson Sequence

Total Duration: 50 minutes- TUESDAY/WEEK 2				
5E Model Stage	Duration	Teacher and Student Actions		Notes
Engage	5 minutes	What Teacher Does	<i>Say: Today we are going to learn more about specific types of plastic bags. Unfortunately many consumers are often hesitant about the recycling rules for plastic bags. (show bags) Would you recycle these? If so, where? It's true they are tricky. In DC, if plastic bags are mixed in with other recycling they will not be picked up. However, many grocery stores do collect them. Plastic bags can get stuck into the machines at the recycling facility, which is why they must be handled properly. However, it is very important that they are recycled as so many are consumed each year.</i>	*gather various types of plastic bags from stores (check the numbers on the bags to make sure you have different types)
		What Students Do	Students participate in the discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explore	10 minutes	What Teacher Does	*Show students various types of plastic bags, pointing out the number on each of them that shows a difference. Ask:	

			<ul style="list-style-type: none"> -Do the bags look different based on their number? -Do the bags feel different based on their number? -Does it seem as if the bags could hold different weights of objects based on their number? -What do you think the numbers mean? 	
		What Students Do	Students participate in the discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explain	10 minutes	What Teacher Does	https://www.ryedale.gov.uk/attachments/article/690/Different_plastic_polymer_types.pdf This document shows the different types of plastics and their classification. Locate the numbers of the bags and read more about the uses and recycling trends. *Number 6 is not commonly recycled in DC. Number 6 includes expanded polystyrene (Styrofoam)- which is not recycled and now banned as serviceware in DC law. Ask: -What do you notice about how often they are recycled? -Why might these items not be recycled regularly?	
		What Students Do	Students participate in the discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Elaborate	10 minutes	What Teacher Does	Say: <i>The process of recycling plastic bags is unique. This video shows the process up close. As you watch, think about all the steps and time it takes to do the recycling.</i> Watch "How Plastic Bags Gets Recycled"	

			https://www.youtube.com/watch?v=Q6hzhKmw4EY Ask: <i>-Why does the recycling staff wish plastic bags were made in a grey/brown color?</i> <i>-What did you notice about the amount of energy and water usage?</i> <i>-What do you notice about the process of recycling the bags?</i> <i>-Why do they say it's "feeky" to have fun and be interested in things?</i>	
		What Students Do	Participate in the discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Evaluate	15 minutes	What Teacher Does	<i>Say: We've brought to life a common recycling problem today. Often people do not know what to do with plastic bags. While we hope consumers will reuse the bags they get, we know eventually they will need to be thrown away and should be recycled at this time. Since this is so tricky—we need to inform other students in our school. Today we are going to design a label for the recycling bin in the cafeteria so students know they should not put plastic bags in there.</i> Options: <i>-Make a separate place at school for plastic bags to be recycled.</i> <i>-Write a letter to a nearby grocery store that may not be collecting plastic bags, asking them to get a receptacle.</i>	*choose a project that makes the most sense for your school and community
		What Students Do	Students participate in the activity as directed by teacher.	

5E Lesson Sequence

Total Duration: **45** minutes- WEDNESDAY/WEEK 3

5E Model Stage	Duration	Teacher and Student Actions		Notes
Engage	3 minutes	What Teacher Does	Ask: <i>When you buy items at the grocery store in DC, why do they count how many bags you've either used or brought with you?</i> *DC currently charges a 5cents plastic bag tax. Ask: <i>Based on what you've been learning, why do you think they charge this?</i>	
		What Students Do	Students participate in brainstorming discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explore	5 minutes	What Teacher Does	Say: <i>Washington, DC is home to the Anacostia River. Less than 50 years ago people swam in this river because it was a much cleaner river. Unfortunately due to litter and other pollution, the Anacostia River is now extremely polluted. This video shows a realistic picture of the problem.</i> https://www.youtube.com/watch?v=41a8TQ2FE6U *If no video ability, could also use pictures. https://www.youtube.com/watch?v=ejOad-hExdQ This is another more updated video that also includes the reasoning of why we need to reduce first.	
		What Students Do	Students engage with video and understand the problems the Anacostia River faces.	

