

POLAR BEARS

GO WITH THE FLOES

Overview

In this "high-stakes" board game, everyone wins or everyone loses! As they play, groups of three to four children ages 11 to 13 build an understanding of how human actions impact global change. As teams, children play a game in which chance and choice determine the fate of a lone polar bear on an ice floe!

Activity Time

45-60 minutes

Intended Audience

Tweens ages 11-13

Type of Program

- Facilitated hands-on experience
- Station, presented in combination with related activities
- Passive program (with modifications)
- Demonstration by facilitator

What's the Point?

- The choices we make now will affect our world, either positively or negatively, in the future — but not all choices are easy. Some choices require us to make changes in the way we live.
- Human actions have a tremendous impact on the global environment and those ecosystems it supports, particularly the fragile Arctic and Antarctic ecosystems.
- Melting sea ice (floes) not only affects aquatic ecosystems, but mammals and birds and other organisms as well.
- Tweens — working with each other and their families and schools — can make a difference through the choices they make.

Facility Needs

- Areas where groups of three to four children can sit and play a board game

Materials

For the Facilitator

- Scissors

- Tape
- Marker
- Brief Facilitation Outline* (below)
- Background Information* (below)

For Each Group of 3-4 Tweens

- 1 (11" x 17") *Polar Bears Go With the Floes* game board, printed in color (select "fit to size of paper" when printing) (below)
- 1 set of ice floe puzzle pieces (below), printed on cardstock
- OR
- 1 set of ice floe puzzle pieces, printed on paper as a template
- 1 (9" x 12") sheet of white craft foam
- 1 set of game pieces, printed in color on cardstock (below)
- 1 deck of game cards, printed double-sided and in color on cardstock (below)
- A *Rules of the Game* sheet (below)
- 1 die

Supporting Media

Books

Arctic and Antarctic (Eyewitness Books)

Barbara Taylor, DK Children, 2012, ISBN 0756690714

Populated with numerous photographs, this book examines the north and south pole regions — climate, plants, animals, cultures, and exploration — in an engaging beautifully illustrated manner for children ages 8 and up.

The Secrets of the Polar Regions: Life on Icebergs and Glaciers at the Poles and Around the World

Barbara Wilson, London Town Press, 2008, ISBN: 0979975905

Children ages 9–12 will enjoy this exploration of the geology, environment, and ecosystems of the north and south polar regions. Wilson also shares implications of global warming on these delicate systems.

How We Know What We Know About Our Changing Climate: Scientists and Kids Explore Global Warming

Lynne Cherry, Dawn Publications, 2008, ISBN 1584691034

Cherry shares with children 8–12 what global warming is all about and how it is evidenced by the little things around them such as butterflies. Children will learn what scientists have discovered about global warming and how children can make a difference.

Human Footprint: Everything You Will Eat, Use, Wear, Buy, and Throw Out in Your Lifetime

Ellen Kirk, 2011, National Geographic Kids, ISBN: 978-1426307676

Eye-popping facts about the average person's impact on the planet accompany kid-friendly tips for being Green. Appropriate for ages 8-12.

Mission: Save the Planet: Things You Can Do to Help Fight Global Warming!

Sally Ride and Tom O'Shaughnessy, Roaring Book Press, 2009, ISBN: 1596433795
Children ages 9-12 will gain knowledge of how to reduce energy at home and school. Kid-friendly surveys, charts, and activities provide visuals for those who want to conserve energy and help fight global warming.

Interactive Websites

Climate Kids: NASA's Eyes on the Earth

<http://climate.nasa.gov/kids/>

Children ages 8 to 13 may enjoy the information, games, and videos on this award-winning site.

Bill Nye's Climate Lab

www.billsclimatelab.org

Children ages 9 to 13 may enjoy the fun missions and activities — and learn about ways to save energy — on this interactive website.

National Geographic's Global Warming Effects Map

<http://environment.nationalgeographic.com/environment/global-warming/gw-impacts-interactive>

This interactive world map shows likely effects due to global warming.

U.S. Global Change Research Program Impacts of Climate Change by Region

www.globalchange.gov/explore

An interactive map of U.S. states and territories summarizes how climate change affects your region. Appropriate for ages 12 and up.

Videos and TV Shows

SciGirls

www.pbskidsgo.org/SciGirls

Tweens access episodes of the SciGirls TV show, join the kid-safe online social network, and read about other girls' at-home science investigations. The episode "Going Green" and the "Earth Day" and "Reduce, Reuse, Recycle" girls' projects are particularly relevant to the *Explore! Discover Earth* module.

Young Voices for the Planet

<http://youngvoicesonclimatechange.com>

Ages 11 and up may benefit from the information, ideas, and inspiration from watching other young people make a difference in the "Young Voices for the Planet" series of films. The website offers suggestions for replicating their efforts.

