17 Climate

Weather changes from day to day, but the climate of a place stays the same – or does it? In this unit we will explore the difference between weather and climate, and find out what is causing Earth's climate to change.

Keywords weather climate atmosphere greenhouse gas greenhouse effect global warming sea level

What's the Difference Between Weather and Climate?

Weather changes often. Some days are bright and sunny. Other days are grey and rainy. Sometimes the weather changes so quickly, we start the day dressed in a warm coat and end it dressed in a light T-shirt.

Even though the weather changes from day to day, each place in the world has a typical pattern of weather throughout the year. This is known as its **climate**. In Ireland, the weather can change quickly, but we expect warmer temperatures in summer and colder temperatures in winter. We also expect more rain in winter. We can say Ireland's climate is mild and wet.

Think About It: What kinds of weather have you experienced in the last week?

We can describe the climate of ...

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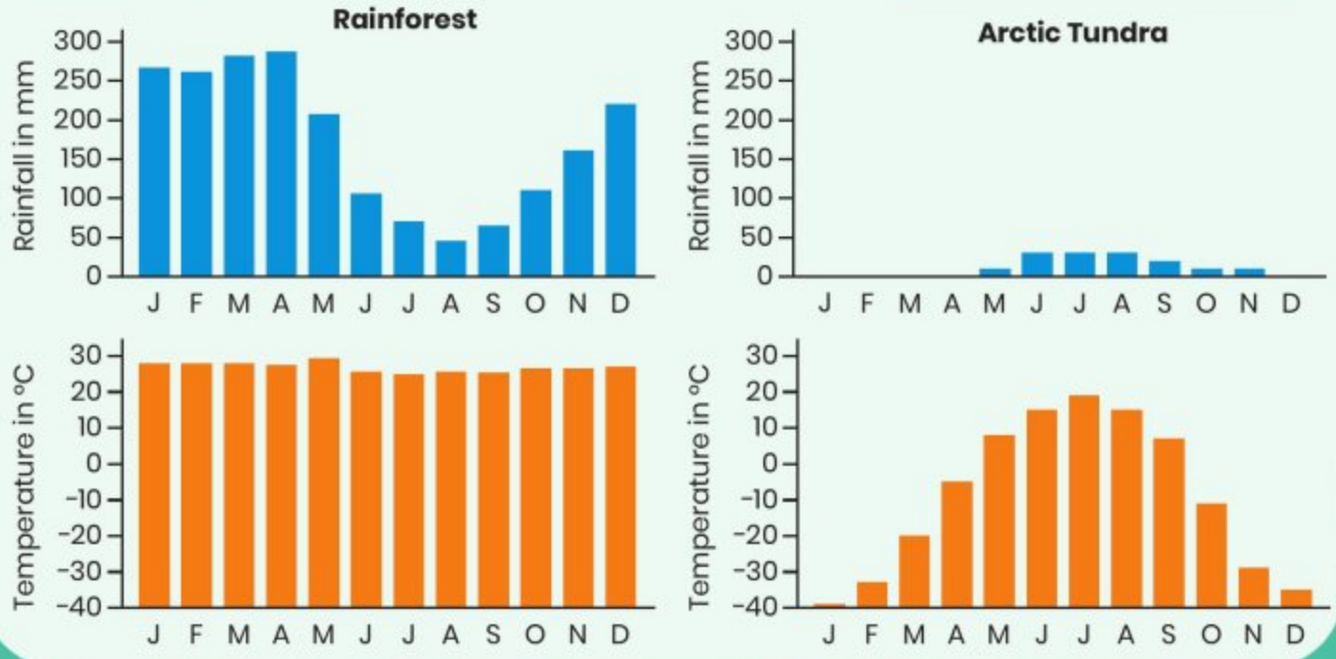
Different Climates

