

Explore Climate Science

What's climate change?

Weather is a specific event—like a blizzard, hot day, or an afternoon thunderstorm—that happens over a few hours, days, or weeks. **Climate** is average weather patterns in an area over a longer period—like 20 or 30 years. Global climate is the average climate over the whole world.

Climate change is when the average conditions—such as temperature and rainfall—in certain areas change over time. Most scientists believe that climate change is happening and making our weather more extreme. It's causing rising seas, stronger storms, and shifting habitats. Small, naturally occurring changes contribute to climate change, but human activities, such as using gas to drive cars, burning forests to farm on or build cities, and burning coal for electricity, are responsible for most of it. Unfortunately, this creates problems for people, plants, and animals.

What's the connection between climate change and carbon?

During photosynthesis, plants take carbon out of the air and use it, along with water and energy from the sun, to make food. Plants store about half of the carbon that they take in. The other half is released back into the air. When the plants die, the carbon they had stored gets released back into the air, too. This is called the **carbon cycle**.

When forests get cut down and other plants die, less carbon is taken out of the atmosphere. Carbon dioxide, or CO₂, is a greenhouse gas released into the environment by human activities—like running factories, driving cars, and flying planes. Greenhouse gases, like CO₂, are among the main reasons that the climate is changing. They trap heat from the sun and cause the earth to get hotter. When this happens, glaciers melt and water levels rise. More greenhouse gases cause an increase in the earth's temperature. This is called the greenhouse effect. In the last few hundred years, the earth's temperature has gone up by 2 degrees Fahrenheit. This sounds like a small change, but it's enough to affect people, plants, and the planet.

Communities, countries, and businesses measure their **carbon footprint**. The bigger the carbon footprint, the more greenhouse gases are being released into the atmosphere.

Try It Out! Explore the greenhouse effect.

You'll need: two thermometers, a glass jar with lid (large enough to contain one thermometer), a timer, paper, a pen, and a sunny spot inside or outside.

Instructions: Write down the temperature of each thermometer (they should be the same). Then, in your sunny spot, put one thermometer inside the glass jar and screw on the lid. Place the other thermometer next to the jar, uncovered. Write down the temperatures of both thermometers every 5 minutes. After one hour, compare the data on each thermometer. What did you observe?

What happened? The air inside the jar is warmer than the air outside. Solar energy shines through the glass and turns into thermal energy that can't escape the jar because of the cover. This is similar to how heat gets trapped in our atmosphere. During the day, the sun shines on us and creates energy. At night, most of that energy escapes back into space, but some of the heat is trapped to keep our temperature stable.

What can we do to stop climate change? What can I do to help?

We can't solve climate change on our own. We need to work with others. Everyone has a role to play. Individuals, communities, businesses, and countries can all help stop climate change. Together, we can reduce the amount of pollution and prevent even worse climate change.

People can reduce their carbon footprint in many ways. They can refill a water bottle or cup instead of using disposable water bottles. They can turn off unused lights or walk or ride a bike instead of driving. They can also reduce food waste and use fewer plastic and paper products. They can use showers and toilets that need less water.

What corporations and governments do makes an even bigger impact. They can find cleaner ways to manufacture and ship products. They can reduce waste and use alternative energies, like electric, solar, or wind. They can make laws and policies about fuel efficiency in vehicles, pollution, or carbon limits on businesses.

Nature itself is also full of solutions! Trees clean the air by reducing greenhouse gases and pollution. They also cool communities and provide habitats for animals. Planting trees is one way to reduce carbon pollution. Protecting existing forests will help, too. You can learn more about the power of trees with the [Girl Scout Tree Promise](#).

How can I learn more about climate change and climate science?

Around the world, scientists are conducting studies and experiments to better understand what is happening with climate and the environment. They need data about weather, plants, animals, air, and land to find solutions that help our global ecosystem. When scientists need a lot of data for their research, they ask regular people to help collect it. This is called citizen science. You can help scientists learn more about climate by observing, measuring, gathering, and sharing data. To find out more about citizen science, check out the [Girl Scout Climate Challenge on SciStarter!](#)

You can also learn how climate change is affecting communities on local, state, national, and international levels. Research changes in your community over the last 20 years. Then examine the United States, other countries, and each continent. What impact has climate change had on business, income, health, and social groups? What are governments, STEM professionals, businesses, and others doing to help? What organizations or groups are working to raise awareness and find solutions?

Try It Out! Track progress on the Paris Climate Agreement.

In 2015 and under the United Nations Framework Convention on Climate Change, the leaders of countries from around the world gathered in Paris to sign a pact to address the negative effects of climate change. Its goal is to reduce greenhouse gas emissions in all countries and, hopefully, limit the global temperature increase this century to 2 degrees Celsius at most. The countries vowed to reduce emissions more and more over time. The agreement also asks richer countries to help poorer countries, as the richer countries are most responsible for carbon emissions, yet emerging economies suffer the most from their consequences.