Preparation

Six months before the activity

- Prepare and distribute publicity materials for programs based on this activity. If possible, build on the children's knowledge by offering multiple science, technology, engineering, art, and mathematics (STEAM) programs. See the STAR_Net resources listed at <http://community.starnetlibraries.org/resources> for ideas.

The day before the activity

- Review the *Rules of the Game*.
- Make copies of the game board, *Rules of the Game* sheet, puzzle pieces, polar bear cards, and both identical sets of game pieces.
- Cut out a set of ice floe puzzle pieces for each group. To make the foam puzzle pieces, tape the ice floe puzzle pieces template to the craft foam in a few places and cut it out.
- Assemble one set of game pieces out of duplicate sets of animal images: Tape each identical image back-to-back. Fold the game pieces where indicated.

Activity

1. Share ideas and knowledge.

- Introduce yourself and the library. Help the children learn each other's names (if they don't already).
- Frame the activity with the main message: The choices we make now will affect our world, either positively or negatively, in the future — but not all choices are easy.
- Set the stage for the game by discussing what is happening to ice on our Earth. Explain that scientists are observing changes to the ice sheets, glaciers, and sea ice on Earth — most are melting (i.e., getting smaller). Earth's global temperatures are getting warmer, in part, because carbon dioxide (CO₂) and other heat-trapping gases are increasing in our atmosphere. When we drive cars using gasoline or burn coal for electricity, we add carbon dioxide to the atmosphere. In general, the sea ice — the thin layer of ice that forms from the chilled ocean water — in the Arctic is getting thinner and smaller and melting earlier each spring.
- Invite the tweens to contribute to the conversation with prompts such as:
 - What animals living in the Arctic might be affected by the sea ice getting smaller?
 - What ideas do you have about how the changes to sea ice affect the polar bears or other animals?
- Highlight the particular plight of the polar bear. Explain that polar bears rely on sea ice to have dens where they hibernate and where their cubs are born. Sometimes these dens can be several hundred miles from the coastline. They also use the sea ice to hunt seals. If the sea ice melts too much, it will not support their weight as they wait for seals to come out of the water. If the sea ice melts too early, they will not be able to hunt at all when they come out of hibernation. With the decreasing ice, polar bears are having to swim farther distances between the ice.

The tweens may be familiar with arctic animals such as whales, seals, walruses, caribou (i.e. reindeer), foxes, wolves, and polar bears. Gently correct suggestions that penguins are found in the Arctic: penguins live in Antarctica and other continents and islands in the Southern Hemisphere (and penguins are much happier because they have never met a polar bear!).

2. Set up the game and play!

- a. Divide the children into groups of three to four players and distribute the game board, *Rules of the Game* sheets, game pieces, cards, puzzle pieces, die, and polar bears. Show the children how to set up their boards, ice floe puzzles, and the polar bear

for the center of the game board, and invite them to choose their game pieces. Explain that an ice floe is a thin, flat piece of floating ice. They may choose from the following animals:

- Caribou (these animals are called reindeer in Europe)
 - Arctic wolf
 - Beluga whale
 - Walrus
 - Polar bear
 - Ringed seal
 - Orca (killer whale)
 - Snowy owl
 - Arctic fox
- b. Review the *Rules of the Game*.
- c. Play the game!

While they are related, the terms “climate” and “weather” cannot be used interchangeably to describe a region’s environment. Weather can change in a matter of hours or with the seasons, but climate is the typical weather pattern over a long period of time, generally 30 years or more.

The United States consists of several regions that have defined characteristics that are influenced by climate. If you were to travel to a different region, you might expect to pack an entirely different set of clothing than what’s in your closet. Be sure to check the weather report before embarking on your excursion, however; it is the nature of weather to not always fit in with what’s expected for a region! Regions of the United States can be *generally* classified as one or more of the following designations:

- Tropical
- Dry
- Mild
- Continental
- Polar
- High elevations

Your community might be particularly proud of certain characteristics of your region that attract tourists, businesses, farmers, and families — all of which depend on climate! For instance, perhaps there is something about the amount of precipitation, air, and temperature that make the area a good place for growing scrumptious regional delicacies. Tap into — and foster — local pride with this activity!

3. **Have a brief discussion to connect the game to real-world choices that the tweens make in their lives.** Together, review and discuss some of the ideas provided on the “Green Points” cards. Encourage them to list choices that they might be willing to make in order to help reduce global warming.

Help the children make the connection between our use of energy and our use of fossil fuels. Often our electricity is generated by burning coal, so every time we turn on a light bulb or turn on the air conditioner in the summer, we are using electricity that was produced by burning fossil fuels and releasing carbon dioxide into the atmosphere. By making careful

choices in our daily lives — even some that do not seem connected to directly using fossil fuels, such as recycling or composting — we can make a difference to the entire Earth — and to the polar regions!

