



Learning Activity:

Climate Trackers

Activity Type	Developing models and interpreting data patterns
Focus Areas	Science, social studies
Time Required	60–90 minutes

● Overview

To fully understand the significance of climate change in the Arctic, you must first understand climate. This activity will establish student comprehension of climate and how it's connected to their local way of life. By creating climate timelines, they will be able to visualize the domino effect of negative implications caused by climate change and how those effects are felt all around the world.

● Objective

At the completion of the activity, students should be able to:

- Define weather and climate and how they differ.
- Explain how a region's climate plays a role in livelihoods within the community and environment.
- Predict the future of Arctic sea ice based on climate models and trends.
- Make the connection between the effects of climate change in the Arctic and local peoples' everyday lives.

● Subject and Standards

Next Generation Science Standards

- 3-ESS2-1 Earth's Systems
 - Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- 3-ESS2-2 Earth's Systems
 - Obtain and combine information to describe climates in different regions of the world.



C3 Framework for Social Studies State Standards

- D2. Geo.2.3-5: Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their environmental characteristics.
- D2. Geo.3.3-5: Use maps of different scales to describe the locations of cultural and environmental characteristics.
- D2. Geo.5.3-5: Explain how the cultural and environmental characteristics of places change over time.

Materials Needed

- Markers/writing utensils
- Sticky notes (4 different colors)
- Large paper/poster, 1 per student/group
- Copies of "Arctic Events" (included in this activity), 1 per student/group
- Scissors/glue stick (optional), 1 per student/group
- Computer access
- [Polar Bear Educator's Resource Guide](#) (for background reading)

Vocabulary

- **Climate:** the average condition of the weather at a place, usually over a long term, as exhibited by temperature, wind velocity, and precipitation
- **Climate change:** a change in climate over time due to natural causes or as a result of human activity
- **Fossil fuels:** formed from fossilized remains of prehistoric organisms (most common are coal, oil, and natural gas) and burned to generate energy; the biggest drivers of climate change
- **Greenhouse gases:** gases such as water vapor, carbon dioxide, methane, and nitrous oxide; they absorb some of the sun's heat energy and trap it in the atmosphere, making Earth warmer
- **Positive climate feedback loop:** a cycle that accelerates a temperature rise and an overall warming trend
- **Weather:** the state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness



POLAR BEARS

● Activity Procedure

Part 1: Introduction and Preparation

- Begin by asking students to give examples of weather. Now ask them to give examples of climate. Many students will be puzzled as to what differentiates the two. Use the definitions provided in the vocabulary section of this activity to help clarify this common misunderstanding. Climate is often defined as the weather pattern that is expected, or the long-term average weather conditions during that time of year in that specific location; weather is the short-term weather conditions or what you actually get each day. If desired, display this information and examples on the board for students to visualize.
 - For example, climate in the northeastern area of the United States in January would be expected to be cold and snowy. The weather might be 20 degrees and stormy.
 - To help students understand, you could also say weather determines if you wear a sweater or a T-shirt. Climate determines how much insulation your house should have in the walls and attic.
- Draw four columns on the board with the name of a different season at the top of each column, leaving plenty of space under the columns. Have students provide you with words to describe the climate during each season in your area, writing each word in the appropriate column. When finished, draw a horizontal line to separate those examples from the next step. For example:

	FALL in my area	WINTER in my area	SPRING in my area	SUMMER in my area
Climate	chilly cloudy cool	cold snowy icy	warm windy rainy	hot dry humid
Event				



POLAR BEARS

- Divide the students into four groups and assign each group a season (fall, winter, spring, or summer). Give each group a stack of sticky notes (a different color for each).
- Instruct the students to think of as many things as they can that take place during their assigned season where they live. These could be activities they participate in, events in the town, behaviors of plants or animals, or anything they recall primarily occurring during their season. They should write one event or activity per sticky note (with no repeats). For instance, depending on where you live, the group assigned summer could write examples such as pools open, they go on vacation, or there are more bugs present.
- Once time has expired, instruct one group at a time to place their sticky notes in the space provided beneath the climate words in their season's column.
- Take a few moments to read aloud the examples on the sticky notes and reflect with the students on what they created. Do any of the activities/events on their timeline depend on the climate? Would that activity/event happen during that same time of year if the climate were totally different?
- To better imagine, pick one season and erase the climate words. Instead, write in words that describe the climate as being much different. A great example would be for winter, to instead write words similar to that of spring or summer. Now reread the activities the winter group came up with. Are there any listed that no longer fit and would now be unlikely to happen? If so, remove the sticky note and move it to the season where students think it would better fit.





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Part 2: Activity

Now that students have an introduction to climate and its role in the existence of other livelihoods, they will apply the concept to the Arctic to uncover the magnitude of the effects of climate change.

- You can choose to have students work individually or in groups. Give each student/group a large piece of paper. Replicating the previous class activity, students will start by making a chart with the seasons at the top and describing the climate under each as it relates to the Arctic. You can review this information verbally or have it available to students on a handout or visual.
 - There are two main seasons that exist in the Arctic: the summer and the winter. The winter in the Arctic is the predominant season, usually lasting from September through March. It is extremely cold, and the landscape is very snowy and icy. The temperature increases during the summer months of April through August, and the landscape reveals much more terrain (grassy).
- After they have completed the climate section of their chart, students will then be tasked with sorting various events that take place in the Arctic according to the season in which they would likely occur. These events are listed with descriptions at the end of this activity. You may choose to print out these events and have students cut and paste them into their chart, or simply write them in using the handout as a reference. When determining each event’s place in their chart, students should consider the nature of the activity and the Arctic climate it would need to take place.