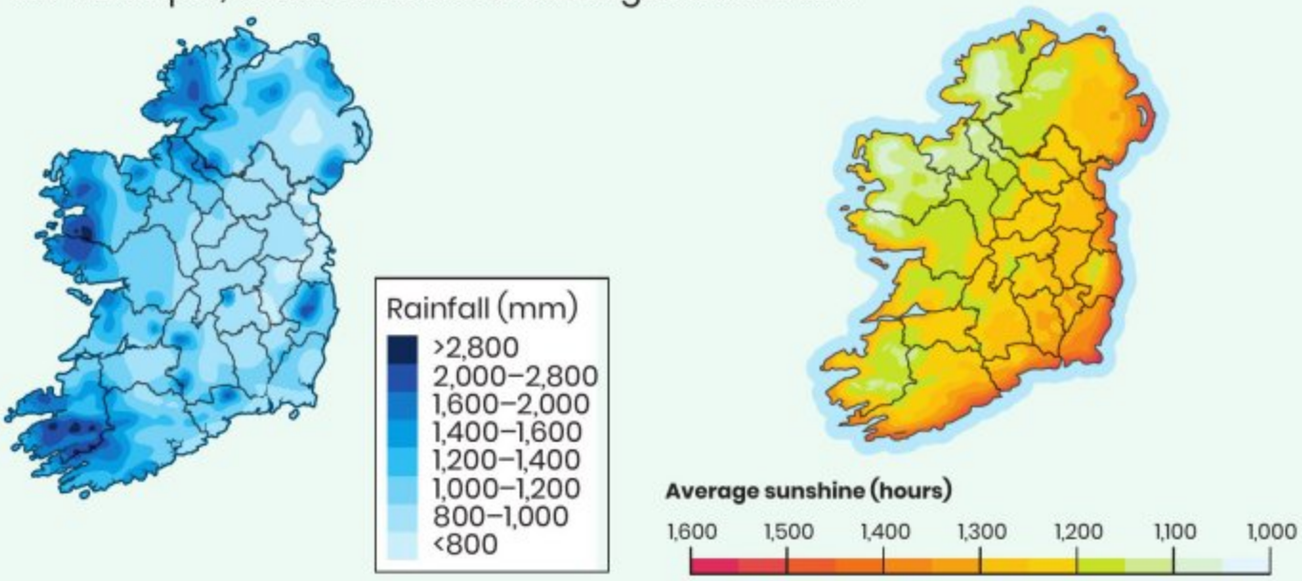
Let's compare two places with very different climates: a rainforest and the Arctic tundra. Each place gets rain and sunshine. Each gets strong winds and light breezes. Each gets thunderstorms. But across the year, the number of days of each type of weather is very different. Their climates are different.

Investigate: Look carefully at the charts for rainfall and temperature. Which place has the warmest climate? Which place has the wettest climate?



What Is the Climate Like Where You Live?

Different parts of Ireland have slightly different climates. For example, areas near mountains get more rain.



Map It: These maps show average amounts of rain and sunshine across Ireland. How much rain and sunshine does your area get each year? Compare it to other areas in Ireland.

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How Does Climate Affect Humans?

Humans live in almost every part of the world, in very different climates. In some parts of the world, people build homes and wear clothes that help them to stay cooler than their surroundings. In other areas, homes and clothes are designed to keep people warmer than it is outside.

How Does Climate Affect Plants?

The climate of an area influences the type of plants, including crops, that grow there. In the past, people could only cook with plants that could be grown nearby. This is one reason that different areas of the world have very different traditional foods. Today it is easier to move food from place to place.

Cocoa beans are used to make chocolate. They only grow in warm climates, such as rainforests in South America.

How Does Climate Affect Animals?

Climate also influences the type of wildlife found in an area. Arctic animals such as polar bears are suited to living in very cold environments. Ireland doesn't get as cold as the Arctic, so there aren't any polar bears roaming in our forests!

What Shapes Earth's Climate?

Although there are very cold areas and very warm areas, the average temperature on Earth is about 15 °C. Mars is much colder, with an average temperature of −63 °C! This is because Earth and Mars have very different **atmospheres**. An atmosphere is a layer of gases that surround a planet or moon.

Earth's atmosphere is made up of a mixture of gases such as water vapour, carbon dioxide and methane. These gases act like a blanket. They trap some of the Sun's energy as heat and stop it from escaping into space.

Earth has a thicker atmosphere, which traps heat, so our planet doesn't get too cold.

Mars has a very thin atmosphere, so most of the Sun's heat escapes back into space.

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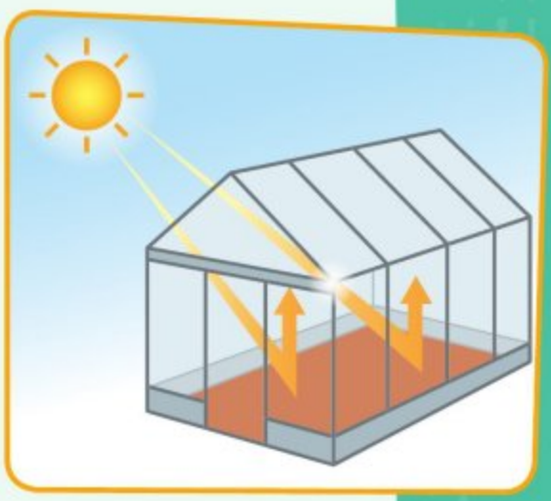
What Is the Greenhouse Effect?