Good choices for young environmental stewards include:

- Conserving resources:
 - Turning things off when we're not using them,
 - Taking shorter showers,
 - Using warm (not hot) water to wash clothes and hanging the clothes to dry instead of using a dryer
- Walking, biking, or taking the bus — **where it's safe to do so** — or carpooling instead of asking for a ride,
- Using the microwave instead of the oven to cook food,
- Eating less meat and more vegetables, and
- Helping your family make energy-conscious choices:
 - Making sure that your water heater is insulated and not wasting energy by losing unnecessary heat, and
 - Lowering the heat in the winter and raising the temperature a bit in the summer.

4. **Conclude.** It is important to let the children know that they — not just adults — can make a difference and help decrease carbon dioxide emissions by making careful choices and by encouraging others to do the same. Just like in the game, we all have to work together to make a difference!

Invite the children to learn more about the science describing climate change and find ways to take action toward environmental stewardship by checking out library resources. Leave them with a positive message that there is action that they can take to make our world a better place!

Correlation to Standards

National Science Education Standards

Grades 5-8

Life Science - Content Standard C

Understanding Regulation and Behavior

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

Understanding Populations and Ecosystems

- The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

Science in Personal and Social Perspectives - Content Standard F

Understanding Populations, Resources, and Environments

- Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.
- Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

Understanding Risks and Benefits

- Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
- Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
- Important personal and social decisions are made based on perceptions of benefits and risks.

POLAR BEARS — GO WITH THE FLOES

Brief Facilitation Outline

1. Share ideas and knowledge.

- Introduce yourself and the library. Help the children learn each other's names (if they don't already).
- Frame the activity with the main message: The choices we make now will affect our world, either positively or negatively, in the future — but not all choices are easy.
- Set the stage for the game by discussing what is happening to ice on our Earth. Explain that scientists are observing changes to the ice sheets, glaciers, and sea ice on Earth — most are melting (i.e., getting smaller). Earth's global temperatures are getting warmer, in part, because carbon dioxide (CO₂) and other heat-trapping gases are increasing in our atmosphere. When we drive cars using gasoline or burn coal for electricity, we add carbon dioxide to the atmosphere. In general, the sea ice — the thin layer of ice that forms from the chilled ocean water — in the Arctic is getting thinner and smaller and melting earlier each spring.
- Invite the tweens to contribute to the conversation with prompts such as:
 - What animals living in the Arctic might be affected by the sea ice getting smaller?
 - What ideas do you have about how the changes to sea ice affect the polar bears or other animals?
- Highlight the particular plight of the polar bear. Explain that polar bears rely on sea ice to have dens where they hibernate and where their cubs are born. Sometimes these dens can be several hundred miles from the coastline. They also use the sea ice to hunt seals. If the sea ice melts too much, it will not support their weight as they wait for seals to come out of the water. If the sea ice melts too early, they will not be able to hunt at all when they come out of hibernation. With the decreasing ice, polar bears are having to swim farther distances between the ice.

2. Set up the game and play!

- a. Divide the children into groups of three to four players and distribute the game board, *Rules of the Game* sheets, game pieces, cards, puzzle pieces, die, and polar bears. Show the children how to set up their boards, ice floe puzzles, and the polar bear for the center of the game board, and invite them to choose their game pieces. Explain that an ice floe is a thin, flat piece of floating ice. They may choose from the following animals:
 - Caribou (these animals are called reindeer in Europe)
 - Arctic wolf
 - Beluga whale
 - Walrus
 - Polar bear
 - Ringed seal
 - Orca (killer whale)

- Snowy owl
 - Arctic fox
- b. Review the *Rules of the Game*.
 - c. Play the game!

3. **Have a brief discussion to connect the game to real-world choices that the tweens make in their lives.** Together, review and discuss some of the ideas provided on the “Green Points” cards. Encourage them to list choices that they might be willing to make in order to help reduce global warming.

Help the children make the connection between our use of energy and our use of fossil fuels. Often our electricity is generated by burning coal, so every time we turn on a light bulb or turn on the air conditioner in the summer, we are using electricity that was produced by burning fossil fuels and releasing carbon dioxide into the atmosphere. By making careful choices in our daily lives — even some that do not seem connected to directly using fossil fuels, such as recycling or composting — we can make a difference to the entire Earth — and to the polar regions!

4. **Conclude.** It is important to let the children know that they — not just adults — can make a difference and help decrease carbon dioxide emissions by making careful choices and by encouraging others to do the same. Just like in the game, we all have to work together to make a difference!

