Severe storm lesson plan

In this lesson students investigate the features and impacts of severe storms and related atmospheric hazards such as lightning.

Students research examples of severe storms in the past and the effects of these events on people and environments. Students demonstrate protective actions to prepare for and respond to severe storms.

Australian Curriculum: Geography
UPPER PRIMARY / LOWER SECONDARY

ITEMS

- Teacher lesson plan
- Student assignments
- About severe storms
- Real life stories
- Severe storms: Be prepared
- Related links

Australian Institute for Disaster Resilience

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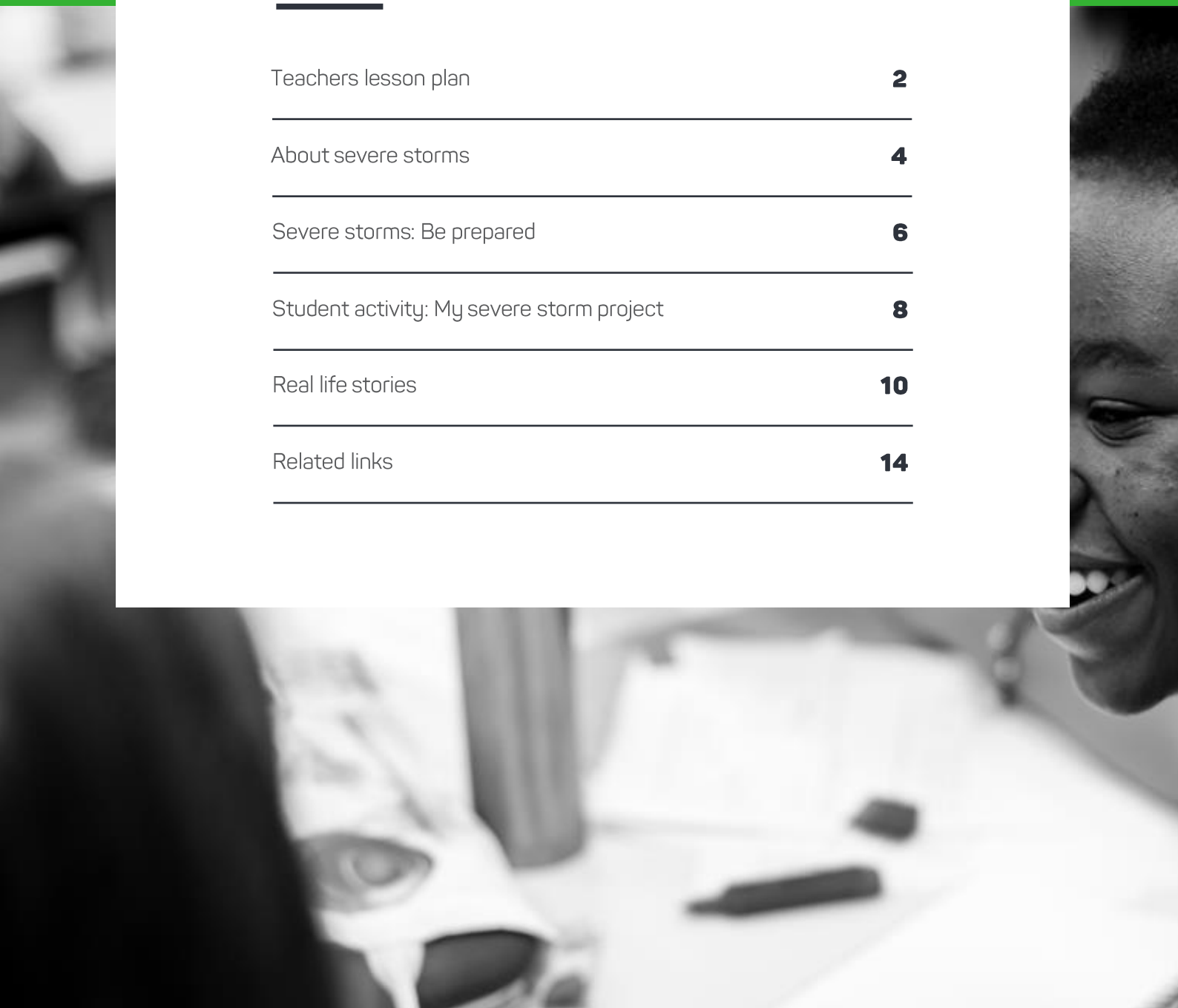

