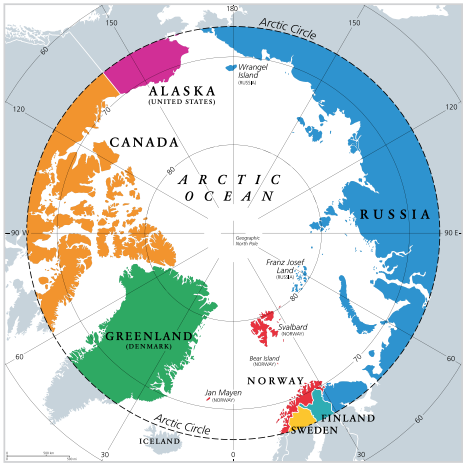
The Arctic, Polar Bears, and Climate Change

The Arctic



When you picture the Arctic, you probably picture deep snow, fierce winds, and ice—lots of ice. While the Arctic can be snowy, windy, and icy, it is also a place with plenty of natural biodiversity.

The Arctic region doesn't have exact borders, but it includes the Arctic Ocean and the land surrounding it, such as parts of Canada, Russia, and Norway. The Arctic Circle, a line of latitude at 66°33'44" North, is often used as a southern border for the Arctic. North of this line, there are multiple types of terrain, including ocean, ice, rocky or mossy tundra, and boreal forests.

The Arctic can be very cold. On a winter day, it might get as cold as minus 40 degrees Celsius (minus 40 degrees Fahrenheit). Compared to Chicago, that is extremely cold. The average temperature in Chicago during the winter of 2021–2022 was minus 1.83 C (28.7 F). During an Arctic summer, a warm day might only be 10 C (50 F). Throughout the year, 60–125 centimeters (24–49 inches) of rain and snow can fall along the coast. Therefore, the plants and animals that live in this region have specific adaptations that evolved over time to survive this extreme environment.

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Arctic Adaptations

Polar bears have many impressive adaptations for surviving in Arctic extremes. For example, they have a layer of dense fat under their skin that can be up to 10 centimeters (4 inches) thick. This fat is called blubber, and it helps keep them warm. Polar bears are also covered in thick fur that keeps them protected from water and cold air. Their paws can be 30 cm (12 inches) wide, and their paw pads are covered in small bumps called papillae, which help them walk on slippery or rocky ground.

Perhaps the most impressive feature of polar bears is their size. A male polar bear can reach almost 600 kilograms (1,300 pounds), making them the largest land carnivore on Earth. They reach this enormous size by mainly eating seals, which are large and calorie-rich. Seals have thick layers of blubber underneath their skin just like polar bears to help keep them insulated from the cold temperatures in the water and on land. Unlike polar bears, seals are adapted to spend most of their time in the water.

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Sea Ice

So how do polar bears catch and eat seals? The answer is sea ice. Sea ice is the ice that forms on the waters of the Arctic Ocean. In some areas of the Arctic, it is cold year-round so there is always a layer of ice on the water. In other areas, sea ice forms when temperatures drop in the fall and melts when the weather gets warmer in the spring and summer.

Seals are mammals, just like humans and polar bears, so they need to come out of the water to breathe. Once ice has formed in large areas, the seals poke their heads out of holes in the ice. Sometimes, they even pull their whole body onto the ice to rest.

Polar bears hunt seals by traveling out onto sea ice and waiting for seals to come up out of the water. This means that sea ice is essential for polar bears to catch the food they need to survive. In the places where the sea ice melts over the summer, polar bears must catch and eat plenty of seals while there is still ice. That way, they build up plenty of blubber in their bodies, and they can use the energy in it to survive during the warmer seasons when they can't hunt seals.

Being well adapted to the extremes of the Arctic has helped polar bears survive, but it also makes them vulnerable to change. It can take thousands of years for animals to adapt to their environment, and when that environment changes quickly, the animals can't always keep up.

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Climate Change in the Arctic

Right now, the Arctic is adjusting rapidly to climate change. As humans burn fossil fuels like oil to make food, power cars, and create electricity, large amounts of carbon dioxide are released into the atmosphere. That carbon dioxide acts like a blanket wrapped around the Earth, trapping excess heat and affecting temperatures all over the planet.

Climate change is especially noticeable in the extreme, cold climate of the Arctic. As excess heat is trapped on Earth by the carbon dioxide "blanket" in the atmosphere, temperatures in the Arctic are increasing faster than anywhere else on Earth. Scientists are finding that as temperatures rise, sea ice is melting earlier in the spring and freezing later in the fall. They estimate that overall, sea ice is decreasing in area by about 14% per decade.

Currently, studies estimate that there are 22,000–31,000 polar bears in the wild, and they all rely on sea ice. Less sea ice means polar bears have less time and space to hunt and eat seals, and a longer period over the summer when they must survive off their stored energy.

Additionally, polar bears need the sea ice to travel, find mates, and sometimes build dens to give birth to cubs. Now that there is less ice, some polar bears are spending more time on land, bringing them closer to humans who live in the Arctic and increasing the potential for dangerous conflicts that could harm humans or polar bears. It is impossible to know what the full effects of climate change will be, but it's safe to say that polar bears will feel the impacts.

Help Protect the Arctic

There are a few ways people can assist polar bears from home. You can help protect the Arctic by reducing your carbon footprint. You can take actions to save energy, such as using less electricity, eating locally produced food or food that is less processed, or taking public transportation to reduce the amount of carbon dioxide being released into the atmosphere. To get an idea of the size of your carbon footprint, use an online carbon footprint calculator.

One of the most important ways to preserve the Arctic from home is to talk to your community. Share your knowledge and concerns with your family, teachers, and community leaders. By educating those around you about the Arctic, you can develop solutions with others that may have a larger impact.

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Vocabulary

Biodiversity
A variety of different types of animals, plants, and other living organisms

Latitude
A coordinate that specifies how far north or south a place is located on Earth

Tundra
Ecosystem in the Arctic Circle known for being extremely cold and having few trees and plants

Boreal forest
Forests in the most northern part of the Earth

Adaptations
Physical or behavioral characteristics that help organisms survive in their environment

Papillae
Small bumps on the skin

Blubber
Layer of fat in animals

Insulated
Protected from losing heat

Carbon footprint
The total amount of greenhouse gases, such as carbon dioxide and methane, generated by our actions

Questions for Discussion/Reflection

1. Polar bears are specifically adapted to survive in the Arctic environment. How might their unique adaptations make it hard for them to survive in the Arctic as it warms?
2. Why does climate change pose such a threat to the survival of polar bears?
3. Describe at least two things you can do to help give polar bears a better chance of survival.

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Further Reading

About polar bears

- https://www.worldwildlife.org/species/polar-bear
- https://polarbearsinternational.org/polar-bears-changing-arctic/polar-bear-facts/diet-prey/
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- https://polarbearsinternational.org/news-media/articles/can-polar-bears-live-on-land

About the Arctic

- https://www.worldwildlife.org/stories/how-big-is-the-arctic-ocean-and-eight-other-arctic-facts
- https://nsidc.org/learn/parts-cryosphere/arctic-weather-and-climate
- https://www.pbs.org/newshour/politics/the-arctic-is-warming-nearly-four-times-faster-than-the-rest-of-the-world

Carbon Footprint Calculator

- https://www3.epa.gov/carbon-footprint-calculator/

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