Invite the children to learn more about the science describing climate change and find ways to take action toward environmental stewardship by checking out library resources. Leave them with a positive message that there is action that they can take to make our world a better place!

POLAR BEARS

GO WITH THE FLOES

Background Information

Ice on Earth

Water is an essential need for our everyday lives — and indeed, liquid water is the one substance required by all life as we know it — but ice plays an important role on a global scale. We are familiar with ice in the form of ice cubes; hail, sleet, and snowflakes falling from the sky; icicles hanging from roofs and trees in winter; snow and ice on and in the ground (including permafrost, or ground that has remained frozen for two or more years); glaciers winding down mountain valleys; sea ice covering polar seas; and ice caps and very large ice caps, called ice sheets, covering large stretches of land at the north and south ends of our globe. These portions of Earth where water is frozen are collectively called the **cryosphere**.

Most of Earth's water is in our oceans as salt water (97%), but glaciers and ice caps hold the next largest portion of Earth's water — about 2% — in a frozen state. (Less than 1% of Earth's water is in groundwater, rivers, and lakes.) Glaciers are found at high altitudes on all continents, except in Australia. Ice caps are distinctive features of the Arctic and Antarctic. In addition to serving as storehouses of fresh water, the ice caps are “cold traps” that help regulate Earth's thermostat (see the section “Each Region Is Unique” below). Furthermore, the ice caps serve an essential role in regulating global ocean and air currents.

Earth's reservoirs of ice have undergone significant changes in recent years, and they continue to shrink. On a seasonal scale, glaciers and ice caps are dynamic — growing in the fall and winter and shrinking in the spring and summer. On a global scale, most ice is retreating rapidly as Earth's temperatures warm. Much of the fresh water stored in glaciers is melting and contributing to sea level rise. Ice on land in Greenland and Antarctica is also beginning to rapidly melt. Sea ice in the north polar region has decreased by 40% in the last 40 years. Because sea ice is already *in* the ocean, it will not increase sea level as it melts. However, the loss of sea ice is detrimental to the wildlife and humans living in the region.



1938



1981



1998



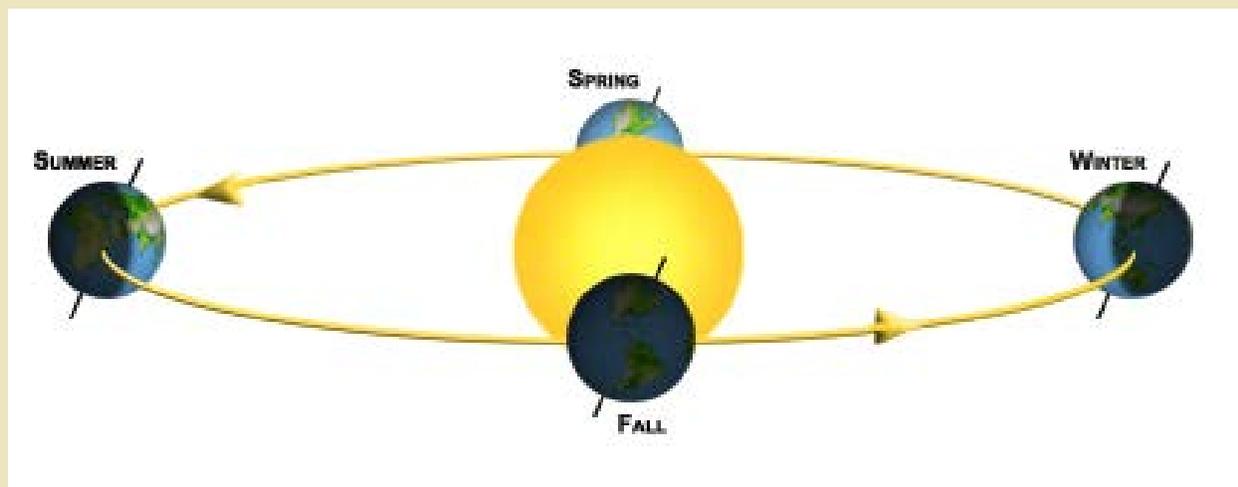
2009

Grinnell Glacier, on Mount Gould in Glacier National Park, demonstrates the sensitivity of glaciers to climate change. The glacier receded between 1938 and 2009, as documented above by the United States Geological Survey (USGS) Repeat Photography Project.

Credits (from left to right): T.J. Hileman, courtesy of Glacier National Park Archives; USGS / Carl Key; USGS / Dan Fagre; USGS / Lindsey Bengtson.