Severe storm lesson plan

Objectives

Participating in this lesson will enable students to:

- describe the features of severe storms
- research historical cases of severe storms and present evidence of the impact of these on communities
- identify ways to prepare for and respond to severe storm events

REQUIRED RESOURCES

- Computers with internet access
- Education for Young People website
- Resources for making posters or multimedia presentations
- 'My severe storm project' activity sheet

Learning areas

YEAR 7 GEOGRAPHY

ACHGK042	Causes, impacts and responses to an atmospheric or hydrological hazard
ACHGS047	Develop geographically significant questions and plan an inquiry, using appropriate geographical methodologies and concepts
ACHGS048	Evaluate sources for their reliability and usefulness and select, collect and record relevant geographical data and information
ACHGS052	Apply geographical concepts to draw conclusions based on the analysis of the data and information collected
ACHGS053	Present findings, arguments and ideas in a range of communications forms selected to suit a particular audience and purpose
ACHGS054	Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge

Lesson steps

In pairs, or small groups, students to review the information on the Severe storms: Be prepared page then answer the following questions:

- What are some strategies we should put in place before a storm?
- What are some items that are contained in an emergency survival kit?
- What actions should you take when a severe storm approaches?

After a brief discussion, allow the students to list the actions they would need to take:

- before the storm season
- as the storm approaches
- when the storm strikes
- after the storm has passed.

Students then design a poster or a multimedia presentation to share the information.
Alternatively, students could use the scenario below to design a community advertising campaign to prepare local residents and visitors for severe storm season.

Scenario: Oaksville

Oaksville is an area prone to severe storms. The beauty and natural surrounds of the area mean that it is a favourite visiting place for thousands of tourists every year, particularly in spring and summer (the storm season).

Students may wish to design two separate posters, one for the residents and one for the tourists, as the different audiences will affect the type of information presented. Students should consider:

- where to go during a storm
- how to get there
- what places are unsafe during a storm
- what they should have in their emergency survival kits
- who can help in an emergency.

About severe storms

For a thunderstorm to be created, it needs three main ingredients: moist air, an unstable atmosphere, and a weather event like a front, trough or area of low pressure.

When you mix these together, thunderstorms can develop. These can be moderate storms, severe storms, multicellular storms or supercell thunderstorms.

Severe storms

A severe storm, also known as a thunderstorm, is a storm that consists of strong winds, heavy rain, lightning, thunder and possibly hail. They can result in tornadoes or cyclones and cause flooding and extensive damage. The Bureau of Meteorology defines a severe thunderstorm as a storm producing any of the following effects:

- hailstones larger than 2 cm in diameter
- wind gusts of more than 90 km per hour
- flash flooding
- tornadoes or 'twisters'.

How are severe thunderstorms created?

Severe thunderstorms are created when cooler air begins to push warmer, humid air upwards. As the warm air rises rapidly in an unstable atmosphere, the cloud builds up higher and higher and begins to spread.

A thunderstorm can quickly develop when the atmosphere remains unstable or if it gathers additional energy from surrounding winds.

Hail

Hail can form within a thunderstorm when the air is much cooler than the water vapours that make the cloud. When the cooler air freezes the water, droplets fall as hailstones rather than raindrops. Hail can range from a few millimetres in diameter to the size of a tennis ball.

