

Lesson 6: What impact do increasing greenhouse gases have on living things and the world?

HS Climate and Resiliency Unit

Previous Lesson....Where we've been: We figured out that human activity is contributing to changes in global climate and wondered if we can see the effects of this around the world right now.

 This Lesson....What we are doing now: This lesson explores case studies to learn about the ways climate change is currently impacting people and other living things around the world.			
Lesson Question	Phenomena	Lesson Performance Expectation(s)	What We Figure Out (CCCs & DCIs), <i>New Questions and Next Steps</i>
<p>L6: What impact do increasing greenhouse gases have on living things and the world?</p> <p>2 periods</p>  <p><i>Building toward</i> ↓ <u>NGSS</u> <u>PEs:</u> HS- ESS3-4</p>	<p>Climate Change Case Study Articles</p>	<p>Obtain and communicate information by reading and summarizing articles illustrating examples of how increased global temperatures are affecting humans and the environment and the actions humans are taking to mitigate these effects</p>	<p>Last class, we came up with an explanation for how human activity is causing the changes in global climate. We wondered how this is currently affecting people around the world and what people are doing about it.</p> <p>We decide that we need to look at case studies of the global climate change effects now. We examine several case studies about populations of humans or other organisms who have already been affected. We divide into partners and each read a case study about one of the following topics:</p> <ul style="list-style-type: none"> • Agriculture and food • Real estate • Temperature and health • Entire communities already experiencing sea level rise, loss of land • Storms and weather • Tourism • Coral reefs • Biodiversity in oceans, ocean acidification • Drought and water cost • Fraser River in CO, erosion rates • Renewable energy, things people are already doing • Green roofs • Individual behaviors • Food waste <p>We figure out from all of our groups that climate change impacts are happening now, but that there are also solutions people around the world are already looking into.</p> <p>We're worried.... We are already seeing massive impacts around the globe and we are wondering: What can we do?</p>

Next Lesson....Where we're going: What can we do to mitigate the impacts and effects of climate change? We will then begin to brainstorm ideas for our Design Challenge.



Getting Ready: Materials Preparation

Materials For Each Group

- Copies of the case study [articles](#) for small groups (2-3 students per article)
- Poster or butcher paper
- Markers

Preparation of Materials (15 min.)

- Visible Driving Questions Board
- [Slides](#)

Materials For Each Student

- [Student Activity Sheet](#)

Safety



Getting Ready: Teacher Preparation

Background Knowledge

ESS3.C from the FRAMEWORK:

By the end of grade 8: Human activities have significantly altered the biosphere sometimes damaging or destroying natural habitats and causing the extinction of many other species. However, changes to Earth's environment 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.

ESS3.D from the FRAMEWORK:

By the end of grade 8: Activities such as the release of Greenhouse Gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior, applying that knowledge wisely, decisions, and activities.

ESS3 from the FRAMEWORK:

“Thus science and engineering will be essential both to understanding the possible impacts of global climate change and to informing decisions about how to slow its rate and consequences...”

Rate of and region of change matters for understanding climate change. Cities are changing faster because of their characteristics - localized amplification because of things black tops, resulting in heat islands in cities. However, this isn't the entire explanation for climate change. Overall, regionally and globally human activities are increasing CO₂ and Greenhouse Gases, which result in global warming.

Alternative Student Conceptions

Students may come into this lesson thinking that climate change isn't going to impact them or that there is not something they are able to do about it. At the end of the lesson, students should be convinced that climate change is impacting human populations currently and there are already examples of how humans can mitigate the impacts of climate change.

Linking Our Understanding to Scientific Terminology

- Climate
- Trend
- Climate Change
- Global Warming





Learning Plan: What impact do increasing greenhouse gases have on living things and the world? (45 - 90 min)



Teacher Supports & Notes

1. (5 min) Begin with a Do Now to reorient students to the storyline:

Suggested Prompts:

- How do we know climate change is affecting humans or other organisms?
- Can you think of any examples of how climate change could be currently impacting humans?

Ask students to share their ideas and create a class list of ideas.

Listen for and capture student responses, such as:

- *Human health impacts of increased temperatures*
- *Biodiversity loss due to habitat loss*
- *Droughts*
- *Extreme weather*

2. (5 min) Lead students in an Initial Ideas Discussion^A so that they come to the idea of examining case studies about how global climate change is currently impacting populations of humans and other organisms.

Suggested Prompts:

- How do we go about gathering evidence and information of the effect of climate change on human populations?
- What specific kinds of information are we looking for?
- What do we hope to figure out with this information?

Listen for student responses and capture the ideas for everyone to see:

- *Want examples of climate change impacting humans*
- *Need news media sources*
- *Want to figure out if climate change is a problem humans needs to be concerned with and do something about it*

4. (25-35 min) Once students have decided to use different news media sources and articles to research documented and observed examples of events caused by climate change and then share information with each other, share the document with them that has sources students can use. Instruct students to work in small groups of 2-3 to read and annotate a selected article. Students will complete PART ONE of their Student Activity Sheets after reading article in preparation for their summary poster.



Strategies for this Initial Ideas Discussion

A: The goal here is that students decide they want to read about documented and observed effects of climate change that have already happened. They are going to jigsaw and then create a poster to share information.



5. (10-15 min) After reading assigned article and completing PART ONE of the Student Activity Sheet, students will continue to work in small groups to create a summary poster. Then, share the information and obtain information from other groups through a gallery walk. Give students 10-15 minutes to create their summary posters. Summary posters should include:

- Title of climate change related issue or topic
- BRIEF description of climate change related issue or topic that includes WHO is being impacted, WHY this is occurring, WHAT is being done or can be done to mitigate impacts
- Facts and/or data from article to explain climate change related issue or topic

6. (10-15 min) Guide students to share information from their article and obtain information from other groups through a gallery walk. Have students complete PART TWO of the Student Activity Sheet as they obtain information from other posters.

7. (10-15 min) Lead students in a Building Understandings Discussion to share out things they notice from the gallery walk and to determine next steps.

Suggested Prompts:

- What have we figured out or noticed today?
- What questions do we still have?
- What should our next step be?

Listen for student responses and capture the ideas for everyone to see:

- *Climate change is currently impacting humans in various ways*
- *List specific examples student state from articles*

Ask students what questions the report brings up so far that we need to add to the Driving Questions Board^B.

Suggested Prompts:

- What questions should we add to our Driving Questions Board? Which ones should we prioritize now?

Listen for student questions:

- *What can we do to mitigate the impacts of climate change in our area?*
- *What can we do to slow down the current rate of global climate change?*

8. (5 min) Before dismissing students, ask student to brainstorm what our next steps should be for class tomorrow.

Suggested Prompts:

- What should we make sure to do in our next class?
- What do we need to investigate next time?



Additional Guidance

B: It is important that students end this lesson with motivation and fuel to come up with solutions. If your students seem like they are feeling defeated, shift the focus of the discussion to proposing solutions rather than discussing all the things that are going wrong and feeling defeated. You want to empower students to move into the design challenge unit.



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Listen for *student responses* such as:

- *We think that we should begin to brainstorm ideas about what we can do to reduce the impacts of the current rate of climate change.*



Alignment With Standards

Building Toward Target NGSS PE

- **HS-ESS3-4:** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Building Toward Common Core Standard(s)

- **RST.11-12.2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **RST.11-12.7:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