In the polar regions of northern Alaska, the changes of the past 100 years are particularly evident. Polar bears epitomize the Arctic struggle for survival, as they experience great change on a year-to-year basis. Floating sea ice dominates the land of the polar bears. The Arctic is an ocean surrounded by land. The land masses of Greenland, Iceland, and some islands in the Canadian Archipelago and large Russian Arctic islands have large glaciers and thick ice caps. Most of the ice in the Arctic is not ice on land, however: The ocean is covered by sea ice six to nine feet (nearly two to three meters) thick on average. (Floating sea ice may be 12-15 feet thick, and it may become ridged into even thicker piles.) Polar bears live on this floating ice and have easy access to the sea to hunt for seals, fish, and beluga whales. Indigenous peoples likewise make their living from the sea ice and northern lands. They have hunted in the ocean since prehistoric times. Musk ox, reindeer, caribou, foxes, and wolves live on the land in the lower latitudes of the Arctic.

Natural changes brought about by the seasons are especially drastic in the polar regions. In the Arctic winter, the tilt of the Earth masks the Sun's warming rays for three months and plunges the Arctic into darkness from mid-fall through mid-winter. In summer, the tilt of the Earth bares the northern regions to the rays of Sun so that to a polar bear standing on the North Pole, the Sun appears to draw a daily circle around her low in the sky from late March to early September. Temperatures reach an average of 37-54° F (3-12° C). This perpetual morning offers enough warmth to melt some of the sea ice, although some remains throughout the year. The sea ice can expand as more ocean water is frozen, reaching to the encircling landmasses of Canada, Greenland, Russia, Alaska, Iceland, Norway, Sweden, and Finland. The coldest temperature recorded in the Arctic was about -90°F (-68°C), and the average wintertime temperature is -30°F (-34°C).



The Earth's tilt creates seasons. In summer, the North Pole points toward the Sun to create a 24-hour-long day. In winter, the night is equally long because the pole points away from the Sun. The seasons are reversed for the South Pole. Note that this drawing is not to scale. Credit: Lunar and Planetary Institute.

Scientists are documenting an alarming trend: ice is melting across the world. Since 1979, scientists have documented an overall downward trend for sea ice in the Arctic Ocean (with

more ice observed in some years than others): Each winter, less sea ice forms, it melts earlier in the spring, and less ice remains at the end of summer. For polar bears, climate change means the gradual loss of the sea ice that forms the necessary platforms from which they hunt.

Your Home Is Changing

Earth's water, ice, air, and life will continue to interact over long-term scales, shaping the particular features of that place we each call home. In one important aspect, however, the global community of humans has proven influential enough to fundamentally alter the future of our planet. We continue to shape our environments at the local level by expanding our cities, changing forests to agricultural lands, and diverting water to suit our needs. Equally powerful are the changes we are making to the atmosphere as we burn fossil fuels, creating heat-trapping gases and tipping the Earth's balance toward a hot global climate.

Carbon dioxide, methane, nitrous oxide, and water vapor are heat-trapping gases. While the atmosphere is 78% nitrogen and 21% oxygen, heat-trapping gases make up only a tiny fraction of the air we breathe. For instance, carbon dioxide (CO₂) makes up almost 0.04% of the atmosphere; methane is more efficient at absorbing infrared radiation from the Earth but makes up only about 0.0002%. Water vapor comes and goes in the form of clouds, fog, and humidity. It is highly variable, and may represent between 1-4% of the atmosphere at the surface. Even in relatively small amounts, these heat-trapping gases have a very big impact on Earth's atmospheric temperature! Small increases in the amounts of these gases mean increased warming of our atmosphere.

Scientists attribute most of the current climate change to increases in heat-trapping gas concentrations in the atmosphere. Scientists also agree that carbon dioxide released to the atmosphere by human activities is the main culprit of climate change. It is released from burning coal, oil, natural gas in power plants, cars, factories, and to some extent, from the clear cutting of forests. Human activities release other heat-trapping gases. Methane is released by farm animals, rice paddies, rotting garbage in landfills, mining, and extraction of natural gas. Chlorofluorocarbons (CFCs) are well-known for creating the ozone hole — a separate environmental issue in itself — but are also implicated in their additional role as heat-trapping gases. The fertilizers used to grow our food add nitrous oxide.

Even as our communities grow and evolve, we remain intimately connected to the larger world.

Tomorrow's World Will Be a Different Place

The thawing of Earth's freezers — the polar regions — will have far-reaching effects. The nature of the polar regions makes them more sensitive to the consequences of climate change than warmer latitudes. Reflective white ice and snow will melt into dark rivers and oceans that better absorb the Sun's energy. Like a freezer overdue for defrosting, increasing temperatures will expose organic matter long locked away in the frozen ground of the arctic tundra. This permafrost will thaw and plant matter decomposing in the resulting marshes will release the heat-trapping gas methane.