Lightning

As the air becomes warmer, clouds build and expand in size. In every cloud there are positive and negative electrons (charges). The positive charges are at the top of a cloud and the negative charges sit towards the bottom. As a cloud grows, it creates a gap between the two charges, which causes a spark, known as lightning. Lightning can occur inside a cloud, between clouds, and between clouds and the ground.

Thunder

Thunder is caused when the lightning rapidly heats the air that surrounds it, causing an explosive effect. The air around a lightning strike can be heated to temperatures as high as 30,000°C in just a fraction of a second.

Where do severe storms occur?

Severe storms can occur anywhere in the world; Uganda and the Democratic Republic of Congo, both in Africa, have the highest frequency of lightning. Australia has several severe storms each year, with most occurring between September and March. Thunderstorms usually occur during these months as more of the sun's energy is available and the weather patterns of spring and summer are favourable for storms.

Severe storms: Be prepared

The information below will help you to minimise damage and injury during a severe storm.

Before the storm:

- Clear or secure all loose materials (metals, tools, large bits of wood) from around your house and garden.
- Trim large branches, especially those hanging over the house and around powerlines. Be sure to engage a qualified contractor to remove the branches over powerlines; if you feel that a specific area needs attention, inform your council. Never attempt to do it yourself.
- Have a battery-operated radio with fresh batteries at hand.
- Have masking tape on hand in case you need to tape the windows in the threat of a storm.
- Prepare a list of emergency contact numbers.
- Check your emergency pantry list (https://www.qld.gov.au/emergency/dealing-disasters/emergency-pantry-list).
- Prepare an emergency kit (https://www.ses.vic.gov.au/documents/112015/135368/Emergency+Toolkit-pdf/4f569017-36e6-4cb1-982a-67003016699b).

During the storm:

- Listen to the radio for important information and updates.
- Secure all pets.
- In the event of strong winds, tape your windows with an 'x' and then a '+' (so it creates a star '*' pattern).

- Remain inside the house in a strong, safe location.
- Have an emergency survival kit and make sure your family can access it.
- Keep clear of windows, glass, pipes and anything metal.
- If outdoors, shelter in a car and never under a tree.

After the storm:

- Listen to the radio for official information and guidance.
- Check your house for damage – if you find it is unstable and unsafe, find a strong part of the house to shelter in.
- Contact your state or territory emergency service (SES) if you require urgent assistance and seek help from neighbours and family.

Be aware: there could be fallen powerlines, unstable buildings and dangerous branches and trees.

STUDENT ACTIVITY

My severe storm project

The projects on this page will help you understand:

- the life cycle of a thunderstorm
- where severe storms occur around the world and why
- how lightning works
- the various types of clouds and how they are formed.

1 Storm chasers

Find out about the lifecycle of a thunderstorm. Research each of the three stages until you are familiar with them.

How do these stages compare to those of other types of storms such as:

- hurricanes
- tornadoes
- typhoons
- cyclones.

Select a region of a country that is susceptible to severe storms.

- What kinds of storms have occurred in this area?
- How often do these happen e.g. every cyclone season (is that summer or winter)?

Write a short article about the storm and your journey in chasing the storm. Your article could include:

- Where did the storm begin?
- What was the track of the storm?
- What were some things you witnessed?
- What were your findings?

List some interesting facts about the storm.

Present your journey to your teacher and your class. Use visual aids to make your presentation more effective and interesting. You can draw your own pictures or find them on the internet or in magazines. Make sure you reference any images used.

2 Rain, hail or... lightning?

There are different types of lightning.

Your task:

1. Explain how lightning is formed.
2. Research the different types of lightning. Select three and describe them. Use words and illustrations to do this.
3. Explain what makes them different to each other?

3 On cloud nine

Present a project to your class and teacher about clouds. There are numerous types of clouds. Find information about five different types of clouds. You can use cotton wool and other materials to demonstrate the different clouds.

4 Creative writing

You are a droplet in the sky, part of a very big cloud. Write a descriptive story, poem, song or piece of literature about your experience.

Real life severe storm stories

There are many severe storms in Australia each year and some result in extensive damage.

