The Plastic Crisis- Its Effect on Humans, Sealife and the Oceans

Environmental Study of Water - Engineering

Essential Question	*How is plastic affecting the oceans, its sealife and humans? How are we addressing this problem?*
Outcomes	By the end of this lesson, students will be able to: ● Explain the impact of plastics on humans, sealife and the oceans ● Identify 3 ways to reduce personal use of plastic and its rationale ● Distinguish between micro and macro plastics ● Describe the role of the Environmental, Polymer, Mechanical, and Hydrodynamic Engineers in the plastic crisis ● Describe two ways Engineers are attempting to manage the plastic crisis (reducing plastic already in the ocean and preventing further plastic in rivers from entering the ocean)
Standards	**Science Targets** ES.a.1 Interactions of matter between living and nonliving things and the location, uses and dangers of fossil fuels. L.c.5 Disruption of ecosystems human causes and effects. L.a.2 Homeostasis, feedback methods that maintain homeostasis, the effects of changes in the external environment on living things. **ELA Content Standards** R.4.1. Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. W.3.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

	R.6.5 Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem. **Math Content Standards** D.4.2 Understand that statistics can be used to gain information about a population by examining a sample of the population, generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that a random sampling tends to produce representative samples and support valid inferences.
STEM Focus	**Science ○ Technology X Engineering ○ Mathematics**

Before you begin this Air Science lesson:

- **Go to File > Make a copy**
- **Change the name to: <your name> Water Engineering**
- **Begin working in your document**

Read the left-column to learn more about water in our environment, then on the right-column complete the reflections or activities.

Engage

What plastic items did you use today ?

Activity 1: Complete the chart below.

In the first column, list 3 plastic items that you used today. In the second column, list where you put the plastic item when you were finished using it.

Plastic item	Where is it now?
1.	
2.	
3.	

Activity 2: Click here to watch the video entitled *Bag It* (2.36)

Explore

What exactly is plastic and how is it made?

Click here to watch video entitled *Plastics 101 by National Geographic* *(6:01)*

Activity 3: Practice Vocabulary
Click on the Quizlet link below to practice the vocabulary from the video entitled Plastics 101 by National Geographic Click here

Explain

Why is plastic a problem?

Watch video: *Why We Need to Stop Plastic Pollution in Our Oceans For Good* *(4:35)*

Activity 4: Scroll through the slide presentation What are some ways we can help the plastic crisis?

Activity 5: Write
Click the link below and write 2 ways that you can aid in stopping plastic from entering the oceans.
Click the link here

Elaborate

Watch the following by clicking the link below:

The Nurdles Quest for Ocean Domination
(4:55)

Activity 6: Complete
Complete the Google form entitled The Nurdles Quest For Ocean Domination

Collaborate

How do we find solutions to the Plastic Crisis?

Think, pair and share your thoughts with a partner. Then consider that first, we must identify the specific plastic problems, so we are able to provide specific solutions.

Watch the video link below:

Are microplastics becoming a macro problem? (2:51)

Activity 7: Learn

Engineering Connection: Click the link to learn about the Types of Engineers Engineers working on the plastic crisis.

Activity 8: Engineering Activity

Field work is one aspect of Environmental Engineering. Environmental Engineers collect samples of various media for chemical and biological analysis and make observations about the conditions in which the samples were found. Then they use this information to solve specific problems.

With a partner click the link below to explore and participate in an Environmental Engineering lab.

Rapid Trash Assessment

Activity 9: Watch and Answer

How are engineers tackling the plastic already in the ocean?

With your partner, watch and answer the questions regarding Hydrodynamic and Mechanical Engineers who deployed their Ocean Clean Up System in the Great Pacific Garbage Patch. Click the link here for the video: *The First Plastic (12:10)*

Activity 10: Watch and Answer

How are engineers preventing plastic from getting into our oceans?

80% of plastic enters the ocean by 1,000 rivers. With your partner, watch and answer the questions regarding what engineers are doing to prevent plastic from getting to the ocean. Click the link here video *Interceptor (12:10)*

Evaluate

So, what did you learn?

Now that you are informed of the plastic crisis, will you do anything differently?

Prepare:

To prepare for activity 11, on a piece of paper formulate a response that answers the following questions:

1. **How can you aid in helping our oceans and sea life?**

2. **What do you think the biggest problem is regarding the plastic crisis ?**

3. **What does this make you think about?**

Perhaps consider the following information to help in formulating your response:

Read:

Click here to read - Plastic Pollution Crisis Contaminating our Oceans and Health and what we can do about it

Activity 11: Discuss

Go to Flip Grid to discuss what you learned in this lesson.

Click here to access flipgrid with gmail
or use
Guest password: XcAbV4RPc7BPfLU

Extend

Turning Trash into Treasure

Learn how one pair of sunglasses can help clean up 24 football fields worth of ocean plastic: read, watch and comment
2020 Ocean Crisis Blog

Additional Extension Activities

Labs
Environmental Engineers and The Great Pacific Garbage Patch Click the link here

Click the link below to access a sea life lab:
You Are What You Eat Lab

Engineering Lab: The Plastisphere- Plastic Migration and its Impacts
Click here for The Plastisphere

Map
Click below to access an interactive ocean map:
Dive Against Debris Interactive Map

Read
Click the link below to read the article
Plastic from Source to Sea