



Flood lesson plan

In this lesson, students develop their understanding of flood conditions and the impact of floods on environments and communities.

Students investigate major historical flood events in their local area. They identify protective actions to prepare for and respond to a flood event, including flood management strategies.

Australian Curriculum: Geography
UPPER PRIMARY / LOWER SECONDARY

ITEMS

- | | |
|-----------------------|-----------------------|
| ● Teacher lesson plan | ● Student assignments |
| ● About floods | ● Real life stories |
| ● Floods: Be prepared | ● Related links |



Australian Institute for
Disaster Resilience

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Flood lesson plan

Objectives

Participating in this lesson will enable students to:

- define a flood, describe the conditions which create a flood and explain how floods are measured
- describe the features of different categories of flood in relation to impact on environments and communities
- research and present evidence of different levels of flood risk in Australia
- analyse flood management or prevention strategies.

REQUIRED RESOURCES

- Computers with internet access
- Online maps or atlases
- 'Map of Australia' activity sheet
- 'Investigating floods' activity sheet
- 'My flood project' activity sheet

Learning areas

YEAR 5 GEOGRAPHY

ACHASSK114	The impact of floods on environments and communities, and how people can respond
ACHASSI094	Develop appropriate questions to guide an inquiry
ACHASSI095	Locate and collect relevant information and data
ACHASSI097	Sequence information about people's lives, events, developments and phenomena
ACHASSI105	Present ideas, findings, viewpoints and conclusions

YEAR 7 GEOGRAPHY

ACHGK042	Causes, impacts and responses to an atmospheric or hydrological hazard
ACHGS047	Develop geographically significant questions and plan an inquiry
ACHGS048	Evaluate sources for their reliability and usefulness
ACHGS052	Apply geographical concepts to draw conclusions
ACHGS053	Present findings, arguments and ideas
ACHGS054	Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge

Lesson steps

Investigating floods

In small groups or individually, students to investigate floods and answer the questions on the 'Investigating floods' activity sheet. The About floods and Be prepared pages are a good starting point.

Map of Australia

Ask students to research then make a list of notable floods in Australia from 1970 to the present day. Mark the location of each of these on the 'Map of Australia' activity sheet (you may need to enlarge it to A3). Have students make some notes about each flood (cause, duration, effects, etc.).

Once all the locations are marked, ask students to identify any patterns in the data. Are there areas that flood more often than others? Why do they think this is the case? In small groups, students to work together to make a list of flood prevention strategies that could be helpful in flood-prone areas.

To extend their learning, students could consider what other places (such as the Netherlands or Venice) have done to manage or prevent flooding. Some places have been doing this for centuries. Students could select one strategy (e.g. dykes or amphibious homes) and give a short presentation explaining how it works.

My flood project

Flood history

Provide students with 'My flood project' activity sheet. Students are to find out about the flood history of their town or city by conducting research at the local library, on the internet or at their local council. They will investigate whether a community flood plan exists and describe what it includes. If there is no flood plan, they will need to decide if it is important to have one and what it would contain.

Predicting and explaining floods

1

Students are to visit the Bureau of Meteorology website (www.bom.gov.au) and examine the rainfall maps. Using the climate data section of the website, they are to make a chart showing the monthly rainfall for the last six months in their state/area.

2

Using their chart and a rainfall map for their area, students are to explain how and when rainfall might cause floods in their community.

About floods

Floods occur when water covers land that is normally dry. They can be caused by prolonged or very heavy rainfall, severe storms or tropical cyclones, and the monsoonal (wet season) rains in the tropics.



**Other causes
include snow-melt
and dam failure.**

In the coastal regions of Australia, floods can also be caused by the sea. Seawater flooding can happen during storm surges, king tides and tsunamis.

People who live in low-lying areas, or close to rivers, creeks or major stormwater drains are usually most at risk from flooding. Heavy rains and storms in one area can cause flooding in another. When the water level of local rivers and streams rises it can cause them to overflow, sometimes spilling out over thousands of kilometres.