Now, research the progress and impact of the Paris Agreement. Which countries signed the Paris Agreement? Which ones are on track to reduce their carbon emissions? Which have fallen behind? How much has the global temperature changed since 2015? What laws or policies have been created? Which should be created?

Connect with Your Community

What's climate justice?

Think globally. Act locally. Climate change affects the entire planet, but communities experience it differently depending on where they are and who lives in them. Some places face rising water lines or flooding. Others are becoming more dry and hot, leading to wildfires and extreme heat.

When we take care of our planet, we take care

of our communities. Everything and everyone is connected in our global environment. **Climate justice** recognizes that climate change affects different people in different ways. It means that we need to combat climate change in ways that are fair. We must involve both the people affected by it and the people and businesses creating it.

How does climate change impact different communities?

Climate change impacts poor and vulnerable people more than wealthy, privileged people. People in less industrialized places have done the least to cause climate change, but they suffer the most from its effects. Black, Indigenous, (and) people of color (BIPOC) are more at risk to experience heat, pollution, and other impacts of climate change. Housing and lending policies and other city planning decisions have forced communities of color into areas with fewer trees or “heat islands” that, as a result, experience more pollution and higher temperatures that negatively affect people’s health.

Rural communities experience erosion, mudslides, and flooding when trees or other native plants are

removed or die. This affects farm and ranch land.

Women and girls are uniquely affected by climate change, as they tend to face traditional expectations about caring for homes and people. They often have fewer resources than men and boys, and are more likely to have to leave their homes.

Climate justice requires justice for all. We must address climate change in ways that are fair. Those who have benefited the most from fossil fuels and deforestation, including businesses, must help and do even more of the work. The people suffering the most should be heard, respected, and included in finding solutions and making decisions.

How can I support climate justice? How can I learn more about my community?

The world needs to make big changes to stop climate change and advance climate justice.

We can create better plans to avoid and survive natural disasters. We can build less expensive and more environmentally friendly housing. We can spend more money to create clean forms of public transportation, like electric cars and buses. We can research clean energy, like solar and wind power.

People everywhere are coming together to make a difference. Citizen scientists gather data. Engineers develop alternative energy sources and ways to remove greenhouse gases from the

atmosphere. People plant trees, preserve existing forests, and design urban areas to prevent erosion or heat islands.

Learn what is going on in your community. How is climate change affecting children and teens? How does it affect women and girls, BIPOC communities, or those living in cities or rural areas? Seek out people and local organizations that are helping. Ask questions and find inspiration. By connecting with others who care about the same thing as you, you can learn new information and skills. You can work together to change the world!

Share Hope

To have an impact on climate change, everyone needs to act! Individual people as well as communities, businesses, and governments all need to get involved. Choose one part of climate change that interests you and is important to your community. Make a project to spread awareness. Climate change may seem like an unsolvable problem, but you can help others learn about climate change and what they can do to fight it.

Create a message to share with your community. Use what you've learned to invite others to take action for the planet. For example:

- **Invite people to reduce their carbon footprint.** Ask them to walk, ride a bike, or take public transportation. Have them use less plastic. Help them save water and energy at home.
- **Educate others through art.** Make posters. Stage a play or film a video. Write poetry or a story. Paint a mural or write a song.
- **Host an event** for others to learn about the issue and get involved. [Plant trees](#) or do a [citizen science project](#) together.
- **Use digital technology** to create a social media campaign, educate others, and invite people to community events and rallies.
- **Call on community leaders, government officials, and businesses.** Share how you feel about climate change and what you'd like them to do about it. Write a letter to Congress or your city council. Create a policy statement or make a video. Visit your elected officials. Attend community events and rallies.

You can work with others to create your message. Start with friends and family members. Ask experts. Talk to businesses and community groups. They might have ideas, materials, or volunteers to help. Connect with environmental groups, climate organizers, and youth activists. They can help you, and you can help them! Reach out to your library. Contact local colleges and universities. Look at local and international organizations.

When people learn about your challenge project, they may be inspired to act, too. Let your community know what you would like them to do. Start at home or with your Girl Scout troop. Then, invite your larger community, like the people from your school, place of worship, or local businesses. Talk to local leaders and elected officials. Share your story with local media.

When you're done, know that you're leading by example. You're sharing hope that we can fight climate change and win.

Not sure where to get started?

Check out these ideas to spread awareness about climate change:

- ▶ Make a climate collection or archive of books, stories of local change, or oral histories.
- ▶ Create a "how to" handout or playbook with local resources and actions.
- ▶ Film a web series, video tutorials, documentary, or live-action movie.
- ▶ Design a poster, zine, comic, T-shirt, or tote bag.
- ▶ Give a speech, make a presentation, or create a petition.
- ▶ Write and perform a song or make a music video.
- ▶ Host a workshop or event, like a concert, play, poetry slam, art exhibit, citizen science day, or tree-planting event.
- ▶ Develop an app, website, blog, or social media campaign.
- ▶ Write an op-ed or letter to a local outlet, city council, or government official.
- ▶ Advocate for a law, policy, or community improvement, like using solar energy or cutting carbon emissions.