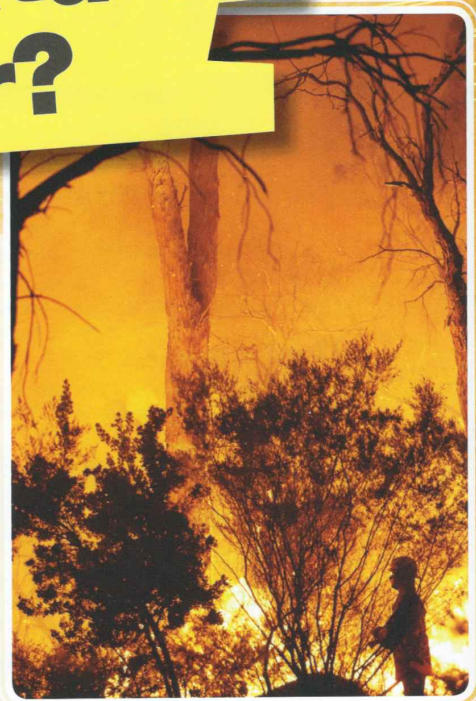


# What is a natural disaster?

When a disaster is caused by a natural force, such as a flood or cyclone, it is called a natural disaster. Every year, thousands of people around the world are affected by natural disasters such as volcanic eruptions, earthquakes and landslides. Natural disasters damage the environment, destroy property, and injure and kill people.



A dangerous bushfire

## Wild weather

Australia's worst natural disasters have been caused by weather. Tropical cyclones have devastated cities and towns. Floods have washed away towns. Long droughts have destroyed cattle and crops. And bushfires have raged through the bush, **incinerating** towns and killing people.

## The wet–dry cycle

But natural disasters are also part of a natural cycle. The Australian bush has been locked in a **wet–dry cycle** for thousands of years. Rains bring new plant growth. When there is a drought, this lush growth dries out and provides fuel for fires. And when the bush burns, many plants **regenerate**, as they need fire to re-start their growth.



## A changing climate

The earth's climate is always changing. For millions of years, the earth's climate has gone through periods of freezing cold followed by warmer periods. The earth's temperature has been getting warmer over the last 100 years, but now climate scientists have discovered that the climate is warming more quickly than expected.



Floods are becoming more common in some parts of Australia.

What does this mean for Australia? Extreme weather is likely to become more frequent. Scientists predict more heatwaves and longer droughts. They also predict that parts of Australia will receive more rain, bigger floods and stronger cyclones.



# Droughts



An empty dam during a drought

Australia is the second-driest continent in the world. Two-thirds of Australia receives less than 500 millimetres of rain a year. But a drought is not just lack of rain.

A drought happens when there is less rainfall than normal over a long period of time. This means that there is less water for people to use. During a drought, rivers and streams stop flowing, and water in dams and lakes **evaporates**. People, animals and plants that need water to survive can become seriously threatened. This is when a drought becomes a natural disaster.

In 1981–82, most of southeastern Australia was in drought. In Victoria, the dry conditions stripped the Mallee and Wimmera regions of **vegetation**. On 8 February 1983, **gale-force** winds ripped 50 000 tonnes of **topsoil** from the Mallee and Wimmera to create a dust storm 2000 metres high and as wide as Victoria. Over 1000 tonnes of dirt was dumped on Melbourne.



## Drought breakers

During the Federation Drought (1895–1902), many people thought it would never rain again. In Sydney, the state government declared 26 February 1902 a public holiday and asked everyone to pray for rain. However, it did not rain, and 1902 turned out to be the driest year between 1901 and 2000.



Preparing for cloud seeding

In Queensland, a **meteorologist** tried to break the drought by firing cannonballs into the clouds. Although a few drops of rain fell at first, it was not successful.

Today, scientists are investigating **cloud seeding** as a way of making rain. They are spraying chemicals into clouds, with the aim of freezing the water droplets in the clouds so that they produce rain.

## EL NIÑO

Every three to seven years, Australia's weather is affected by a weather pattern called El Niño, which causes winds over the Pacific Ocean to change direction. The winds push warm water towards South America, causing tropical storms. The ocean waters close to Australia become cooler, which means less rain ... and drought.



# Heatwaves

What's the difference between hot weather and a heatwave? A heatwave happens when it's hotter than normal for a longer period of time. Many parts of Australia have hot temperatures for part of the year. This weather is regular and people can prepare for it.

However, in parts of Australia where the weather does not usually bring high temperatures, a long heatwave can result in the loss of lives. More people have died from heatwaves in Australia than from any other natural disaster. Seventy-one people died in the 1939 bushfires, but 438 people died because of the heatwaves that came *before* the bushfires.

Heatwaves are one of Australia's invisible natural disasters. According to Australia's Emergency Management Agency, more than 2000 people have died from heatwaves in the last 100 years.

## HOW HOT IS A HEATWAVE?

In January 2009, Melbourne had its hottest temperatures since records began in 1855, with temperatures greater than 43 °C for three days in a row. The temperature was so great that train tracks buckled.





