

# OUR FROZEN WORLDS

## Key Takeaways:

- Sea ice is of immense importance to plants, animals, and people. It provides protection, habitat, and feeding grounds.
- Polar regions seem beyond reach for most of us, but they are not beyond our influence. The Arctic and its unique environment are warming twice as fast as the rest of the planet due to the positive feedback loop. Sea ice reflects sunlight back into the atmosphere, while oceans absorb it. When there is less sea ice, more sunlight is absorbed into the ocean, causing increasing water temperatures. The warmer water then continues to melt the sea ice. As long as climate change persists at the current rate, this cycle will continue. With current levels of emissions, the Arctic could be ice-free in the summer by 2040.
- Life in the poles is not easy. Species that are able to thrive in these environments have adapted survival techniques that help them find food, protect their families, and withstand the cold temperatures. But as climate change continues to threaten the amount of sea ice available, these species are facing new challenges that they may not be able to overcome.
- Polar bears spend over 50% of their time hunting for food. Their dependence on sea ice for traveling, hunting, mating, and resting makes them extremely vulnerable to a changing climate.

- Humans are causing climate change. Greenhouse gases trap heat in the atmosphere and regulate our climate. These gases exist naturally, but humans add more by burning fossil fuels for energy and by clearing forests. These gases act like a blanket; the thicker the blanket, the warmer our planet becomes.

Gentoo penguins in Antarctica live mainly on crustaceans, such as krill. Krill depend on the shelter and algae food source provided by sea ice to survive their first year of life.

## GUIDED DISCUSSION PROMPTS

Use these prompts to generate a class or small-group discussion based on the Our Frozen Worlds episode or on videos on [ourplanet.com](http://ourplanet.com).

- 1** As with all ecosystems around the world, the polar regions rely on plant life and the smallest of creatures to support a larger food web. Discuss a food web example provided in the episode. Who are the producers and primary consumers? How do they benefit the polar regions? What would happen if they disappeared? How does a balanced food web contribute to the health of an ecosystem?

Example from the episode:

*Ice is the soil upon which plant life grows and therefore provides food for grazers such as krill. In Antarctica, algae trapped in the ice begin to be set free upon the ice melting, creating the polar equivalent to grasslands. This attract large amounts of krill, which all the larger creatures such as leopard seals, king penguins, and humpback whales depend on. With sea ice disappearing, the amount of algae produced is reduced, which in turn brings fewer krill and threatens the future of the larger creatures below the sea ice.*

- 2** With the effects of climate change impacting the poles more than any other areas in the world, the species of these regions are making life-altering, risky decisions. Review how climate change is affecting our frozen worlds. Using examples from the episode, discuss some of the decisions different species are making in order to survive in their changing environment.

Examples from the episode:

*Large numbers of walruses are hauling out on a crowded, single beach. Their natural home is on the sea ice, but as it declines, the beach is the closest place to their feeding grounds they can rest. Unfortunately, the shoreline can be up to 250 miles round-trip, and often, young walruses cannot make the trip.*

*A mother ringed seal leaves her pup out in the open, vulnerable to predators such as polar bears. In times past, she would have built a den on the ridge to cover her pup, but the sea ice is freezing later in the season and is melting quicker, making it flatter and providing no time for her to build shelter.*

*Leopard seals escape Antarctica's winter by traveling to South Georgia Island, typically returning to Antarctica in the spring. However, they are now staying away longer while king penguins, their food source, continue to crowd around the island's shores in search of krill and space to raise their chicks.*



## GUIDED DISCUSSION PROMPTS

**3** The polar regions are important to many species that don't live there on a permanent basis. Many marine animals and birds travel long distances to feed or breed at the poles. Discuss why these animals make these long trips to the polar regions, providing examples from the episode. How will the loss of sea ice or other climate change impacts affect these species?

Examples from the episode:

*Albatross travel over the Antarctica seas to feed on nutrients that have been stirred up from the deep by the rough currents and raise their chicks on surrounding land for one year before they're ready to take flight.*

*In the summer, narwhals travel to the Arctic awaiting the break in sea ice that allows them to travel in safety to the shallow bays where their feeding grounds are.*

**4** Why do we need sea ice to help fight against global warming? In the episode, sea ice is referred to as "the planet's protective white shields." Explain this metaphor.

