



# LESSON PLAN

## HUMAN IMPACTS ON THE ENVIRONMENT GRADES 6-8

### SUMMARY

Students construct explanations about ocean garbage patches, discuss how human population growth has contributed to this problem, and propose solutions to mitigate the negative impact plastics have on our oceans.



**MS-ESS3-4.** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

#### Science & Engineering Practices

**Developing and Using Models**

**Obtaining, Evaluating, and Communicating Information**

**Constructing Explanations**

**Engaging in Argument From Evidence**

#### Connections to Classroom Activity

- Students use a 2-liter bottle model to describe the phenomenon of plastic trapped in an ocean gyre.
- Students read and obtain scientific information and evidence about the ocean garbage patches.
- Students use evidence from the article and ideas demonstrated by the model to construct an explanation using the Claim, Evidence, Reasoning (CER) format.
- Students construct a written argument about a proposed solution to the plastic waste problem in our oceans and discuss what it will take to make these solutions a reality.

## Disciplinary Core Ideas

### ESS3.C Human Impacts on Earth Systems

Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

## Connections to Classroom Activity

- Students read an article and discuss how human activities such as the use and disposal of plastics are destroying ocean habitats.
- Students discuss how human population growth and per-capita consumption contribute to the garbage patches found in the ocean.
- Students propose a solution to the plastic waste problem in our oceans and the positive impact this might have on living things.

## Cross Cutting Concepts

### Patterns

## Connections to Classroom Activity

- Students are asked to identify patterns in human behavior that cause plastic waste problems affecting our oceans.

## DURATION

90 min.



## ENGAGE

Ask students to read the National Geographic article "[Great Pacific Garbage Patch.](#)"

After reading the article, facilitate a class discussion about experiences students have had with plastic waste. Guiding questions might include:

- What types of plastic do you throw out or recycle?
- How much one-use plastic do you use each day?
- Where have you noticed plastic waste in your community?
- Where do you think your plastic waste ends up?
- How do you think plastic waste gets into the ocean?



## EXPLORE

Explain that a gyre is a large system of rotating ocean currents. Ask students to develop a physical model of a gyre with plastic waste to simulate an ocean garbage patch using a 2-liter bottle with a cap, water, and small pieces of plastic. Tell students to cut plastic waste into small pieces (1 cm to 3 cm) and then place the small pieces of plastic inside the bottle, fill with water, and tighten the cap.

## MATERIALS

### Each group of students will need:

- 2-liter bottle with cap
- 2 liters of water
- Plastic waste
- Scissors

Ask students to rotate the bottle to model an ocean gyre. Use this model to create a class list of observations in student notebooks or displayed in front of the class.

Facilitate a class discussion about this model while students share observations. Guiding questions might include:

- What do you notice about the different pieces of plastic?
- How does this model a gyre?
- How does this model an ocean garbage patch?
- What are the limitations of this model?



## EXPLAIN

Ask students to use the National Geographic article and the list of class observations to provide evidence and scientific reasoning about how plastic waste from humans creates ocean garbage patches and how plastic waste impacts marine life.

Use the Claim, Evidence, Reasoning (CER) structure to provide support for students in creating claims supported by evidence and scientific reasoning.

The first claim students will make will answer the question, “How does plastic waste from humans create an ocean garbage patch?”

The second claim students will make will answer the question, “How does plastic waste in the ocean impact marine life?”

First, write these questions on the board and support students in making claims to answer these questions. Second, ask students to find evidence from the article or from the list of class observations to support their claims. Third, ask students to provide scientific reasoning that links the claim to the evidence. This requires students to provide science ideas that support how the evidence is linked to the claim.

An example of this would be:

Claim: Plastic waste from the shores of North America and Asia gets caught in ocean currents to travel to the garbage patches.

Evidence: Plastic waste coming off the coast of California travels with the California current south and then the North Equatorial current east.

Reasoning: The vortex of the garbage patch slowly draws in the plastic waste from these currents to the center of the gyre to form a garbage patch in the ocean as demonstrated by our model.

*End of Day 1*



## ELABORATE



**WATCH THE GENERATION GENIUS HUMAN IMPACTS ON THE ENVIRONMENT VIDEO AS A GROUP**

After watching the video, facilitate a class discussion about how human population growth has contributed to the development of the ocean garbage patches. Guiding questions to help facilitate this discussion might be:

- What patterns in human behavior can you identify that cause the plastic waste problem affecting our oceans?
- What does it mean when we talk about human consumption?
- What does it mean when we talk about per-capita consumption?
- How does increased human population growth and per-capita consumption contribute to the garbage patches found in the ocean?



## EVALUATE

There are multiple ways to assess your students' understanding of this topic. The exit ticket is an opportunity for students to use the science ideas they built in the lesson in a new context. Alternatively, you can use the Kahoot! quiz (which provides downloadable scores at the end of the game) and/or the paper quiz. All these resources are located right below the video in the assessment section.



## EXTENSION

Ask students to write a paragraph that proposes a solution to our plastic waste problem in our oceans supported by evidence and scientific reasoning. Allow students to discuss in small groups their proposed solutions and how this will positively impact living things before writing their paragraphs individually. When finished, ask students to share out their proposed solutions and respectfully argue and question the positive impacts and what it will take to make these solutions a reality.

