

2022
EDITION



Next Generation Climate

Grades 6-8



Lesson 5: In what ways can the repercussions of climate change be minimized?

Minimize your impact



<i>Age Level</i>	Grades 6-8
<i>Time Needed</i>	Three 50 minute class periods
<i>Materials</i>	Impacts, Mitigation, Adaptation Prompt Lines (1 for class) Mitigation and Adaptation Venn Diagram (drawn on board) Worksheet: Adaptation & Mitigation Scenarios (1 for each student) Worksheet: Claim, Evidence, Reasoning (Mitigation and Adaptation) (1 for each student)
<i>Vocabulary</i>	mitigation: Technology changes that reduce emissions, reduces or prevents greenhouse gas emissions. adaptation: Adjustment in natural or human systems to a new or changing environment that moderates negative effects, reduces harm to the environment. resilience: The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.
<i>Student Learning Outcomes</i>	<ul style="list-style-type: none"> • Students will be able to explain the difference between adaptation and mitigation, and provide many examples of each. • Students will be able to debate about the positives and negatives of mitigation and adaptation solutions using the CER framework.
<i>Performance Expectation(s) addressed</i>	<p>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 system.</p> <p>MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p>
<i>Educator Prep</i>	<ul style="list-style-type: none"> • Make one copy of <i>Impacts, Mitigation, Adaptation Prompt Lines</i>. • Make copies of <i>Adaptation & Mitigation Scenarios</i> worksheet for each student. • Make copies of <i>Claim, Evidence, Reasoning (Mitigation and Adaptation)</i> worksheet for each student. • Create and post two signs on opposite walls in your classroom. Signs will say “Impacts of Climate Change” and “Actions to Combat Climate Change” and will be used for the Impacts, Mitigation, and Adaptation Activity.

Background Information

Students will apply the information they learned in Lesson 2 about making claims in this lesson. They will research and discuss/debate the many ways of minimizing the effects of climate change. Refer to the CER discussion in the front of this curriculum for more information (page vi and vii).

There are many terms that are used when discussing climate change solutions. Making students aware of the terms and differences between them is important to their understanding of solutions. Mitigation is often used when discussing possible solutions. *Mitigation* involves reducing the severity or seriousness of a problem. We can mitigate the effects of climate change by creating more fuel efficient vehicles or using renewable energy. *Adaptation* means adjusting to new conditions. This means that the effects are already occurring. While mitigation is concerned with reducing future effects, adaptation is taking action on the current issues at hand, recognizing that they are already occurring. We can adapt to a changing climate by making upgrades to sewer systems for increased rainfall during storms. These actions will lead to more resilient communities therefore allowing those communities to recover quicker from the repercussions of climate change.

Lesson 5: In what ways can the repercussions of climate change be minimized?

Minimize your impact

Keep in mind that there are actions that adapt and mitigate the effects of climate change at the same time. These actions include planting trees (they reduce emissions through photosynthesis and provide shade from the heat for animals and humans) and building or expanding a mass transit system in a city (this reduces emissions by eliminating cars on the road and reduces harm in the same way).



Journal Activities

In their journals, students will have definitions of mitigation and adaptation, a drawing of a venn diagram with mitigation and adaptation examples, and a paragraph arguing for mitigation, adaptation, or a combination of both.

Activity Description

Introduction:

1. Ask students if they have heard of the words adaptation or mitigation. Have them do a think-pair-share (think about what the words mean and write a definition in their journal, pair up and talk to their partner about their definitions, and share with the class). Let the class discuss and explain how they came up with their definitions. We will come back to this after a couple of activities. Leave space on this page to write the final definition later.
2. Show students a video that illustrates what they would need to minimize their impacts and the impacts of others. These three videos will help introduce the terms adaptation and mitigation and can be found at <http://www.climategen.org/ngconline>.

- a. *Climate Change 2014: Mitigation of Climate Change* would be great to use with older or advanced students. This video discusses where greenhouse gases come from, what future climate change will look like, and how humans can mitigate for a cleaner future. It discusses these things from a science and social studies perspective.
- b. *Climate Change Adaptation and Mitigation* are shorter and focus on the definitions of adaptation and mitigation and how they are being used to combat climate change

The scientific understanding of climate change is now sufficiently clear to justify taking steps to reduce the amount of greenhouse gases in the atmosphere.

