

For Creative Minds

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Glaciers

If it snows where you live, it probably melts during the summer. But the North and South Poles and some mountain peaks have snow all year long. By mid to late summer, you can see a line (firn line) where the glacial ice and snow meet. Below the line, the snow melts. Above the line, the snow piles (accumulates) on top of the snow from earlier years.

The weight of all the new snow turns the older snow into ice—like a metamorphic rock changed by pressure. When the ice gets as thick as 60 feet (about 18 meters) give or take, it becomes a glacier. It takes years for glaciers to form.

A “river of ice?” Rivers do not freeze to make glaciers, but glaciers do move. As the ice builds and the glacier gets heavier, gravity pulls it down.

Moving glaciers pick up rocks and dirt, carrying them along with the ice. The rocks and glaciers carve valleys, eroding the land as they move.

Some glaciers move slowly and others move quickly. You might hear loud noises from a fast-moving glacier.

During ancient ice ages and glaciations, some huge rocks were moved hundreds of miles. They are not like any rocks around them and are called “glacial erratics” or “out-of-place rocks.”

Ice sheets or continental glaciers move out from their edges on flat land. Alpine glaciers are on mountains and flow down.

When glaciers melt, they “drop” the rocks and dirt, making new land called moraine.

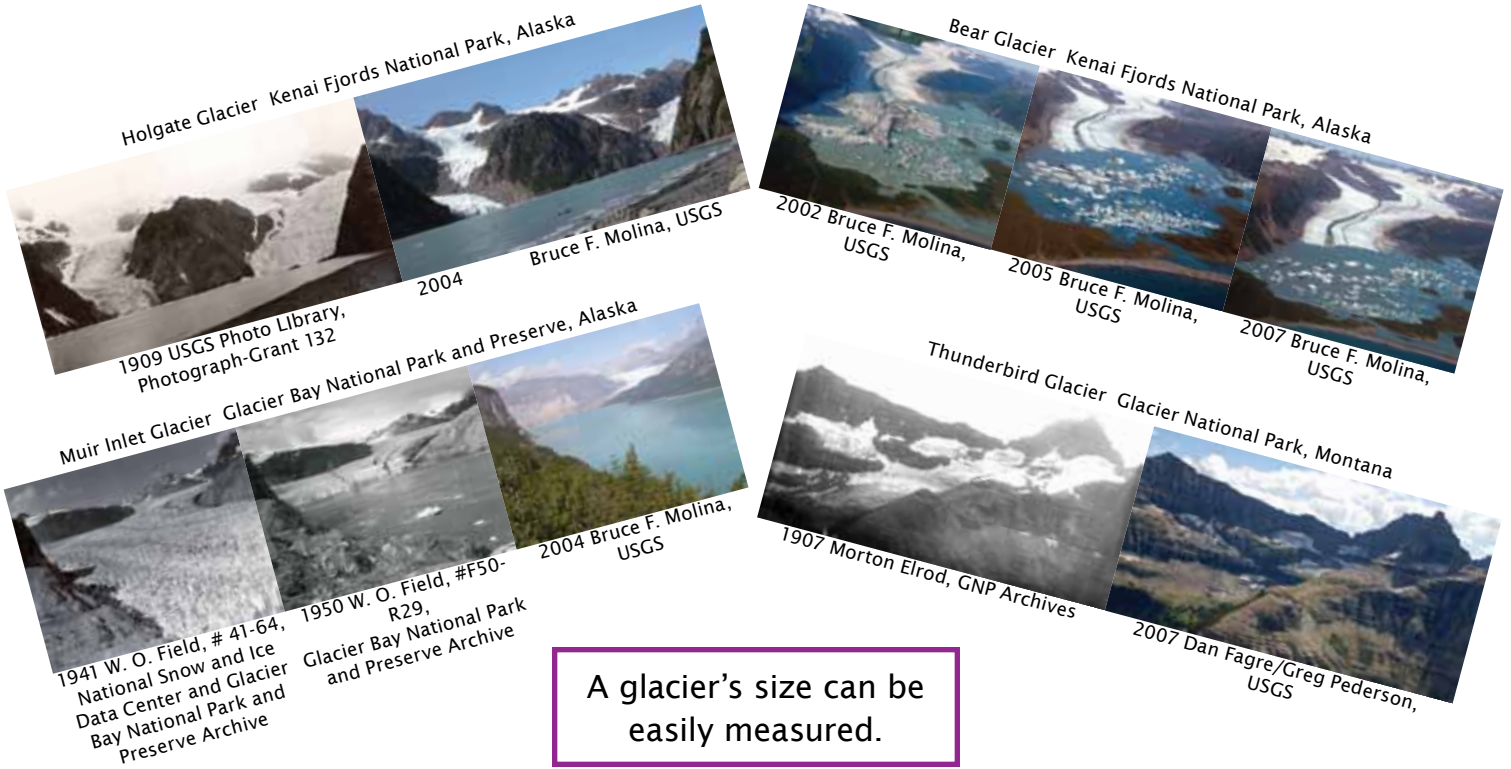
Glaciers grow if snow collects year after year.