Water vapour, carbon dioxide and methane are known as **greenhouse gases** because they do the same job as the glass in a greenhouse! Glass is good at letting sunlight in, which warms up everything inside the greenhouse. But the heat can't escape back through the glass. The air inside the greenhouse becomes so warm that it creates a different climate. The natural **greenhouse effect** is a good thing. Without it, the average temperature on Earth would be more like -20°C!



How Do Humans Affect the Climate?

Over the last 200 years, humans have released lots of extra greenhouse gases into the atmosphere. These gases are trapping more of the Sun's energy than normal, and our planet is heating up. The average temperature around the world is almost 1 °C higher than it was 150 years ago. This change is called **global warming**. The Sun's heat powers our water cycle and wind, so global warming is changing patterns of weather all around the world. This shows us that Earth's climate is changing.

Burning fossil fuels such as coal, oil and gas is one of the main causes of global warming. Humans burn fossil fuels for heat and electricity, and to power transport and factories. As fossil fuels burn, they release carbon dioxide into the atmosphere. Other causes are farming, deforestation (cutting down trees) and chemicals from landfills.

Greenhouse gases are created by many activities in Ireland.

How Is Global Warming Changing Ireland's Climate?

A temperature rise of 1°C does not sound like much, but in Ireland it has already led to fewer frosty days and changes in the amount of rain we get each year. Scientists have used computer programs to predict that Earth's average temperature will keep rising unless humans take action to reduce the amount of greenhouse gases we are releasing into the atmosphere.

How Does Global Warming Affect Sea Levels?

One effect of global warming is a rise in **sea levels**. A lot of Earth's fresh water is frozen as ice. Most of this ice is found in thick sheets over the land in Greenland and Antarctica. There are also glaciers, which are large masses of ice that move slowly over land. Global warming is causing land ice to melt into liquid water. This pours into the sea and is causing the amount of water in the world's oceans to rise by an average of 3 mm each year. Rising sea levels put land along the coast at risk of flooding and damage from waves and storms.

Case Study: The Okjökull Glacier

In 2019 Iceland said goodbye to its first glacier to be completely melted by global warming. The Okjökull glacier once covered an area the size of a large town. By 2014, it had disappeared.

Investigate: Do Sea Levels Rise When Land Ice Melts?

You will need:

- waterproof tub
- large rock
- water
- ice cubes
- ruler

Steps:

1. Place the rock in the tub. This will act as the land.
2. Pour the water into the tub, but don't cover the rock. This will act as the sea.
3. Pile some ice cubes on the rock. This will act as the land ice.
4. Use the ruler to measure the level of the water in the tub.
5. Leave the ice to melt and measure the level of the water in the tub again.

Results:

Compare the measurements of the level of the water before and after the ice melted.

Conclusion:

Do water levels rise when land ice melts?

Investigate whether sea levels rise when sea ice melts by trying the investigation again, but this time adding the ice cubes to the water instead.

Climate is the typical pattern of weather in a place. In recent years, global warming is causing Earth's climate to get hotter. What can humans do to tackle global warming?

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Activities

Fact Finding

1. What words can be used to describe Ireland's climate?
2. Why don't polar bears live in Ireland?
3. What is the average temperature on Earth?
4. Name two greenhouse gases.
5. How much are sea levels rising each year, on average?

Explore More

1. What is the difference between weather and climate?
2. Give an example of how the Irish climate affects how we live.
3. How did greenhouse gases get their name? Explain in your own words.
4. What are the four biggest sources of greenhouse gases released by humans in Ireland? What could be done to reduce these?
5. Give one example of an effect of global warming on Ireland.

Working as a Geographer and Scientist: Analysing

Sort the statements below into those that describe **weather** and those that describe **climate**.

1. It is 15 °C today.
2. It is usually wet in winter and dry in summer.
3. The average temperature is 10 °C.
4. The average rainfall this week was 1 mm.
5. It is usually windy at the top of the mountain.

Working as a Geographer: Recording and Communicating

This table shows the weather each month for one year in Ireland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall in mm	70	52	53	50	60	55	53	71	75	76	72	80
Temperature in °C	5	5	6	8	11	14	15	15	13	11	7	6

Use this information to make a climate chart for Ireland, similar to the charts on page 93.

What patterns can you spot?

How does Ireland's climate compare to the climate in a rainforest and in the Arctic tundra?