Example from the episode:

*Sea ice plays a vital role in determining the climate of the entire planet. The white surface of the ice reflects the sun's energy back into space, whereas the dark surface of the water absorbs over 90% of the energy and warms the planet, contributing to climate change. For thousands of years, there has been a healthy balance of sea ice forming and retreating. That is now no longer the case, as there is 40% less sea ice cover in the summer than there was in 1980. By 2040, the ocean in the Arctic will be mostly free of ice in the summer months. This loss of ice will inevitably have devastating consequences for all those who depend on it.*

**5** Polar bears are a vital member of the Arctic ecosystem. Discuss the various ways their lives are being affected by climate change and how their absence would cause a decline in the health of the ecosystem.

Example from the episode:

*Polar bears depend on sea ice to hunt, using stealthy tactics to sneak up on their prey. Due to rising temperatures, sea ice is freezing later in the year, making it much flatter. It is more difficult for the polar bears to hunt on the flat sea ice because there is no place for them to hide and sneak up on their prey.*

**6** What can we do to help our frozen worlds and the species that depend on them? What small changes could we make in our everyday routines that could greatly impact the future of the polar regions?



## ACTIVITIES

ACTIVITY IDEA	SUBJECTS
Create a climate timeline and understand just how many components of an ecosystem are affected when climate is altered.— <a href="#">Climate Trackers</a>	Science
Read an excerpt from the diary of a polar bear patrol team member and create a journal entry as if you're part of the team protecting polar bears and people.— <a href="#">My Day on Patrol</a>	Language arts
Understand how our daily uses of energy are connected to the future of polar bears through cause-and-effect modeling.— <a href="#">What's the Connection?</a>	Science
Play a red light/green light-style game that represents the stamina and focus polar bears require to catch a meal and stay alive.— <a href="#">Polar Bear Freeze</a>	Physical education
Conduct a research project that outlines the benefits of using renewable energy versus energy originating from fossil fuels. Present your research in the form of a persuasive argument as if your objective were to convince a panel of government officials.	Language arts
Take the <a href="#">Polar Bear IQ</a> quiz to test your knowledge of polar bears. The more answers you get right, the more polar bears make it across the sea ice! Have students create their own game using facts on climate change and the polar regions.	Trivia game
Start a movement in your school to help protect our frozen worlds by saving energy. Conduct an energy audit at your school and propose a plan to your school administration of ways to improve current sources of energy expenditure.	Social studies

## What We Can Do:

There's so much we can all do. The pollution driving climate change comes primarily from our electricity, our transportation, and our food.

- Switch to renewable energy—if you own your house, you can check out installing solar panels, which are getting cheaper and cheaper, or, more simply, ask your utility to switch you to renewable energy; many utilities can make the change with little to no effect on your bills.
- Change the way you move—you can walk, ride bikes, carpool, or take public transit—even doing these just one more time per week helps.
- Don't waste food—one simple way is to buy only as much as you need, and eat it all. In the US, we waste nearly half of the food we buy, which wastes all the energy that went into producing it, and it often ends up in a carbon emitting landfill.
- Spread the word—talk more about climate change. Bring it up to your friends and family, bring it up to your city council or school. Start holding your leaders accountable for taking action themselves.

## Additional Resources:

- [What is a walrus haulout and what does it mean for the planet?](#)—answers frequently asked questions regarding walrus haulouts, similar to what is shown in the episode
- [3 things you should know about January's record-low Arctic sea ice](#)—simple outline breaking down what is happening with sea ice and the impacts
- [Polar bears and climate change](#)—a full assessment of the vulnerability of these important members of the Arctic to the effects of climate change
- [Polar bear species webpage](#)—facts about this important species including how we can help protect polar bears
- [Arctic habitat webpage](#)—what makes the region unique and why it's in danger
- [Antarctica ecoregion webpage](#)—information on the region's biodiversity and current health status
- [Polar regions habitat webpage](#)—why the poles matter
- [Our Planet official webpage](#)