Glaciers stay the same size if ice melts at the same rate as the snow collects.

Glaciers shrink if the ice melts faster than the snow collects.

Are Glaciers Melting?

Compare the pictures of glaciers below.
Do you think the glaciers are growing, staying the same, or melting?



A glacier's size can be easily measured.

Scientists know that most glaciers are melting. They think the melting is from a natural climate change speeded up by what humans do. Scientists will keep researching (studying) to learn more.

What could happen to rivers as glaciers melt and how could that affect the people who live downstream?

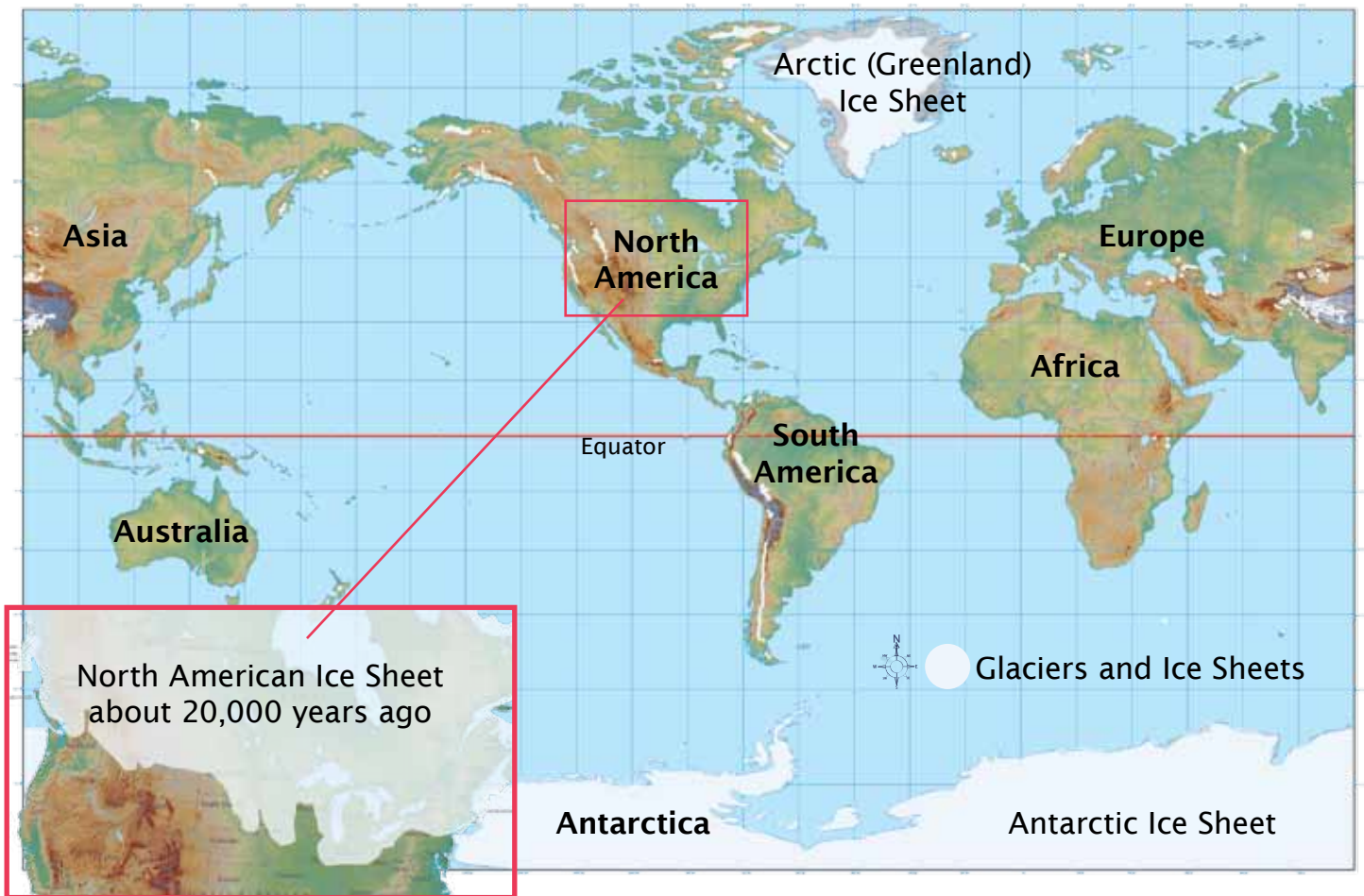
What could happen to the sea level as glaciers melt and how could that affect the people who live on islands or along the coasts?