5E Model Stage	Duration	Teacher and Student Actions		Notes
Explain	2 minutes	What Teacher Does	<p>Say: <i>In 2009, The Department of Energy and Environment conducted a trash study in the Anacostia River and found that disposable plastic bags were one of the largest sources of litter. For this reason, DC passed a bag fee for disposable paper and plastic bags.</i></p> <p>Ask: <i>-What do you think the goal of charging is?</i> <i>*This bill focuses on changing consumer behavior. Instead of banning the bags altogether the hope is that DC residents use less disposable bags and bring more reusable bags.</i></p>	
		What Students Do	Students engage in discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Elaborate	5 minutes	What Teacher Does	<p>Say: <i>I'm sure you are wondering where the 5 cents goes and how DC decided to charge 5 cents. It was decided that 5 cents is an amount people care about but not an amount where everyone will completely stop buying the bags. This aligns with DC's goal of changing consumer behavior. So, where does the 5 cents go?</i> <i>-1 cent goes to the business- this can be increased to 2 cents if the store offers a rebate when customers bring their own bag</i> <i>-the remaining 3 or 4 cents goes to the Anacostia River Clean Up and Protection Fund</i></p>	

			<p><i>This money supports the 5th grade camping field trip in DCPS schools. The goal of the trip is to teach students more about the environment and how to protect it.</i></p> <p>Ask:</p> <ul style="list-style-type: none"> -Can you describe your experiences with the bag tax? -Have you noticed the bag tax changing anyone's behavior? 	
		What Students Do	Students engage in discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Evaluate	30 minutes	What Teacher Does	<p>Say:</p> <p><i>The idea of a bag tax is highly controversial. Today more than 200 cities have some sort of policy related to plastic bags.</i></p> <p>Articles about the bag tax/ban:</p> <p>DC: https://ggwash.org/view/38159/the-data-proves-the-dc-bag-fee-is-working (US-focused): http://www.nbcnews.com/business/business-news/ban-bag-why-plastic-bag-taxes-bans-don-t-always-n580926 DC: https://newrepublic.com/article/72732/tiny-taxes-are-better-nothing DC: http://wtop.com/news/2012/10/officials-rejoice-over-low-5-cent-bag-fee-revenue/slide/1/</p> <p>After looking at one or more of these articles students should form their own opinion about the bag tax. A large part of the Anacostia River is in Prince George's County, Maryland. Based on what they've learned and their</p>	

			opinion, students should write a letter to Prince George’s County proposing a solution to the pollution problem.	
		What Students Do	Students write a letter to Prince George’s County proposing a solution to the pollution problem.	

5E Lesson Sequence

Total Duration: 35 minutes – THURSDAY/WEEK 4

5E Model Stage	Duration	Teacher and Student Actions		Notes
Engage	5 minutes	What Teacher Does	<p>Say: <i>We’ve learned about the plastic bags getting into the Anacostia River locally, however plastic in the ocean is another important issue facing the ocean habitat and the animals that live there.</i></p> <p>Ask: -What problems are plastic items in the ocean causing? -How does the plastic get into the ocean?</p>	
		What Students Do		
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explore	5 minutes	What Teacher Does	<p>Say: <i>This video shows what happens to plastic in the ocean and reminds people what they can do to stop it from happening. Let’s take a look to learn more.</i> https://www.youtube.com/watch?v=YFZS3Vh4lfl</p>	
		What Students Do	Students engage with video.	
5E Model Stage	Duration	Teacher and Student Actions		Notes

5E Model Stage	Duration	What Teacher Does	<p>Ask:</p> <ul style="list-style-type: none"> -What types of plastic do you use daily? -When you use those things what happens after you are finished with them? <p>Say:</p> <p>8 million tons of plastic leak into the oceans each year. Plastic is cheap to make and therefore the containers made from plastic are typically meant to be used once, increasing the total amount used. Many sea animals eat the plastic.</p> <p>*Read Article aloud or independently http://grist.org/living/these-sea-creatures-are-eating-the-plastic-you-throw-into-the-ocean/</p> <p>Say:</p> <p>The lanternfish is one fish that ingests a lot of plastic as plastic is often broken down into tiny pieces by the time it spreads in the ocean. These tiny pieces are the size of the fish food making it easy to confuse them.</p> <p>Another article option: http://www.iflscience.com/environment/ocean-animals-%E2%80%98death-plastic%E2%80%99-could-be-occurring-more-frequently/</p> <p>Say: This article describes what happens to 3 specific animals when they eat plastic- whales, turtles, and birds.</p>	Notes
		What Students Do	Students will engage in discussion.	

