What Is an Ice Age?

An ice age is a period of hundreds to thousands of years when the climate on the earth becomes colder and wetter and much of the earth's northern hemisphere is covered by glacial ice. There have been several ice ages in the earth's history. The most recent ice age is often referred to with capital letters as the Ice Age. It began about two million years ago and ended about 12,000 years ago.

Glaciers, especially huge continental glaciers like the sheet of ice covering Antarctica, take tens of thousands of years to build up. In fact, most of today's glaciers—which cover about 10 percent of the earth's surface—are left over from the last ice age.
During the Ice Age, one-third of the earth's land area was covered by glaciers. Almost all of Canada, as well as much of the northern United States, was covered with ice.

Most of the glaciers that exist today are the remains of glaciers that were formed during the last Ice Age. The light gray areas on the map below show how much land, in North America and the Arctic, the glaciers covered 20,000 years ago.
How Cold Is It During an Ice Age?

Today, the average temperature around the world is 14°C (58°F). In some places, like Antarctica, it is much colder, and in other places, like Africa, it is much hotter.

During the Ice Age, the average temperature was around 10°C (50°F)—just four degrees Celsius less than the average temperature today. This may not seem like a lot, but back then it was enough to put many parts of the world into a deep freeze, one cold enough and long enough, to create the vast glaciers of the Ice Age.

How Did the Last Ice Age Shape North America’s Landscape?

The huge glaciers of the Ice Age did much more than sculpt U-shaped valleys, scrape the rock, and dump moraines and other deposits on the land. Much of the rich soil of the Midwestern United States was deposited by glaciers, and the way the Ohio River drains was influenced by these glaciers. The Great Lakes in the northern United States were also scooped out by these glaciers.

Changing Earth Fact
Long Island, in New York, is a moraine that was deposited during the last Ice Age, around 15,000 years ago.
Areas in the northeastern United States or the northern Midwest states with these features were probably shaped by the giant ice sheets:

- Stony soil
- Hills dotted with lakes
- Scratched and grooved rock surfaces
- Long, low ridges made of sand and pebbles

**Why Do Ice Ages Begin and End?**

No one knows for sure why ice ages start and why they end, but scientists have several ideas.

- In very ancient times, the depth of the oceans may have played a role. If the ocean is shallow, the sun warms the water more; if it is deeper, the water is colder.

- Scientists think that more recent ice ages might have been affected by how much Earth tilts, or wobbles, on its axis. When part of Earth is tilted away from the sun, the climate there is colder.

- Once these giant ice sheets start to form, they help keep an ice age going because they reflect the sun’s energy away from the earth and prevent the land from warming up.

When the climate around the world gets warmer, ice ages end and glaciers begin to melt. Many of the causes for this are natural, but there is one cause that has developed in the past 100 years or so. You may have heard the term **global warming**. Many scientists think that global warming, caused by humans, is speeding up how quickly the world’s glaciers are melting.
Global Warming

What Is Global Warming?

Have you ever gotten into a car that’s been sitting closed up in the sun on a hot summer day? Or been in a greenhouse in early spring, when it’s still too cool for plants to grow outside? The greenhouse may be as warm as a tropical island, while you still need to wear a coat outside. The car and the greenhouse both trap air, heated by the sun, inside.

In the same way, gases in the earth’s atmosphere trap heat energy from the sun’s rays. Scientists call this the greenhouse effect. If none of the sun’s energy was trapped, Earth would be a very cold place, so cold that it would not be possible for humans or lots of other animals and plants to survive.

Earth’s climate has always changed. What concerns scientists is how quickly those changes have taken place in recent years. In the last 100 years, the earth’s surface has warmed about 0.5°C (1°F). This may not seem like much, but remember that the difference between the comfortable climate we have today and the last Ice Age was just 5°C (9°F). In fact, the year 1990 used to be the warmest ever recorded, but that record has been broken almost every year since then. In fact, scientists believe the world is warmer now than at any time in the past 1000 years.

Some of the reasons for the warming climate may be natural. At different times in the earth’s history, the climate has been warmer or colder. But scientists also think that some things that people do are causing this rise in the temperature.
What Causes Global Warming?

In the past, humans lived much more simply. There were no cars, no trains, no planes. People did not have electricity or any other energy source, besides fire, to heat their homes, cook food, or make any of the other tasks of everyday life easier.