How does the earth's climate affect a glacier?

Why are some glaciers and ice sheets melting and not others? So far, the Antarctic ice sheet is not melting, but the Arctic sheet in Greenland is.

How much freshwater might come out of melting glaciers?

Glaciers Around the World: True or False?



<p>1 Glaciers are near the North or South Pole or are high in the mountains.</p>	<p>2 There are some glaciers near the equator (look for the red line).</p>
<p>3 Africa is the only continent without any glaciers.</p>	<p>4 Continental glaciers (also called ice sheets) are found in Alaska and Antarctica.</p>
<p>5 There are three active glaciers in New England.</p>	<p>6 More land area is covered by glaciers on the North American continent now than 20,000 years ago.</p>

Answers: 1. True; 2. True; they are high in the mountains; 3. False; Africa does have glaciers but Australia does not; 4. False: there are only two ice sheets and they are found in Greenland and Antarctica; 5. False, there are signs of past glaciers in New England but the active glaciers in the US are in Alaska and in the western mountains; 6. False: an ice sheet covered much of the continent 20,000 years ago.

What Can We Do?

How can we help slow down the climate change?

Reduce, recycle, and reuse as many things as you can:

Take and use your own bags to stores.

Pack your lunch in reusable containers.

How can you reuse outgrown clothes, toys, or books?

Save water:

Take showers instead of baths.

Wait until you have a full load before running the washing machine or dishwasher.

Don't run water when not actually using.

Save gas:

Walk or ride a bike whenever you can.

Use a carpool or ride a bus to school.

*Plant native trees
and bushes in
your yard.*

*Buy fresh, local
produce when
possible.*

Use less heat and electricity:

Keep house temperatures a few degrees warmer in the summer and cooler in the winter.

Adjust thermostats when you leave the house and at night.

Turn lights off when you leave a room.

Turn off TVs, computers, and other electrical equipment when you aren't using them.

Use energy-efficient light bulbs.

Water and Glaciers

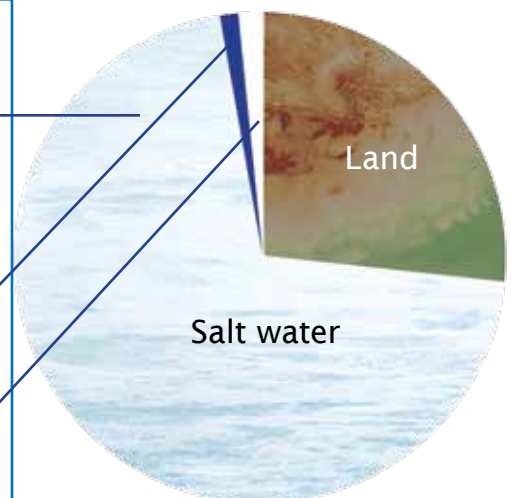
Water covers about 72% (almost 3/4) of the Earth's surface.

Of that amount, 97% is saltwater (ocean water).

Only about three percent is freshwater needed for drinking, bathing, and growing food.

One third (about 33%) of freshwater is in the water cycle (rain and clouds), groundwater, (underground water), and surface water, such as lakes and rivers.