- U.S. National Academy of Sciences

Activity 1: Impact, Adaptation, Mitigation Activity

1. Post two signs on opposite walls in your classroom: "Impacts of Climate Change" and "Actions to Combat Climate Change."
2. Have students get into groups of two. Pass out one of the prompts from the *Impacts, Mitigation, Adaptation Prompt Lines* sheet to each set of partners. Explain that the students will need to discuss their prompt with their partner, move closer to the wall that best fits their prompt, and be able to justify their response.
3. Draw the *Venn Diagram* on the board or make one on a large piece of paper. Have students with the Actions to Combat Climate Change place their prompt in the Venn diagram that best describes their prompt (mitigation, adaptation, or both). Have students with Impacts of Climate Change statements decide which of these actions would combat their impacts and have them include their impact in the correct circle. Before moving on, have students draw the Venn Diagram in their journals with all responses included.
4. Have a discussion about why students placed their impacts and actions where they did. Come up with other examples of ways to mitigate and adapt to climate change. Are there mitigation and adaptation techniques on these lists that you could participate in?
5. Next, the students will examine the *Adaptation and Mitigation Scenarios* worksheet in groups of 4 (two sets of partners). For the first task, students will examine two scenarios, identify the climate change impact, and the adaptation or mitigation actions that took place. Students will also explain why they are actions of mitigation and/or adaptation. In the second task, students will create their own Climate Change Scenario that includes an impact, a response to mitigate and/or adaptation to the situation, and an explanation.

Lesson 5: In what ways can the repercussions of climate change be minimized?

Minimize your impact

Activity 2: National Climate Assessment Part II

1. Return to the introduction at the beginning of this lesson, ask students to take out their journals. Ask students to write out the definitions of adaptation, mitigation, and resilience (see vocabulary section).
2. Students will use the National Climate Assessment again, but this time they will be finding ways people are minimizing the impacts of climate change. Within the NCA Report, students will click on ‘Response Strategies.’ There are five areas that the students can look at to find out what option they think is the best to minimize climate change: Decision Support, Research Needs, Sustained Assessment, Mitigation, and Adaptation. For lower grades, use just the mitigation and adaptation sections. (This will avoid confusion for students and keep them focused on choosing just one of the ideas, but still be able to find evidence to back up their position.)
3. Students will be collecting evidence that supports a claim they make about what response is best, mitigation or adaptation. Students will use a similar worksheet as in Lesson 2. The worksheet for this lesson; *Claim, Evidence, Reasoning (Mitigation and Adaptation)* does not have an area for data collection but still provides an outline for their claim, evidence, and reasoning. After finding data, ask students to make their claim. They will then cite evidence from the NCA site and explain their reasoning to finish the worksheet.

Conclusion

Using the *Claim, Evidence, Reasoning (Mitigation and Adaptation)* worksheet, students will discuss and debate which strategy they claimed is ‘best.’ They will need to utilize their evidence and reasoning as they talk with their classmates. Ask students to write in their journals a paragraph arguing for mitigation, adaptation, or a combination of both.

Extensions

Ecological Footprint Quiz

1. Have students take the Ecological Footprint Quiz to see what their impact is on the earth. They will answer the question: How many tons of CO₂ do I use per year? After the quiz, students will think of ways they can minimize their impacts, including ways to mitigate and adapt.
2. Students will go to the following website: <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/>
3. Directions to take the quiz:
 - a. Enter Basic or Detailed Information for each category (encourage students to enter as much Detailed Information as they can, as their results will be more exact.)
 - b. The quiz will collect information from the following categories: your food (where and what you eat), your home (recycling habits, dwelling type, energy usage), your mobility (car mileage and mpgs, public transit usage, and flights). The results of this information will give students their collective ecological footprint on the planet.
 - c. When they have completed the quiz, students will review their results.
4. Students will need to edit parts of their quiz to see how they can change their footprint. They need to write in their journals about how they could minimize their impact (what they will need to do, how much their impact changed). They should have 4-5 items written down about what they changed and how their impact increased or decreased. They can also reflect on the activity with this question: what things caused the most dramatic changes in your footprint? Answer in a detailed paragraph.
5. Facilitate a discussion about what things they can do after seeing their results.

Watch “Minnesota Stories in a Changing Climate.”