Flooding can be caused by a range of situations that include:

- seawater flooding – coastal areas may be flooded when a cyclone or severe storm causes a surge of sea water
- tidal flooding – floods that are caused by high tides that coincide with higher than normal river levels
- run-off from rivers and dams – flooding can be caused when river systems need to carry more water than usual following a snow-melt or when dams start to overflow
- urban drainage – flash flooding is a serious problem in some cities when the drainage systems fail. People can be caught in stormwater drains, trapped in their cars or even swept off the roads by water.

Is it always bad news?

Floods can have both positive and negative impacts. Sometimes floods can bring welcome relief for people, livestock and areas experiencing drought conditions.

Flooding can also be a natural way for wetland areas, swamps and native waterways to survive. Underground aquifers and soils with high salt levels also benefit from floods.

Types of floods

There are three common types of floods that affect Australia:

Slow-onset floods

Inland rivers in the vast, flat areas of Western Australia, central/western New South Wales and Queensland often flood. These floods may take days to build up, but can last for weeks or even months.

The damage caused by slow-onset floods includes:

- major loss of livestock
- rural towns being cut-off and isolated
- crop damage
- damage to roads and railways.

Rapid-onset floods

Rapid-onset flooding occurs more quickly than slow-onset flooding. Rapid-onset floods can be much more damaging and pose a greater risk to loss of life and property because there is generally less time to take preventative action from a faster, more dangerous flow of water. This type of flooding can affect most of our major towns and cities.

Flash floods

Flash flooding results from relatively short, intense bursts of rainfall, often during thunderstorms. It can occur in almost all parts of Australia and poses the greatest threat to life. People are often swept away after entering floodwaters on foot or in vehicles. These floods can result in significant property damage and major social disruption. They are a serious problem in urban areas where drainage systems are often unable to cope with large amounts of water in a short time.

Floods: Be prepared

If your house is in a low-lying area or near a watercourse (such as a lake, river, creek or drainage system) it could be flooded. This guide lists simple things that you and your family can do to stay safe and protect your property.

Be prepared

Know your local flood history

Check the following information with your local council or state or territory emergency service (SES):

- What the terms major, moderate and minor flooding mean for your area.
- At what official river height would your home become isolated or inundated?
- Your local flood plans – understand when you may need to evacuate and how to find the nearest safe location.

When you hear a flood warning or if flooding appears likely

- Tune in to your local radio station and listen for warnings and advice.
- Check that your neighbours also know of the flood warning.

- Prepare to move vehicles, outdoor equipment, rubbish, chemicals and poisons to higher ground.
- Plan which indoor items you will raise if water threatens to enter your home.
- Check your Emergency Survival Kit and remember your pets.

Act on flood warnings

When you hear a flood warning, you should:

- Stack your furniture and possessions above the likely flood-level. Make sure you have your electrical equipment on top.
- Secure objects that could float in the flood water and cause damage.
- Move rubbish and chemicals (such as poisons or fuel) to a high and secure place.
- If you have a shop or commercial property, relocate stock and equipment to a higher position away from the water.
- If you live on a farm, move livestock to high ground.
- Check your car and fill it with fuel.
- Check your emergency pantry list (<https://www.qld.gov.au/emergency/dealing-disasters/emergency-pantry-list>) and prepare an emergency kit (<https://www.ses.vic.gov.au/documents/112015/135368/Emergency+Toolkit-pdf/4f569017-36e6-4cb1-982a-67003016699b>)
- Make sure you have plenty of fresh water.

During a flood

If you need to evacuate

You may be asked to evacuate, but if you plan to leave early make sure you tell the police or SES and your neighbours. In either case, you should take the following actions:

- Pack warm clothing, essential medication, valuables, personal papers, photos and mementos in waterproof bags, to be taken with your Emergency Survival Kit.
- Raise furniture, clothing and valuables onto beds, tables and into roof space (electrical items highest).
- Empty freezers and refrigerators, leaving doors open (to avoid damage or loss if they float about).
- Turn off electricity, water and gas.
- Take your mobile phone.
- Put sandbags in the toilet bowl and over all laundry/bathroom drain-holes to prevent sewage back-flow.
- Don't forget your pets.
- Lock your home and take the recommended evacuation routes for your area.

- Never drive into water of unknown depth and current.