Beginning about 200 years ago, people began to use machines to help them do a lot of their work. This period is called the Industrial Revolution. It changed the way that many people live, in large and small ways, making our lives much easier. But these changes may also be the reason that Earth's climate is getting warmer.

Over the past 100 years, people have used more and more machines, and more and more energy to run these machines. Much of the energy used to run our machines comes from electricity. Every day we use electricity to light and heat our houses, to cook food, to wash clothes and heat the water to wash ourselves, to watch TV, and to run computers and other equipment.

Electricity comes from power plants. Most power plants use coal and oil to make electricity. Burning coal and oil produces carbon dioxide, one of the gases called a greenhouse gas. Whenever we drive or ride in a car, we are also adding greenhouse gases to the atmosphere.
Other things we do send greenhouse gases into the air, too. Some of the trash that we send to landfills produces a greenhouse gas called methane. Methane is also produced by the cows, pigs, and chickens we raise for food. And, when factories make the things that we buy and use every day, they too can send greenhouse gases into the air.

**How Does Global Warming Change the Earth’s Surface?**

Many scientists believe that today’s temperature increase of one degree is already changing the landscape. They have observed that glaciers around the world are melting and that glacial ice is not as thick as recorded earlier. Temperatures in Antarctica are actually rising twice as fast as other places in the world, causing the ice to melt. The largest block of ice in Antarctica, the Ward Hunt Ice Shelf, which had been around for 3,000 years, began cracking in 2000, split apart in 2002, and is now breaking into pieces and drifting out to sea, where it will melt.

When glaciers melt, most of the water eventually flows to the ocean. The continental glaciers in the polar regions store a lot of water, about 2% of Earth’s water. If these huge glaciers melt, that water would be added to the oceans, causing the sea level to rise. Indeed, over the last 100 years, the level of the sea has risen about 6–8 inches worldwide. Scientists know this is so because they have taken measurements and have seen that the high tides today are higher than they were in the past. (When the sea level rises, the tide goes farther up the beach.)

**What Might Happen If Global Warming Continues?**

Scientists are not fortune-tellers. They don’t know exactly what will happen in the future. But they can use special computer programs to predict how the climate may change in the years ahead. And the computer programs, along with the melting glaciers and rising seas, provide some good clues. They tell us that the Earth’s
temperature will probably continue to rise as long as we continue releasing so many greenhouse gases into the atmosphere.

Sea level may rise between several centimeters and as much as one meter during the next century. This will affect both natural systems and man-made structures along coastlines. Coastal flooding could cause saltwater to flow into areas where salt is harmful, threatening plants and animals in those areas.

If all glacial ice melted, sea level would rise approximately 70 meters worldwide.

Places like this could be eroded or flooded by rising sea levels.

Oceanfront houses and other buildings, especially in areas close to sea level like Florida, could be affected by flooding. Beach erosion could make this problem even worse. Moving these houses or building barricades to protect them from the rising sea could cost billions of dollars. Flooding could also reduce the quality of drinking water in coastal areas.

Global warming may make it possible to grow crops in areas that are currently too cold. But it might make it impossible for crops to grow in other areas. For example, in Kansas, where a type of wheat called “winter wheat” is grown, warmer winter temperatures could
prevent the freezing temperatures that kind of wheat needs as part of its growth cycle. A rise in summer temperatures could also create **droughts**, drying out cropland. In some parts of the world, people may not have enough to eat because they will not be able to grow the food they need.

**How Can People Help Slow Global Warming?**

If people make changes in how they live and begin to **conserve**, or use less, energy whenever possible, it may be possible to slow down global warming. Here are some ways that people conserve energy today:

- Drive a car that gets better mileage. A car that gets 30 miles per gallon burns half the fuel, and produces half the greenhouse gases, than a car that gets 15 miles per gallon. A hybrid car that combines a gas engine with an electric motor, can get as much as 50 miles per gallon and reduce greenhouse gases even more.

- Ride the bus, subway, or train. Ride a bicycle or walk to reduce the use of fossil fuels to zero!
• Use more energy-efficient light bulbs. About twenty-five percent of all the electricity produced in North America is used just to make light. A **compact fluorescent bulb** (or CFL), uses less than half the electricity than an **incandescent bulb** does to produce the same amount of light.

Changes like these can help reduce greenhouse gases and protect Earth from global warming.