Antarctic sea ice is as necessary to penguins as forests are to songbirds. If the 3.6°F (2°C) rise in global temperatures predicted over the next 40 years comes to fruition, essential nesting and feeding grounds will have melted away. The warming would translate to a 50% decline of emperor penguins. The Pt. Géologie colony that increased this species' fame through the movie *March of the Penguins* already is in decline as northern Antarctic temperatures increase. With less sea ice, Adélie penguins have a shorter journey from their nests of rock to fetch food

from the ocean for their chicks. However, Adélie penguins are adapted to the cold and overall are harmed by increasing temperatures. They face a loss of 75% with the predicted temperature rise. Climate change adds to the problems of pollution and over-fishing of the Southern Ocean.

Arctic sea ice is predicted to continue disappearing. Commerce by sea will have entirely new opportunities for transport through the opened Arctic Ocean, but the changes for humans and animals dependent of the ice are grim. According to a study by the United States Geological Survey, the predicted loss of Arctic sea ice in future years may result in the loss of 2/3 of the polar bear population by the middle of this century. Of the 19 subpopulations of polar bears, 8 are currently declining. For 7 of the subpopulations, there was not enough data to determine whether they were growing or falling. One subpopulation is increasing...and Arctic researchers are hopeful that humans can work toward mitigating climate change and other threats to all of the subpopulations.

Humans Have the Power to Stabilize Global Change

Humans clearly have an impact on the global environment and the ecosystems it supports. Our use of fossil fuels, such as coal and oil, has added carbon dioxide to the atmosphere and warmed our planet. Now, our influence can be used to stabilize or *reduce* climate change!

Use of fossil fuels pervades our everyday life and it is challenging to know where to begin reducing it. Not only do fossil fuels power our cars and school buses, coal often produces the electricity that runs our air conditioners and charges our cell phone batteries. In addition, fossil fuels are often used in the production and transportation of our goods before we even take them home from the store. For instance, fossil fuels are used for the energy and materials to create plastic bottles and transport heavy drinking water across the country to the local grocery store. Thus, not only does driving less and conserving electricity help combat climate change, so does being a savvy consumer of local produce and recycled goods.

In addition to carbon dioxide, the heat-trapping gases methane and nitrous oxide are by-products of everyday practices. Methane, a natural waste product of certain microbes living in the intestines of cattle, is released by these animals in large amounts. Stocking up on protein from fish, and especially beans and other vegetables, instead of beef is one way grocery shoppers can help slow climate change. Human-produced fertilizers break down in the soil and release nitrous oxide, so composting the vegetable clippings from that high-protein bean salad to use as natural fertilizer can further help slow climate change.

It is amazing that something as tiny as heat-trapping gas molecules can create and change our global climate so drastically, even though they are vastly outnumbered by the nitrogen and oxygen molecules that make up the majority of our atmosphere. Though we may sometimes feel small and insignificant as individuals or communities in our complex societies, we likewise have the power to make a large impact — and make the changes necessary to manage Earth's resources wisely!

Activity Materials to Print

Player game pieces — cut out and fold base under



fold under for base

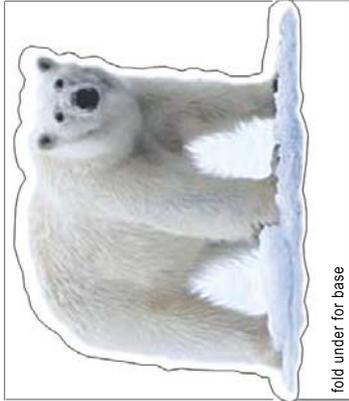


fold under for base



fold under for base

Polar Bear floats on ice on center of game board. Cut out and fold base under.



fold under for base



fold under for base



fold under for base



fold under for base



fold under for base



fold under for base

Player game pieces — cut out and fold base under



fold under for base



fold under for base



fold under for base

Polar Bear floats on ice on center of game board. Cut out and fold base under.



fold under for base



fold under for base



fold under for base



fold under for base



fold under for base



fold under for base

Cut along dashed lines and use cards with game board.

Eco
BLOOPER

Cut along dashed lines and use cards with game board.

You just went to the grocery store and bought beef and pork — producing these meats emits more greenhouses gases than for fish and beans. Choose seafood for a healthy protein.

The “Eco-Friendly Squad” visited your house and found that you left your computer and entertainment center on standby! Clocks and “standby” settings use electricity even when electronics are off.

Oops!
The Sunday paper just went out with Monday’s trash.

Oh no! Another ice shelf just broke apart in Antarctica. In 2002, another large floating sheet of ice, called the Larsen B Ice Shelf, collapsed because of climate changes.

Your school cafeteria does not have recycling bins. Convince your fellow teachers and students to install bins in your cafeteria and school yard.

Last year your family, if it is like most, threw out 88 pounds of plastic — all made from fossil fuels. This year, recycle plastic containers, use reusable shopping bags, and don’t buy stuff in plastic if you can avoid it.