If you need to stay

If you remain in your home or when you return take the following precautions:

- Keep your Emergency Survival Kit safe and dry.
- Do not eat food which has been in contact with floodwater and boil all water until supplies have been declared safe.
- Don't use gas or electrical appliances which have been flood-affected until they have been safety checked.
- Beware of snakes and spiders which may move to drier areas in your house.
- Avoid wading, even in shallow water, as it may be contaminated.
- If you must enter shallow floodwater, wear solid shoes.
- Check with police for safe routes before driving anywhere and never enter floodwaters.
- Keep listening to your local radio or TV station and follow all warnings and advice.

After a flood

Flood water can be extremely polluted. The following tips will help you reduce the risk of injury, sickness or infection:

- Do not eat food which has been in contact with floodwater.
- Boil all water until supplies have been declared safe.
- Do not handle wet electrical equipment.
- Avoid wading, even in shallow water, as it may be contaminated.
- If you must enter shallow flood water, wear solid shoes or boots for protection.
- Beware of snakes and spiders which may move to drier areas in your house.

Check with police for safe routes before driving anywhere.

STUDENT ASSIGNMENT

Flood map of Australia

Student name:

Date / /

Research to find out where major floods have occurred from 1970 to the present day and mark the locations on this map.



STUDENT ASSIGNMENT

Investigating floods

Student name:

Date / /

Use a variety of information sources to find out the following about floods. Record your source/s.

How/why do floods occur?

Source/s:

Are there different types of floods? If so, how many and how do they differ?

Source/s:

Is there a difference in how much warning time we have for each type of flood?

Yes No

What are the impacts of having varying warning times?

Source/s:

Apart from rainfall, what else can cause floods?

Source/s:

STUDENT ASSIGNMENT

My flood project

Your flood history

1

What is the flood history of your town or city? Use your library, local council or the internet to find out.

2

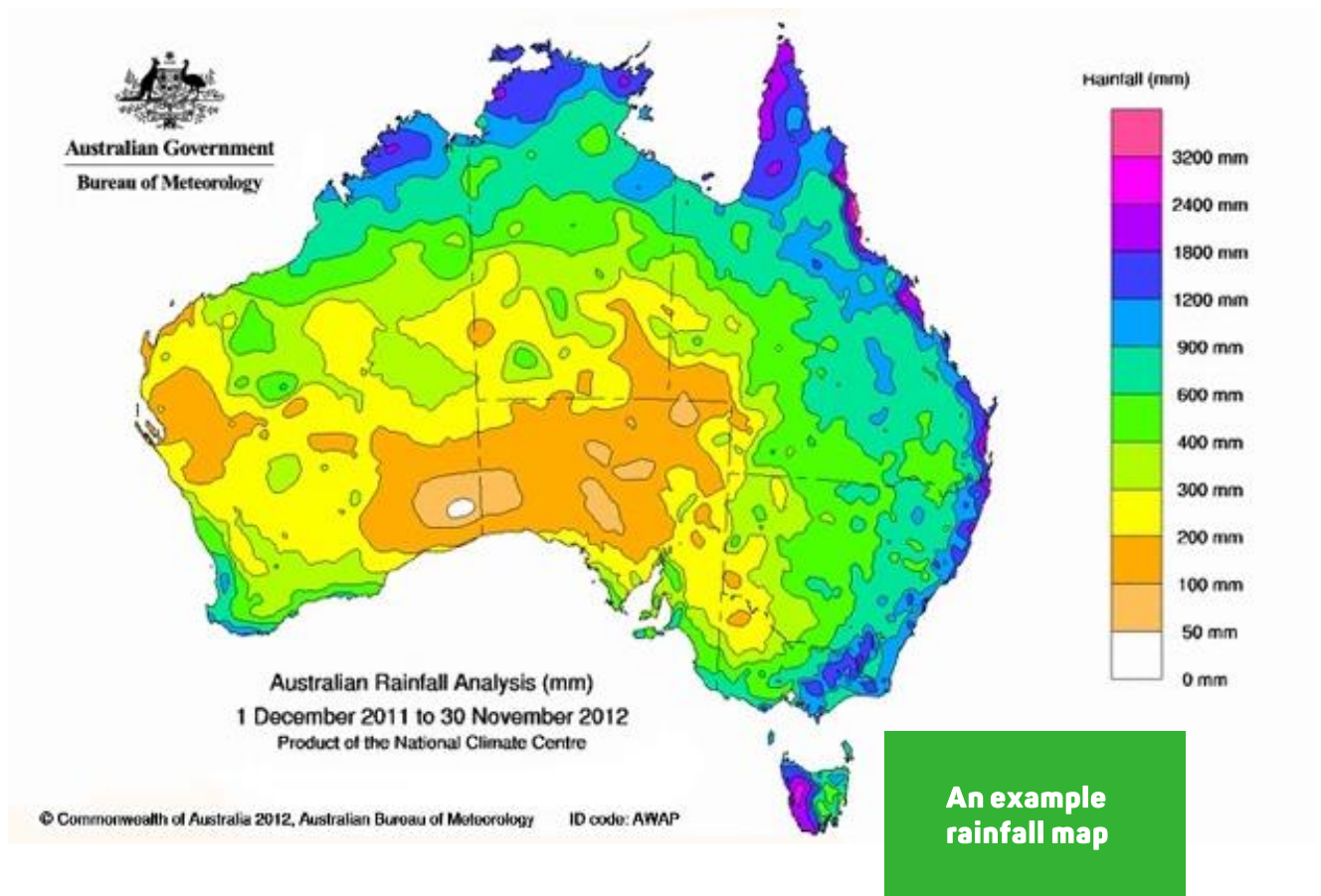
Is there a flood plan for your community?
What is it?