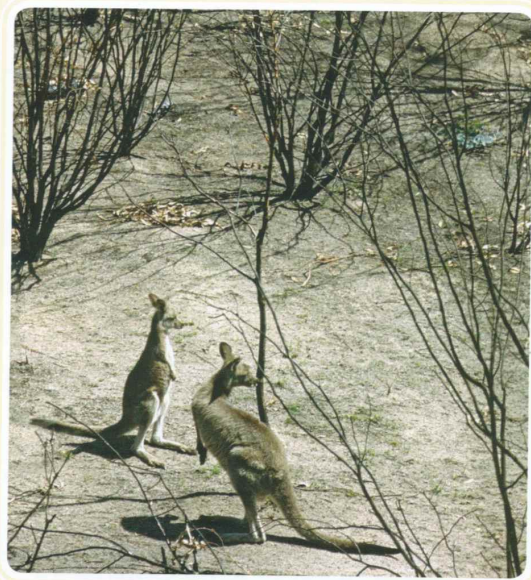
## What causes a heatwave?

A heatwave happens when summer temperatures become very high. Hot, **humid** days and little air movement make it difficult for people to stay cool. People who become too hot can suffer from **heat stress** and become ill.

## Animals and heat stress

Animals and plants suffer from heat stress, too. During a heatwave, ringtail possums leave their nests in search of water and a cooler place to sleep. If they can't find water, they can die.

Plants also suffer from heat stress. Plants lose water through their leaves, and they lose even more water during a heatwave.



Animals can suffer heat stress, too.

## EFFECTS OF HEATWAVES

Heatwaves can lead to:

- power failures
- extreme temperatures that ruin fruit crops
- the bush becoming dry
- damage to railway lines and electrical equipment.



# Bushfires

Saturday 7 February 2009 started like any other hot summer's day in Victoria—but ended like no other. By nightfall, Victoria had endured record high temperatures, and bushfires were raging across the state.

Many towns were wiped out by a fire more ferocious than any fire the firefighters had seen before. 2009 was the worst ever fire season in southeastern Australia. More than 2000 houses were destroyed, and 173 people died, with many more left homeless.



Firefighters trying to control a bushfire

## Fire-prone areas

Southeast Australia is one of the three most **fire-prone** areas in the world, along with California in the United States and the south of France. The fires of Black Saturday 2009 erupted during the same conditions that have lead to all of Australia's bushfires: a prolonged dry period, soaring temperatures, strong hot winds and very low air moisture.

## Total fire ban

When the forecast temperature is more than 37 °C, the wind speed is more than 55 kilometres per hour and there is low air moisture, authorities usually declare a day of total fire ban. No-one is allowed to light fires outdoors.



## How bushfires start

Bushfires are often started by lightning strikes. They can also start when small fires burn out of control, or when they are lit by an **arsonist**.

The front edge of a moving fire is called the **fire front**. Material in the path of the fire is heated, dries out and bursts into flames, and the fire moves on. The fire is hottest at the front and produces **radiant heat**.

The sides of the fire are called the flanks, and are extremely dangerous. A change in wind direction can turn a flank into a front. This happened during the 1983 Ash Wednesday fires. A cold change turned the eastern flank of the fire into a raging fire front that destroyed towns.



After Black Saturday, 2009

## AUSTRALIA'S WORST BUSHFIRES

- Victoria: Black Thursday, 6 February 1851
- Victoria: Red Tuesday, 1 February 1898
- Victoria: Black Friday, 13 January 1939
- Tasmania: Black Tuesday, 7 February 1967
- Victoria: Ash Wednesday, 16 February 1983
- New South Wales: Sydney bushfires, January 1994
- New South Wales: Sydney bushfires, 2 December 1997
- ACT: Canberra bushfires, 18 January 2003
- Victoria: Black Saturday, 7 February 2009



## Bushfires and wildlife habitats

During the 2009 Victorian bushfires, hundreds of millions of animals were killed. The fires raged through forests that were home to many endangered species, including:

- the helmeted honeyeater
- Leadbetter's possum
- the spot-tailed quoll
- the southern brown bandicoot
- the spotted tree frog.

Koalas, kangaroos and wallabies starved after the fires because the land where they used to find their food was burnt, and there were no plants or grasses for them to eat. Rain after the fires washed ash into creeks and threatened the lives of fish, some of which were already **endangered**.



Wildlife can starve after bushfires.

## AUSTRALIA'S LARGEST FIRE

In 1974–75, lightning strikes in Central Australia started fires that spread over large areas and burnt unchecked for months. Over 117 million hectares—or 15 per cent of Australia—was burnt.



## Fire and germination

Australian eucalypts often need intense fires to **germinate** their seeds. After a fire sweeps through a forest, seeds regenerate and a new forest grows. But the 2009 Black



New growth after a bushfire

Saturday fires were so hot that even seeds that need fire to germinate were killed. The soil was baked and all life, such as worms, bugs and bacteria, was killed. Even gum trees that have bark to prevent them from burning died.

## Fires for thousands of years

Indigenous Australians have always burnt areas of bush. The fires cleared land and generated new growth. The new growth attracted wildlife such as kangaroos, which made them easier to hunt.

### BUSHFIRE FACTS

- Bushfires move more quickly uphill than downhill.
- A fire moves the quickest and is the most dangerous when it gets into the **canopy** of a forest.
- The leaves of eucalypt trees can explode into flames.