1. This one-hour video discusses six Minnesotans and their stories about impacts of climate change on their lives and how

Lesson 5: In what ways can the repercussions of climate change be minimized?

Minimize your impact

they are adapting or mitigating to those changes. Find it at <https://www.climategen.org/climate-change-resources/mn-stories-in-a-changing-climate/>

2. During the video, students should take notes in their journals. Have students make a T Chart in their journals. Write “Monitor” on one side and “Minimize” (also list if it is a form of adaptation or mitigation) on the other.

3. After the viewing, use the TPT video discussion guide to ask students questions and have a discussion about the video. Use the discussion questions featured in each section.

4. If you aren't in Minnesota think about how these stories are similar or different to those you might tell in your state.

Resources

What's your favorite carbon calculator? <http://www.climategen.org/blog/carbon-calculators-reviewed/>

References

Impacts, Mitigation, and Adaptation Prompt Lines and Adaptation and Mitigation Scenarios adapted and used with permission from Region of Peel Integrated Planning Division. https://www.peelregion.ca/planning/teaching-planning/pdfs/2_Impact_mitigation_and_adaptation.pdf

Impacts, Mitigation, and Adaptation Prompt Lines

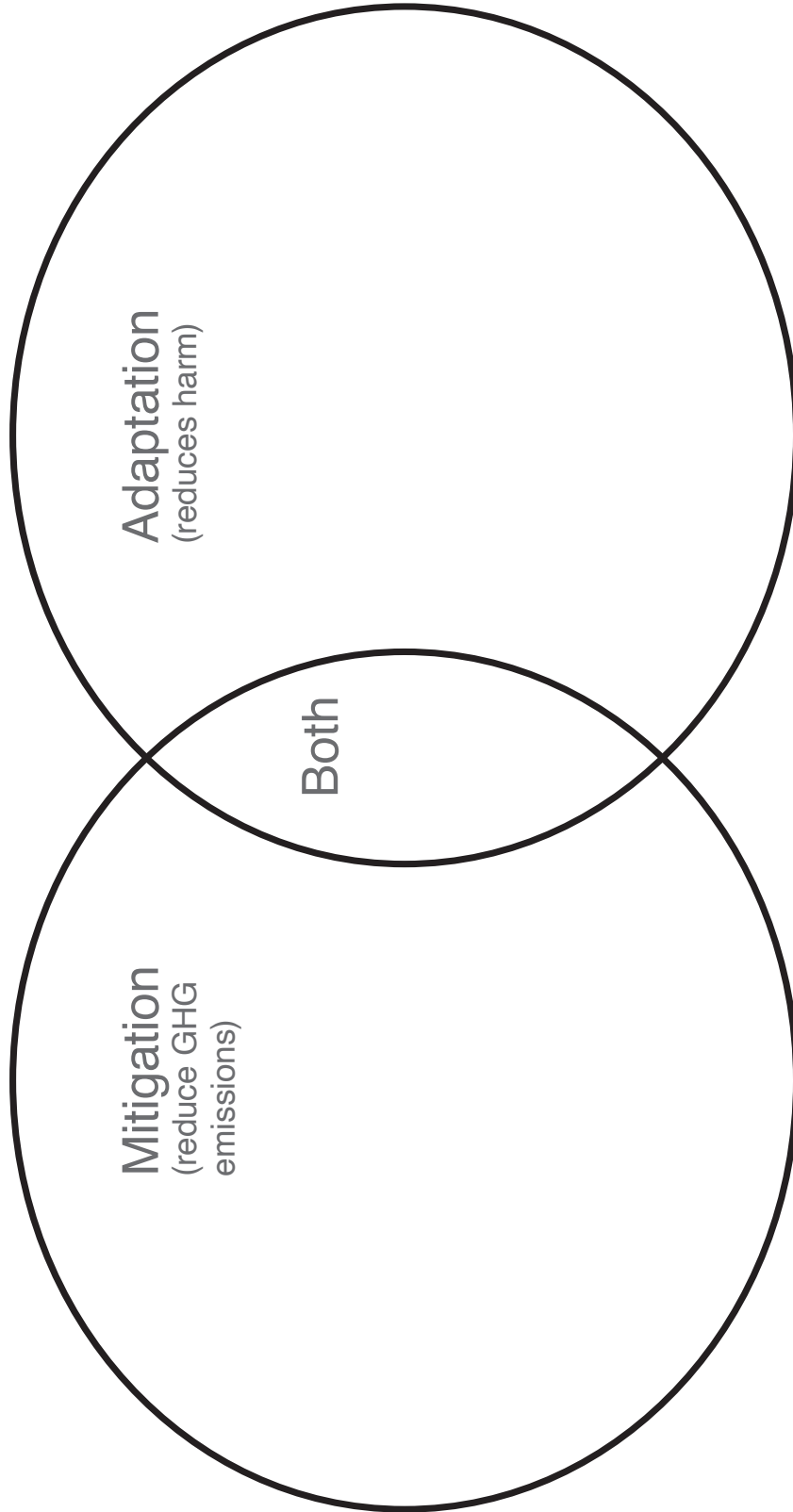
1. Intense high wind weather event hits the St. Cloud area of Minnesota. Wind storm causes damage to homes and businesses. Roofs and cars are damaged. Clean up costs exceed \$2 million.
2. Increase in seasonal snowfall causes high runoff of snowmelt; resulting in flooding of Minnehaha Creek. Basements are flooded.
3. Record heat wave hits Chicago. Power outage occurs due to high demand to power cooling systems.
4. Midwest farmer loses crop due to extreme ice storms; three years in a row.
5. The numbers of leopard frogs found in the wetland are slowly decreasing.
6. The Sioux Falls area hosts a community Tree Planting Day.
7. The City of Rochester, NY upgrades sewers, culverts and overland flow routes for extreme rainfall.
8. The City of Portland, OR expands the transit system.
9. The City of San Francisco builds more biking and walking paths. A new website includes an interactive map that will allow cyclists and walkers to plan their trips.
10. A new recycling plant is built and it is heated and cooled by ground source heat pumps (no direct use of fossil fuels).
11. A Solar Thermal Hot Water system is installed at Children's Hospital.
12. There are indoor recreation programs offered on extreme heat days.
13. Two children's splash pads are built in the area.
14. One acre of forest land is donated to the City of St. Louis. The land will be protected as parkland.
15. Drive-thrus are no longer permitted in the Downtown areas of Seattle.
16. Cooler uniforms are given to staff working outside in the summer.