3

If there isn't a flood plan, do you think you need one and what should it include?

Predicting and explaining floods

Visit the Bureau of Meteorology (BoM) website <http://www.bom.gov.au/jsp/awap/rain/index.jsp> to view examples of rainfall maps.



Make a chart of the monthly rainfall in your state/area for the last six months (you will find this in the 'Climate Data Online' section of the Bureau of Meteorology website).

1

Check the rainfall deciles for your area. What sort of rainfall have you had over the last six months (below average, average or above average)?

2

Use your chart, and a rainfall map for your area to explain how and when rainfall may cause floods in your community.

Real life flood stories

Each year in Australia floods cause millions of dollars of damage.

Flooding affects buildings and critical infrastructure such as roads and railways as well as agricultural land, livestock and crops.

Floods also cause major disruptions to business and can affect the health of communities. Sometimes towns can be cut off; people may need to be evacuated and emergency services may carry out relief efforts.

Community flood prevention and reduction

Many communities have flood prevention or reduction strategies such as:

- restricting the building of houses on floodplains
- use of dams
- building of levees and flood diversion devices
- flood-proofing homes
- raising homes and businesses in known flood areas.

It is important to know your local flood history. Knowing your local flood plan, when you may need to evacuate and how to get to your nearest safe location can save lives.

Flooding in Australia

Floodwaters can affect many Australian towns, areas and even cross borders. The following are some examples of significant floods in Australia.

Queensland



DATE:

November 2010

In late November 2010, rain began falling in Queensland. On 25 December of the same year, Cyclone Tasha crossed the northern Queensland coast and brought flooding to major river systems.

On 10 January 2011, a wall of water swept through Toowoomba, then travelled west, flooding the towns of Oakey, Dalby, Chinchilla and Condamine for a second time, causing flooding through the Lockyer Valley, including Murphy's Creek, Postman's Ridge, Helidon, Grantham, Laidley, Lowood, Fernvale and Forrest Hill. The floodwaters affected Brisbane River systems, reaching heights that engulfed several towns and suburbs of Brisbane.

During January, extensive flooding affected 75 per cent of the state and a disaster zone was declared. Thirty-three people had lost their lives and approximately 3572 businesses were affected by flood water.

There were 5900 people evacuated from 3600 homes. Commercial loss was approximately \$4 billion across the mining, agriculture and tourism sectors. Nineteen thousand kilometres of roads were damaged. Three major ports were significantly affected. More than 28 per cent of the Queensland rail network was left twisted and displaced. An estimated 28,000 homes needed to be rebuilt while vast numbers of dwellings required extensive repairs.