About two thirds (66%) of the freshwater on earth is frozen in glaciers, making glaciers the largest reservoir of freshwater on earth.



Animal Matching Activity

Match the animal to its description. Answers are upside down on the next page.



bighorn or
Dall sheep



ground squirrel



marmot



pika



snowshoe hare



white-tailed
ptarmigan



wolverine

1 These **mammals** easily climb up and down narrow cliffs on rocky mountaintops and feed on whatever **plants** and grass they find. The males (rams) have huge, curled horns that they use to fight each other for the females (ewes). These animals **migrate** down the mountain in the winter to where it is a little warmer and back up again for the summer.

2 These **birds** live in high mountain areas from Alaska to New Mexico. They can fly but prefer to walk and their feathered legs and toes keep them warm. Their feathers turn white during the winter to help hide in the snow but are a gray brown during the rest of the year. They eat berries and leaves from tundra **plants**. Some **migrate** down the mountain or small distances, following food in the winter.

3 There are several different types of these **mammals** adapted to a wide variety of habitats from hot deserts to cold mountaintops and the arctic. Some live in trees (maybe in your own backyard) and some live on the ground, like the one in this book. Most eat **seeds** and have a special “cheek pouch” to carry the seeds. They are related to chipmunks and most **hibernate** during the winter.

4 Because these mammals don't hibernate in winter when it can be hard to find food, these animals cut and dry **plants** during the summer and then save the plants in a “hay pile” in their burrows to eat during the winter.

5 These social **mammals** live in underground burrows and **hibernate** during the fall and winter. During the summer, while most are playing, one animal stands guard and will let the others know if danger approaches. These **plant**-eating animals will also eat snow to get the water they need.

6 Unlike their rabbit cousins, these **plant**-eating **mammals** are born with fur and able to see. Their fur turns white in the winter so they can “hide in plain sight.” They even have fur on their long hind feet that help them to walk on top of the snow, like snowshoes. They have short ears that help them to stay warm in the winter.

7 These **meat**-eating **mammals** are shy but clever. They usually live alone and mark their territories with a strong smell. These animals have long guard hairs (on top of their fur) that trap air to help keep them warm and the snow and rain out. These fast-running animals kill prey with their very sharp teeth.

Alpine and Arctic Animal Adaptations

The animals in the book can be found in the same area (habitat) as you would find glaciers: high in the mountains (alpine) and the arctic. It gets very cold in the winter with a lot of snow and stays cold and windy during the summer. Animals living in these areas need to stay warm, hide in the snow and ice, and find or have food to eat (especially in the winter). Use the information and illustrations in the book and in the matching activity to answer the following questions. Answers are upside down, below.

1	Which animals have white fur or feathers in the winter to hide in the snow?	2	Which animals have fur or feathers on their feet?
3	Which animal gathers food during the summer to eat in the winter?	4	Which animals have little ears to stay warmer in the winter?
5	Which animal has big feet (like snowshoes) to walk on snow?	6	Which animals hibernate for the winter?
7	Which animals migrate for the winter?	8	Which animal is a bird?
9	Which animals are mammals?	10	Which animals eat plants (herbivores) and which eats meat (carnivore)?

Food for Thought

How is this story similar to and different than *The Sky is Falling*?

Why did Wiley Wolverine want the animals to go to his den? How did he try to trick them?

The animals in the story worry about what they will do and how they might live if the glaciers melt. What is each animal worried about?

Matching Answers: 1. bighorn/Dall sheep, 2. white-tailed ptarmigan, 3. ground squirrel, 4. pika, 5. marmot, 6. snowshoe hare, 7. wolverine
 Adaptation Answers: 1. ptarmigan, snowshoe hare; 2. ptarmigan, snowshoe hare; 3. pika; 4. pika, snowshoe hare; 5. snowshoe hare back feet; 6. marmot, some ground squirrels; 7. bighorn/Dall sheep, ptarmigan; 8. ptarmigan; 9. bighorn/Dall sheep, ground squirrel, pika, marmot, snowshoe hare, wolverine; 10. Herbivores: bighorn/Dall sheep, ptarmigan, ground squirrel, pika, marmot, snowshoe hare; Carnivore: wolverine