Suggested answers: (I- 1, 2, 3, 4, 5) (A- 6, 7, 10, 12, 13, 16) (M- 6, 8, 9, 10, 11, 14, 15)

Adapted and used with permission from Region of Peel Integrated Planning Division.



Mitigation and Adaptation Venn Diagram



Student Worksheet: Adaptation and Mitigation Scenarios

Task 1: Examine the scenario below. Identify the climate change impact, and the adaptation or mitigation actions that took place. Explain why they are actions of mitigation and/or adaptation.

Scenario 1: Due to extreme ice storms over the past month, a 70 year old woman is unable to purchase groceries. She calls a local food bank organization to deliver her food to her apartment.	
Impacts:	Why is this a climate change impact?
How was the impact adapted and/or mitigated:	Why is this action considered to be a mitigation or an adaptation to climate change?
Scenario 2: Increased temperatures over time in Caledon has lengthened the growing season for the farmer. The farmer has calculated that the crop can be grown twice during the season. This will double his farming profits.	
Impacts:	Why is this an impact?
Adaptation/Mitigation or both:	Why is this action considered to be a mitigation or an adaptation to climate change?

Task Two: Create your own Climate Change Scenario that includes an impact and a response to mitigate and/or adapt to the situation. Explain your thinking. If necessary, you may use resources around the classroom or the internet.

Adapted and used with permission from Region of Peel Integrated Planning Division.



Student Worksheet:

Claim, Evidence, Reasoning (Mitigation and Adaptation)

After searching for information about adaptation and mitigation, write a claim that answers the question: What is the best option for minimizing the repercussions of climate change?

Claim

(Write a sentence stating the best option for minimizing impacts of climate change? Be as specific as possible and include if your option is an adaptation or mitigation technique.)

Evidence

(Provide scientific data to support your claim. Use evidence (graphs, tables, etc.) from the National Climate Assessment website.)

Reasoning

(Explain why your evidence supports your claim. Why is your evidence important? Describe what it means to minimize certain impacts and why your evidence allowed you to determine that your option is the best one.)