A judicial inquiry into Queensland's floods started on 10 February 2011 and the final report was published in March 2012.

The Insurance Council of Australia estimated the 2011 damage at \$2.38 billion.

Coffs Harbour, New South Wales



DATE:

25 November 1996

A devastating flash flood hit Coffs Harbour when 168mm of rain (and up to 300mm in the area) fell in two hours on 25 November 1996.

Flash flooding

The November 1996 flood caused widespread devastation to property located on low-lying land beside the Coffs Creek. Around 260 residential homes and 200 commercial properties were flooded above floor level during this flash flood.

Flood damage, injuries and deaths

One woman died when she was swept more than one kilometre from her home and into the sea. Over 500 homes and 100 businesses were damaged and 300 people were evacuated. The flood caused extensive damage to roads and a disaster was declared with more than 800 properties flood-affected. Part of the local banana crop was also destroyed due to erosion and landslides. The damage was estimated to be worth more than \$140 million.

Mackay, Queensland



DATE:

February 2008

During the period 10-18 February 2008, a number of towns including Townsville, Bundaberg, Mackay, Rockhampton, Airlie Beach, Proserpine, Cooktown, Cairns and Ingham, were seriously affected by severe weather. Heavy rainfall and flooding resulted in widespread damage. There was damage to state infrastructure, buildings and houses; in Mackay alone 4000 houses were inundated with floodwater. The agriculture and horticulture industries suffered heavy losses.

The Insurance Council of Australia estimated the 2008 damage at \$410 million.

The Great Floods – New South Wales, Queensland and Victoria



DATE:

February 1990

The 1990 floods in eastern Australia were huge. The total area flooded was estimated to be more than one million square kilometres. That's an area larger than Germany.

Rainfall, river systems and flooding

In central-northern New South Wales and central-southern Queensland, continual heavy rains partly caused by cyclones drenched the flat inland plains. Further torrential rainfall created almost instant floods. Many rivers had already flooded once and were in flood again, this time at even higher levels.

The flooded river systems around northern New South Wales and southern Queensland made flood height prediction difficult. Residents of Nyngan, on the Bogan River, strengthened levee banks in expectation of a record flood height, but the flood waters exceeded the levees. Nearly every building in the town was flooded and almost 2500 people were evacuated, mainly by helicopters, under emergency conditions as all town services were lost.

Flood damage, injuries and deaths

Across the three affected states, the Great Floods of 1990 claimed seven lives, caused 60 injuries and left 5000 people temporarily homeless. The total estimated cost of these floods was \$415 million (1997 values). Most of this damage was insured.

Road and rail links were severed for a long time and many residents could not return to their home for three weeks or more. A huge 'tent city' was established at the Charleville Airport after the hospital was evacuated.

Brisbane, Queensland



DATE:

January 1974

This major flood was the result of heavy rains caused by Cyclone Wanda. Wanda crossed the Queensland coast 150 kilometres north of Brisbane on 24 January 1974, and was weakening when she caused minor wind damage, but five days of heavy rain in Brisbane.

Rainfall and record flooding

Before Cyclone Wanda came ashore, there was already some flooding in and around Brisbane. Among the highest rainfall recordings were 1318mm (1.3 metres), whilst in Brisbane itself 819mm of rain fell. Many houses that bordered rivers and creeks were washed away as rivers rose to their highest levels since the disastrous 1893 floods.

Flood damage, injuries and deaths

During the 1974 floods, 16 people died, 300 people were injured, 8000 people were made homeless and 56 homes were swept away. Approximately 1600 homes were submerged by the floodwaters.

At the height of the flood, ships were torn from their moorings. A large oil tanker on the Brisbane River was damaged and the total damage bill was estimated to be around \$980 million.

Related links

Geoscience Australia, 'What is a flood?'

<http://www.ga.gov.au/scientific-topics/hazards/flood/basics/what>

Geoscience Australia, 'Major historic floods'

<http://www.ga.gov.au/scientific-topics/hazards/flood>

Bureau of Meteorology National Flood Warning Services

<http://www.bom.gov.au/australia/flood/>



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