	SUMMER in the Arctic	WINTER in the Arctic
Climate	short warmer dry grassy	long very cold snowy icy
Event	Sea ice melts Ocean drilling for oil/gas Shipping traffic Walrus haul out Tourist season Fishing season	Sea ice forms Polar bear breeding Polar bear feeding Seal breeding/nursing



- Once students have finished, review the Arctic events together and have them share how they categorized each. How did they determine when these events would typically occur? Have students answer the following conclusion questions. You may choose to have the questions as a handout assignment or as a class discussion.
 - What does sea ice have to do with events or activities in the Arctic?
 - What do you think happens when the climate changes and there are fewer months when sea ice exists (the winter gets shorter, summer gets longer)? Who would be affected, and how?
 - How does/will climate change affect you?

Part 3: Discussion and Assessment

- Show this time-lapse video from NASA, [Yearly Arctic Sea Ice Age: 1984–2016](#), which shows changing sea ice cover in the Arctic. Have students explain what they're watching. Where is it? What is being depicted? The video shows the average amount of sea ice in the Arctic over the span of approximately 30 years. Encourage students to describe any trends or patterns they notice in the video.
- Explain to students that the climate is changing and temperatures are increasing due to human-induced impacts (you may choose to reference climate change terms from the vocabulary section of this activity). The Arctic and its unique environment are particularly affected; this region is warming twice as fast as the rest of the planet. This is due to the positive feedback loop. Light colors reflect sunlight, and dark colors absorb sunlight. This same concept applies to sea ice. Sea ice (a light color) is able to reflect sunlight back into the atmosphere, while oceans (dark) absorb it. When there is less sea ice, more sunlight gets absorbed into the ocean, causing increasing water temperatures. The warmer water temperatures, in turn, continue to melt sea ice. As long as climate change persists at the current rate, this cycle of increasing temperatures and disappearing sea ice will continue to generate the changing patterns that students uncovered during the activity.
 - In addition, the devastating effects of climate change in the Arctic are felt around the world. As glaciers and sea ice continue to melt, sea levels rise, threatening shorelines everywhere. Rising sea levels contribute to erosion on beaches and could eventually leave many coastal towns underwater.
- Have students generate ideas about how their area and lives are and will continue to be affected and what they can do to help. This information can be found in the "What Kids Can Do" section of the [Polar Bear Educator's Resource Guide](#).



● Extended Learning Options

- Using maps of the Arctic, have students make predictions as to how much sea ice coverage will exist in the future based on current trends.
- If available, use a tablet or smartphone to download the [WWF Together app](#). Encourage students to explore the polar bear segment, which contains interactive modules outlining the difficulties that arise from decreasing sea ice.
- Start a class fundraiser to protect polar bears and other wildlife and their habitats, using WWF's online fundraising tool, Panda Nation. Learn more at [pandanation.org](#).

● Additional Background Info

You can use the information found at the links below to enhance your discussion with the class, or you may want to share some links directly with students if you determine they are grade-level appropriate.

- **Video:** [Climate Change & Arctic Warming](#)—outlines how the melting of the Arctic region is affecting species
- **Article:** [Polar Bears and Climate Change](#)—a short overview of how polar bear populations are affected by climate change
- **Article:** [Record low sea ice impacts polar bears](#)—a WWF researcher's firsthand account witnessing the effects of climate change on polar bears
- **Web feature:** [How big is the Arctic Ocean? And eight other Arctic facts](#)—nine Q&As about why the Arctic is important
- **Article:** [Lack of winter sea ice disrupts life in the Arctic](#)—impacts of one of the lowest-recorded yearly levels of sea ice in the Arctic
- **Article:** [Climate change puts the Pacific walrus population on thin ice](#)—how the receding sea ice in the Arctic is impacting walruses
- **Article:** [Why are glaciers and sea ice melting?](#)—outlines the effects melting glaciers and sea ice have on species and communities around the world

For more fun classroom activities with a focus on wild species and conservation, visit [wildclassroom.org](#).



● Arctic Events

SEA ICE FORMS

When sea ice freezes and covers large areas of the Arctic

SEA ICE MELTS

When sea ice melts and retreats

POLAR BEAR BREEDING

Polar bears gather on sea ice to mate

POLAR BEAR FEEDING

Polar bears patiently hunt for seals off of sea ice

SEAL BREEDING/NURSING

Seals stay on sea ice to give birth to and nurse their pups

OCEAN DRILLING FOR OIL AND GAS

Less sea ice means more open areas to drill deep below for oil and gas

SHIPPING TRAFFIC

With less sea ice, there's more room for ships to navigate through Arctic waters

WALRUS HAUL OUT

Large groups of walrus gather on the shore when sea ice melts, many times hurting each other in the process

TOURIST SEASON

Less sea ice provides more room for cruise ships to travel through the Arctic, allowing people to visit

FISHING SEASON

The Arctic has 4 of the world's top 10 major fisheries and the world's appetite for fish continues to grow