The fertilizers you use leak chemicals into the environment and cause the release of nitrous oxide — a greenhouse gas. Start a compost pile (recycle your food) to fertilize your garden.

You are wasting gasoline!
The tires on your family’s car are low and the engine needs a tune-up.

Your lemonade stand uses styrofoam cups, made in part from fossil fuels, instead of cups made from recycled paper.

Cut along dashed lines and use cards with game board.

Eco
BLOOPER

Eco
BLOOPER

Eco
BLOOPER

Eco
BLOOPER

Eco
BLOOPER

Eco
BLOOPER

Cut along dashed lines and
use cards with game board.

Eco
BLOOPER

Cut along dashed lines and use cards with game board.

Your family buys small bottles of water every day instead of refilling reusable water bottles. All those plastic bottles are made using fossil fuels and most are not recycled.

Your family often runs the dishwasher when it is only partially full. Filling the dishwasher and using low energy settings will save money and burn less fuel.

Your purchases at the store are put into many, many plastic bags. Reduce packaging! Put more in one bag — or even better, use reusable cloth bags!

Instead of putting on a sweater in the winter, your family turns up the heat, burning more fossil fuels.

You can't make up your mind about what you want for a snack, so you leave the refrigerator door open while you search. The refrigerator wastes energy and has to work harder to cool everything inside.

Your long shower and high-flow shower head waste water and the energy it takes to heat the water. Spend the time you need to get clean and then get out!

You know lots and lots of ways to save energy and you don't share them with your friends and family.

Cut along dashed lines and use cards with game board.

Cut along dashed lines and use cards with game board.

Eco
FACT

Cut along dashed lines and use cards with game board.

Use CFBs!
Compact fluorescent bulbs last 10 times longer than incandescent bulbs and use 65% less energy! (LEDs are also "green.")

Use CFBs!
Replacing just *one* 60-watt incandescent bulb with a compact fluorescent bulb saves your family \$30.00 over the life of the bulb.

Washing your clothes with warm water, rather than hot, and hanging them outside to dry will reduce the amount of CO₂ your family's laundry produces by 95%!

If you can feel the heat from your family's water heater, you need to insulate it to reduce the water heater's CO₂ emissions by 7%.

Recycle!
The energy we save by recycling even *one* glass bottle is enough to light an incandescent light bulb for *four* hours!

Eating less red meat is one of the best ways to reduce your family's greenhouse gas emissions! Cows "emit," to put it politely, the greenhouse gas methane to the atmosphere.

Recycle!
The amount of wood and paper we throw away every year is enough to heat 50 million homes for 20 years!

Recycle!
Every ton of paper that is recycled saves 17 trees.

Fruit, vegetable, and bean production creates less greenhouse gases than for red meat or chicken.
Eat more greens — and be Green!

Cut along dashed lines and use cards with game board.

Eco
FACT

Eco
FACT

Eco
FACT

Eco
FACT

Eco
FACT

Eco
FACT

Cut along dashed lines and
use cards with game board.

Eco
FACT

Cut along dashed lines and use cards with game board.

Unplug!

Unplugging computers, TVs, and other electronics can cut their electrical draw by almost 15%!

Recycle!

2.5 *million* individual plastic water bottles are thrown away every hour in the United States!

Recycle!

Making paper products from recycled paper uses 60% less energy than making paper products from trees.

Recycling just one run of Sunday newspapers in the U.S. could save more than 50,000 trees.

Even if your family doesn't own a hybrid, you can still help reduce greenhouse gas emissions and increase mileage by 3% if your family keeps the car tires inflated properly.

Stay Clean...

but shower less! Shortening your shower time even a few minutes saves water and reduces greenhouse gases released from heating the water.

Seventy percent of the electricity produced in the United States is from burning fossil fuels like coal, which adds greenhouse gases to the atmosphere.

Cut along dashed lines and use cards with game board.

Cut along dashed lines and use cards with game board.

GREEN
POINTS

Cut along dashed lines and use cards with game board.

– 10,000 Points –

Your family started replacing incandescent light bulbs with compact fluorescent light bulbs, reducing the energy you use and saving money!

– 10,000 Points –

You used a microwave, rather than an oven, to cook up a healthy after-school snack. A microwave uses one-third or less of the energy of an electric oven.

– 10,000 Points –

The Eco-Club just placed recycling bins in all classrooms. Recycling saves energy by not having to make a product from scratch.

– 10,000 Points –

You and your family turn your thermostat down by just two tiny degrees in the winter to reduce your electricity use and save money. You have reduced your CO₂ emissions for temperature control by 10%.

