

About climate change

In order to understand what climate change is and how it is occurring it is necessary to understand both the greenhouse effect and global warming.

What are the greenhouse effect, global warming and climate change?

The greenhouse effect has been around since the formation of the planet. Naturally occurring greenhouse gases – such as methane and carbon dioxide – form a blanket around the Earth, trapping heat from the sun in our atmosphere and keeping the Earth at a steady temperature where life can thrive. However, in recent years, human activities – such as burning fossil fuels and deforestation – have seen an increase in the amounts of these heat-trapping gases entering the atmosphere. This has meant that more heat from the sun is being trapped in our atmosphere. This is the greenhouse effect. As more heat is trapped in our atmosphere, the temperature rises. This is known as global warming.

In our atmosphere, there are close connections between temperature, water vapour, the extent of polar ice sheets and the concentrations of greenhouse gases (especially CO₂). When one of these is disturbed, the others react in ways that may increase or decrease the original disturbance. For example, warmer temperatures may result in more sea ice melting, which may alter the movement of warmer ocean currents, which may affect climatic conditions. This is one example of climate change.

What is weather? – Weather is the hourly, daily or weekly events such as temperature, cloud cover, wind, heat waves, storms or precipitation.

What is climate? – Climate is the long-term changes in patterns of weather over a long period of time, such as 20 years.

What is climate change? – Climate change is a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring overtime scales of decades or longer.



Where do greenhouse gases come from?

It is true that there have always been changes in our climate caused by a range of events, such as variations in the sun's energy and volcanic eruptions. However, the change in climate variation observed recently is believed to be the result of human behaviours increasing the concentrations of greenhouse gases in our atmosphere.

These include:

- Water vapour – This is the most abundant greenhouse gas. It increases as the Earth's atmosphere warms.
- Carbon dioxide (CO₂) – CO₂ is the gas we hear the most about. Normally this is a minor - yet very important - component of the atmosphere. CO₂ is released through natural processes like respiration and volcano eruptions, but also through human activities such as deforestation and burning fossil fuels. Since the beginning of the Industrial Revolution, humans have increased atmospheric CO₂ concentration by more than a third.
- Methane – This hydrocarbon gas is produced both naturally and through human behaviours, such as waste breakdown in landfills, agriculture, and cows burping!
- Methane is a more potent greenhouse gas than CO₂; however, there is over 200 times more CO₂ in the atmosphere than methane.
- Nitrous oxide – This greenhouse gas is produced through farming practices, such as the use of commercial and organic fertilisers.
- Chlorofluorocarbons (CFCs) – Often found in aerosol cans, foams and cooling for refrigerators, these gases are known for their contribution to the destruction of the ozone layer. These greenhouse gases have limited production due to the *Montreal Protocol on Substances that Deplete the Ozone Layer*.

What are the impacts of climate change?

It is hard enough to predict what will happen with the weather next week, let alone what will happen with the climate over a long period of time. Scientists have developed a range of models to help them determine how the climate might change and the potential impacts of those changes.

In recent years, we have started to see some of these impacts already. Around the globe we have already seen:

- Melting glaciers and sea ice – Sea ice in both the Arctic and Antarctic are frequently at record lows.
- Earlier flowering and ripening dates – Research suggests that hotter weather is already
- affecting the quality and availability of many foods.
- Coral bleaching – Elevated sea temperatures are the primary cause of mass coral bleaching events. A recent bleaching event in the Great Barrier Reef has seen 93% of the reef affected.
- Migration of plants and animals towards the poles – Plants and animals are already
- migrating towards the poles to escape hotter weather closer to the equator.



Other impacts we might see include:

- Global temperatures will continue to rise – However, temperatures will not rise evenly across the globe; some places will experience more warming than others.
- Changes to agricultural production – In some places, growing seasons could be extended as much as two or three months, while in other hotter and drier conditions will limit the growing season. Food supplies are expected to be negatively impacted in some areas.
- Bushfires – In Australia, we can expect the number of extreme fire risk days to increase.
- Increase in the number and severity of heatwaves – This is predicted to affect human health, agricultural production, and the health of ecosystems, plants and animals.
- Extreme weather – We can expect an increase in the intensity, frequency and duration of extreme weather events.
- Sea level rise – Sea levels are expected to rise approximately 2.3 metres for each degree Celsius of temperature rise.
- Ice-free Arctic – The Arctic Ocean is expected to become mostly ice-free in summer before the middle of this century.

What can you do?

- Learn more – Read, watch, listen and talk about it. Finding out more about climate change will help you understand more about what you can personally do.
- Cut your energy use – Make simple changes in your energy use, such as turning lights off, replacing light bulbs with new energy-efficient bulbs, and unplugging electronic devices when not in use. In winter, wear a jumper instead of increasing the heat. And in summer, take something off before turning up the air conditioner.
- Consider your transport – Leave the car at home and walk, cycle and use public transport where possible to reduce your CO2 emissions.
- Switch to renewable energy – Switching to energy produced by renewable resources is the simplest and most effective way to avoid producing carbon emissions.
- Do you really need it? – Think carefully about all your purchases, and where possible, choose the greenest option.
- Refuse, reduce, reuse and recycle – Cut the waste, save on resources and eliminate unnecessary emissions.
- Get involved – Send a letter to a politician or join a group like AYCC (Australian Youth Climate Coalition – www.aycc.org.au/).
- Spread the word – Let the people around you know that reducing greenhouse gas emissions will also build healthier communities, spur economic innovation and create new jobs.

