



# GLACIERS AND FEEDBACK (Part III)

**GRADE** Grade 8

**PART** 3 of 3

**TOPICS** Climate change, glaciers, water cycle, feedback loops, greenhouse effect

## CURRICULAR CONNECTIONS

Grade 8 Science

Unit E – Freshwater and Saltwater Systems

2. Investigate and interpret linkages among landforms, water and climate
  - Identify evidence of glacial action, and analyze factors affecting the growth and attrition of glaciers and polar ice caps
4. Analyze human impacts on aquatic systems; and identify the roles of science and technology in addressing related questions, problems and issues
  - Illustrate the role of scientific research in monitoring environments and supporting development of appropriate environmental technologies
  - Provide examples of problems that cannot be solved using scientific and technological knowledge alone

## OVERVIEW

In Part I and Part II of this lesson, we explored how glaciers form and the impact that climate change is having on alpine glaciers. In this final part, we turn our attention towards better understanding how people can adapt to and mitigate the effects of climate change on glaciers. The activities that follow help students better understand how human values shape our responses to scientific information and how we can craft messages to convey the importance of responding to the threats posed by climate change.

## OBJECTIVES

- Students will learn to distinguish between the root causes and symptoms of a problem
- Students will understand the difference between actions that are mitigations for climate change and those that are adaptations
- Students will understand the importance of a well-crafted message when communicating the science and impacts of climate change

## KEY TERMS

- **Adaptation** – the process of changing to suit different conditions
- **Mitigation** – the action of reducing the severity or seriousness of something
- **Net-zero building** – a building with zero net energy consumption, meaning that the total amount of energy used by the building in a year is equal to the amount of renewable energy created on site
- **Root cause** – the main underlying reason for a problem
- **Symptom** – the reaction to a problem

## GUIDING QUESTIONS

- Is your individual energy better spent addressing the symptoms of climate change or the root causes? Why?
- What are strategies that we can use to communicate the science of climate change to diverse audiences?

## BACKGROUND ESSAY

When we think about tackling the challenges posed by climate change, it is important to make the distinction between **adaptations** and **mitigations**. Mitigations are actions that are taken to address the **root cause** of climate change by reducing greenhouse gas emissions. Adaptations on the other hand seek to address the symptoms or impacts of climate change and reduce our vulnerability to its effects. By understanding the predicted impacts of climate change we can make changes to be better prepared. Both mitigations and adaptations are important considerations for our communities to address the threats posed by climate change.



### GO BEYOND

**Hot Planet, Cool Athletes** is a not-for-profit, charitable organization dedicated to educating and inspiring the next generation of climate champions. The goal of the program is to inspire high school students to be climate leaders in their schools, communities and beyond. You can book a program in your school by visiting [www.hotplanetcoolathletes.ca](http://www.hotplanetcoolathletes.ca).

In Part I we learned that glaciers are an important freshwater resource, especially for irrigation. By improving water infrastructure and water use efficiency in agriculture, farmers can increase their resiliency to dry periods that are expected to become more common in the future. In areas that rely on glacier meltwater for hydropower, communities can explore alternative forms of energy production such as biomass generation or wind power. And finally glaciated areas that rely heavily on tourism can look into expanded forms of tourism. Adaptation is an important piece of the puzzle, especially given the uncertainty surrounding climate change timelines and feedback loops.

There are many actions that individuals can take to mitigate climate change with the goal of slowing down the worst predicted impacts. The actions that are the most realistic and the most impactful will differ from person to person. What matters most is that we all do what we can to create the largest impact. Some actions that address the root causes of climate change – greenhouse gas emissions – include:

- Eating less meat
- Choosing alternative transportation wherever possible, such as carpooling, walking or biking instead of driving alone or flying
- Buying only what you need and reusing whenever possible
- Considering who you can influence and what is the best way to do so, such as friends, family and lawmakers

**DURATION** 20-30+ minutes

### MATERIALS

- Agreement signs (optional)
- Tape
- “Take a Stand” prompts

### ACTIVITY – TAKE A STAND

This activity asks students to respond to a number of provocative statements on climate change. It will challenge students to explore their attitudes and opinions and those of their classmates on complex environmental and social challenges.

1. Identify an area in the programming space where students can stand along a line, a U-shape or in designated areas. Place “*Strongly Agree*” and “*Strongly Disagree*” signs at opposite ends of this line or designated areas.
2. Before beginning, outline to students the importance of showing respect to classmates and others who hold opinions that differ from their own. Ask students to offer their opinions or stance using “*I*” language, rather than the more accusatory “*you*.”
3. Explain to students that you are going to read a statement. You will give the students a few seconds to reflect on the statement and then they will move to a spot along the line that represents their opinion on the statement. Tell them that if they stand at the far end, they are indicating that they firmly agree or disagree. They may stand anywhere between the two extremes, depending on how much they do or do not agree with the statement. *You may wish to begin with one or two statements*



that are simple in order to ensure that students understand the activity, for example “cats are better than dogs.”

4. Invite students to explain why they have chosen to stand where they have and encourage the students to refer to examples and evidence when they explain their position. Emphasize that there is no wrong or right position.
5. After several viewpoints have been shared, ask the students if anyone would like to move. Encourage students to keep an open mind; they are allowed to move if someone else presents an argument that alters where on the line they want to stand. Ask students to respond to statements made by their peers.



### CASE STUDY

How do the opinions of your students compare to those of adults across Canada? The Yale Program on Climate Change Communication created the Canadian Climate Opinion Maps, which estimates and visualizes differences in perceptions, attitudes and support for climate policy across the country, riding by riding. View the map at [bit.ly/3aA1cU1](http://bit.ly/3aA1cU1).