– 10,000 Points –

You only spent 10 minutes in the shower, instead of 20. You saved water, reduced the energy it takes to heat the water, and cut the CO₂ you produced showering by 50%.

– 10,000 Points –

Your family decided to drive less and walk more. You reduced the amount of gasoline used, cut the amount of CO₂ released into the atmosphere, and got into better shape!

– 10,000 Points –

You just chose to buy recycled paper for your computer.

– 10,000 Points –

Your family combines driving errands so you make fewer trips. This reduces the amount of gasoline used and the amount of greenhouse gases released into the atmosphere.

– 10,000 Points –

You start a carpool to get to school. Your father drives you and three friends who live nearby to school instead of each of you being driven separately every day.

Cut along dashed lines and use cards with game board.

GREEN
POINTS

GREEN
POINTS

GREEN
POINTS

GREEN
POINTS

GREEN
POINTS

GREEN
POINTS

Cut along dashed lines and
use cards with game board.

Use your Green Points wisely
to help save the Polar Bear!

GREEN
POINTS

Cut along dashed lines and use cards with game board.

– 10,000 Points –

Your family started a compost pile and will use it to fertilize your garden. Bonus! You have a garden and are eating “local”!

– 10,000 Points –

Your mother starts taking the bus to work, instead of driving, so she saves gas and puts less CO₂ into the atmosphere.

– 10,000 Points –

You shop at the cool re-sale store in town and buy vintage clothing. Not only do you look marvelous, but you have not caused energy to be wasted in producing new clothing.

– 10,000 Points –

You and several friends carpooled to the local farmer’s market and bought produce grown locally. You helped to reduce the energy wasted on long-distance transport.

– 10,000 Points –

You and your family turn your thermostat *up* by just two tiny degrees in the summer and reduce your electricity use. This cuts your CO₂ emissions for temperature control by 10%.

– 10,000 Points –

You just shared a report with friends about the Arctic sea ice melting more each year and the danger to polar bears. They were inspired to convince their families to switch from incandescent bulbs to energy-efficient fluorescent bulbs!

– 10,000 Points –

You just planted a tree. It will help reduce CO₂ in the atmosphere by using that CO₂ to grow!

**Cut along dashed lines and
use cards with game board.**

**Use your Green Points wisely
to help save the Polar Bear!**

POLAR BEARS GO WITH THE FLOES

RULES OF THE GAME

OBJECTIVE: Work together as a team to keep the sea ice intact under the polar bear.

SET UP: Put the ice floe puzzle pieces together, place the puzzle in the middle of the board, and place the polar bear on the ice floe. Shuffle the deck of “Green Points” game cards and deal each player four cards. Shuffle the “EcoFact” and “EcoBlooper” game cards and place them on the card sheet.

RULES OF THE GAME:

1. Roll the die to determine who goes first, then proceed clockwise from player to player. On each turn you should roll the die and advance the number of squares indicated.
2. If you land on an EcoFact, pick an “EcoFact” card and read it to the rest of the team, then return it to the bottom of the pile.
3. If you land on an EcoBlooper, you have three choices.
 - ☞ Pay the number of points indicated on the square (resolving environmental problems is costly!).
 - ☞ Go back five squares. You may only use this option twice. If there are not five squares behind you, then you must choose another option.
 - ☞ Remove a piece from the ice floe puzzle (keep it with your “Green Points” cards).
4. Place all used “Green Points” cards in the discard pile on the card sheet. They can only be used once.
5. Once you are out of cards totalling the number of points you need, you may ask other teammates to contribute. More than one teammate may contribute, although no teammate has to contribute.
6. All players must reach the last square before the game concludes. Players who are on the last square may still share “Green Points” with players in need.
7. If there is at least one piece of the ice floe left for the polar bear when all players are on the last square, everyone wins. Players tally their “Green Points” left at the end of the game (each player with a piece of ice in their possession loses 10,000 points for each piece) and the player with the highest number of points remaining is the **Big Winner!**
8. If the final piece of the ice floe is removed before all players reach the last square, everyone loses, even the player with the most points.

PLAY POINTERS:

- ☞ There are many factors to be weighed, and choices to be made, when you land on an EcoBlooper. Giving up points is hard, but may allow you and your teammates to win in the end! Moving back may lessen your chances of being the **Big Winner**, but may improve the chances of everyone, including you, winning!
- ☞ You can say “No” to a teammate who asks you to contribute points. You may suggest that he/she choose the option of moving back five squares if he/she has not already done so twice.
- ☞ Don’t take it personally if one of your teammates says “No” to your request for points. They may have a different strategy than you.
- ☞ Remember that you are working together as a team toward a common goal.

Put

EcoFacts

Here

Used cards go to the bottom of the pile.

Put

EcoBloopers

Here

Used cards go to the bottom of the pile.

Put

Used Green Points

Here