<p>Elaborate</p>	<p>10 minutes</p>	<p>What Teacher Does</p>	<p>Say: <i>This pie chart shows the different types of garbage that end up in ocean.</i></p> <p>Ask: <i>-Is there anything that surprises you? -What do you notice?</i></p>  <p><i>One small thing that can be changed is the use of straws – which make up 4% of the great garbage patch. Sea turtles are finally starting to gain attention because straws are killing them by going into their noses. One reason I’m so excited to be teaching you more about how to recycle and reuse is because one students, just like you, in another school decided to focus on reducing straw usage. His campaign is called one less straw. If you think about it, we use straws as a luxury or something we are used to but not something we absolutely need. Just like this kid, I’m hopeful you will become passionate about one of the ways we can help the environment so you can spread your knowledge through activism.</i></p>	<p>*There are some videos of sea turtle rescues on YouTube but they are graphic. If students can handle it, they can be shown. Teachers should pre-watch to determine.</p> <p>Another great video about the Great Pacific Garbage Patch: https://vimeo.com/11704000</p>
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		What Students Do	Students engage in discussion.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Evaluate	10 minutes	What Teacher Does	Say: <i>If we know what's in the great garbage patch and we know so much about recycling---why can't this patch be cleaned up?</i> Compile a list of reasons as to why it might be so difficult to clean up. (This is in preparation for the next day's activity.)	
		What Students Do	Students brainstorm reasons why it's difficult to clean up the ocean.	

5E Lesson Sequence

Total Duration: 50 minutes- Friday/ Week 5				
5E Model Stage	Duration	Teacher and Student Actions		Notes
Engage	3 minutes	What Teacher Does	Say: <i>During the last lesson we came up with the reasons it might be difficult to clean up the garbage in the ocean. Today you are going to have a chance to try to clean up the ocean yourself!</i>	
		What Students Do	Listen to project in order to prepare.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explore	2 minutes	What Teacher Does	Show students the buckets of ocean water that have been filled with trash. Today your goal is to figure out the most cost effective way to clean this ocean water.	These buckets should be prepared in advance using trash from

		What Students Do	Listen to project in order to prepare.	around school/home. Examples to put in include: -coffee grounds -paper -plastic bags -food -bottles -straws -soil -oil
5E Model Stage	Duration	Teacher and Student Actions		Notes
Explain	10 minutes	What Teacher Does	Show students their options of tools for cleaning the water. Each tool has a cost so you'll need to choose which tools to use wisely. *Giving a price to the tools makes this a great true STEM activity. However, the lesson could also be done without "charging" for the tools.	The tools should be prepared in advanced and assigned prices. Examples include: -cups -forks -Ziploc bags -sponge -paper bag
		What Students Do	Listen to project in order to prepare. Work with group to decide which materials to purchase.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Elaborate	20 minutes	What Teacher Does	Say: <i>Now that you have your tools, you will have 15 minutes to work on cleaning your ocean. The trash can be separated out into the extra bucket. At the end of the 10 minutes, we'll take a cup of water from each bucket and use our eyes to determine which is the cleanest.</i>	

			Teacher then observes.	
		What Students Do	Students will work to clean their water with their tools, paying close attention to which tools remove the most garbage.	
5E Model Stage	Duration	Teacher and Student Actions		Notes
Evaluate	<i>15</i> minutes	What Teacher Does	A cup of water from each tub will be collected and analyzed in order to see which group has cleaned the water the most. This will be compared to the amount of money the group spent on tools. A wrap-up discussion about the challenging parts of this activity and what this represents about cost-effective garbage cleanup in the ocean should occur based on the results.	
		What Students Do	Students determine which water is the cleanest. Students participate in group discussion about the results.	