### Extension Activities

6. Lead a discussion about the clash of opinions that resulted from sharing different perspectives on issues related to climate change.
  - a. What are some of the underlying values that might inform people’s opinions? Brainstorm strategies for overcoming these differences of opinion.
  - b. Ask students about what would happen if you took a vote on the statement in question. Ask the students who lost how they feel about the outcome.
  - c. Challenge students to modify the statement in a way that everyone in the group can agree on the statement. Students should recognize strategies to help them find common ground on the issue.
7. Have students pair up with someone who had a different opinion than their own. Invite students to find out why their partner stood where they did and to understand their perspective.
8. This activity can be used to set up a class debate on an issue. Choose a statement that has created a clear divide among the group. Have each side formulate their arguments, which they can then present to the other side using a debate format.  
**Note: Avoid debating whether climate change is human-caused, as this may lead to students developing conclusions that are rooted in bad science or misinformation. Facilitate a discussion about developing persuasive arguments and citing reliable sources and facts prior to conducting research for this debate.**

### “Take a Stand” prompts

- Climate change is the most pressing challenge facing the world today.
- Earth’s climate has changed in the past and therefore we don’t need to be too concerned with climate change.



- Humans can solve climate change using technology alone.
- Humans can solve climate change without compromising their quality of life.
- Humans have a moral responsibility to solve climate change.
- Drought and extreme weather conditions attributed to global warming are really just part of the natural fluctuations of the global climate system.
- Canada should immediately cease all oil and gas extraction.
- When it comes down to it, protecting jobs in the short run is more important than protecting the environment for future generations.
- Automobile manufacturers should be required by law to produce only electric vehicles, even if it costs the consumer more.
- People should be required by law to recycle and compost their waste.
- Wealthy countries who emit more CO<sub>2</sub> should be required to pay developing nations that are more impacted by climate change so that they can adapt.
- Canada should increase taxes on carbon-based fuels in order to offset emissions.
- All new buildings should be built to **net-zero standards**



### KEEP READING

The Alberta Narratives Project (ANP) is a community-based initiative that aims to uncover language and narratives that reflect the values and identities of Albertans, and to find ways of talking about our energy-climate future that build bridges to better community conversations. The ANP produced two reports that are intended to provide practical guidelines for climate and energy communicators about what language works well and what language might pose an obstacle for communicating with any specific group. Learn more by visiting [www.albertanarrativesproject.ca](http://www.albertanarrativesproject.ca).

### BACKGROUND ESSAY

While 97% of scientists agree that the earth's climate is changing and that these changes are caused by human activities, only 70% of Albertans believe that the climate is getting warmer. That is 13% below the Canadian average, according to a 2018 Canadian Climate Opinion Map created by the Yale Program on Climate Change Communication. Being able to communicate the science of climate change to our peers, neighbours and society at large is a vital skill.

Furthermore public opinion on climate change is an incredibly important input for the development of climate change mitigation and adaptation policies. Without public support, governments will face much more pushback for introducing measures like carbon taxes that are meant to offset carbon emissions and will therefore be less likely to take the decisive action necessary to curb emissions.

While communicating accurate scientific information is incredibly important, we should also consider the language that we are using and the way that we are framing the conversation. If people are confronted with scientific evidence that appears to attack their values, they are much more likely to become defensive. In turn, they may consider the evidence they are receiving to be flawed, thus strengthening conviction in their prior beliefs.

Consider this: we have learned that glaciers are melting at an unprecedented rate due to the enhanced greenhouse effect. This is already contributing to more severe droughts, increased forest fires,



and changing access for recreation. Rather than talking about the science of climate change to your audience, present information in a way that takes their values into account. Communicating with a farmer? Talk about changes in access to water or the consequences of warmer winters. Communicating with a backcountry skier? Discuss changing access to sought-after routes or traverses and heightened danger due to new crevasses. In order to teach, inform and connect with people, we need to be effective storytellers.

**DURATION** 60+ minutes

**MATERIALS**

- Internet access

**ACTIVITY – COMMUNICATING THE SCIENCE OF CLIMATE CHANGE**

In this activity, students will assume the role of a climate scientist trying to address misconceptions about climate change. Students can identify their own misconceptions or choose from a list.

1. Students will choose (or be assigned one) from the following list of misconceptions about climate change, or identify their own.
  - The Earth’s climate has always changed, this is no different
  - Plants need carbon dioxide and more is better
  - Global warming can’t be real because it is still cold in the winter
  - Climate change is a problem that is in the future
  - Renewable energy can only work when it is windy or sunny
  - Animals will adapt to climate change
  - China emits more carbon dioxide than Canada, so why should Canada be responsible for dealing with climate change
  - Climate change is due to sunspots
2. Ask students to research and write a letter refuting the misconception that they have chosen. Students should try to understand the underlying assumptions and values that have led to people adhering to this misconception. What is the evidence or reasoning behind the misconception and how will you refute it using scientific reasoning? Alternatively, students can present their arguments in any number of ways such as a class presentation, a letter-to-the-editor, or an opinion piece for the local newspaper.
3. *Extension: Explore creative ways to have the students share what they have learned with the school or the community.*

**REFERENCES**

Climate Reality Project. (2017, November 09). *Communicating climate change: focus on the framing, not just the facts*. Accessed 1 April 2020. [www.climaterealityproject.org/blog/communicating-climate-change-focus-framing-not-just-facts](http://www.climaterealityproject.org/blog/communicating-climate-change-focus-framing-not-just-facts)



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Mildenberger, M., Howe, P., Lachapelle, E., Stokes, L., Marlon, J. & Gravelle, T. (2016). *The Distribution of Climate Change Public Opinion in Canada*. PLoS ONE 11(8): e0159774.