Below are stories of severe storms that have caused major damage.

Severe storm, Melbourne

DATE :
25 December 2011

LOCATION :
Victoria

Severe thunderstorms developed near Ballarat, to the west of Melbourne, at approximately 2.30 pm on Christmas Day. Over the next seven hours up to five severe, long-lasting thunderstorm cells moved eastwards across the northern suburbs of Melbourne.

Thousands of homes were damaged as the thunderstorms swept across the city bringing flash flooding and hail. The SES received more than 4200 requests for help. There were reports of two tornadoes in Fiskville and Melton and cars being overturned.

The Insurance Council of Australia declared the weather event as a catastrophe. The insurance industry received up to 30,000 claims for damage to houses, businesses and motor vehicles. The Insurance Council of Australia estimated the cost of the damage at $680 million.

Severe storm, Perth

DATE :
22 March 2010

LOCATION :
Western Australia

Severe thunderstorms occurred on 22 March 2010 in Perth and the southern parts of Western Australia. Large hail, heavy rain and severe winds caused considerable damage. Over 150,000 properties lost power, and the number of requests for help from FESA and SES exceeded 3000, a record number for a single storm since the May 1994 wind storms. Many hospitals were damaged and up to 15 schools were closed the following day due to damage from the storm.

Large hail (up to 4-6 cm) hit some suburbs and badly damaged cars and houses. It also blocked gutters and drains, causing extensive flooding to houses, businesses and the University of Western Australia's library. A landslip occurred at Kings Park and several apartment towers required evacuation as mud flowed into lower levels threatening the buildings' stability.

The Insurance Council of Australia estimated the 2010 damage at over one billion dollars.

Tornado, Lennox Head

DATE :
3 June 2010

LOCATION :
Mew South Wales

On 3 June 2010, a tornado which formed at sea off Lennox Head, hit the town with damaging winds exceeding 150 km per hour. The water spout, similar to a mini-tornado, caused flash flooding. Approximately 30 houses were extensively damaged, roofs were ripped off and power poles blocked some roads. The local caravan park also sustained damage.

The town was declared a disaster zone.

Hail storm, Canberra

DATE: 27 February 2007

LOCATION: ACT

At 9 pm on 27 February 2007, the Bureau of Meteorology issued a severe storm warning for the Australian Capital Territory. There was an electrical storm for a few hours prior to the warning. Later that night, Canberra received some rain, but it was mostly hail.

Hailstones, approximately 2 cm in diameter, blanketed the city causing flooding of streets and homes. Roads were closed due to the damage and bulldozers were called in to clear away the piles of hail that continued to line the streets over the next two days.

Thunder storm, Gracemere and Rockhampton

DATE: 12 February 2007

LOCATION: Queensland

On 12 February 2007, supercell thunderstorms moved through the Gracemere and Rockhampton areas of Queensland. The storms produced hailstones the size of golf balls and caused damage to homes, cars and buildings. Many large trees were brought down by the strong wind gusts which caused traffic chaos. Hail up to 3 cm in diameter was also reported west of Ipswich on the same day.

Severe storm, Darwin

DATE: 27-28February

LOCATION: Northern Territory

On 27 February 2005, a series of storm cells formed a line which moved though Darwin city. More than 1000 homes lost electricity due to power surges from lightning strikes or trees and falling branches touching powerlines. A line of storms also crossed the Darwin area in the early evening of 28 February. A large steel tank (approximately 15 m high and 13 m in diameter) under construction at East Arm Wharf (in southern Darwin) partially collapsed due to wind gusts from the storm.

Hail storm, Sydney

DATE :
14 April 1999

LOCATION :
New South Wales

On the night of 14 April 1999, a severe hail storm hit Sydney causing damage to homes and cars. Emergency services from the Australian Capital Territory and Victoria came to assist the New South Wales emergency services as residents called 000 for assistance. The damage was estimated at over a billion dollars.

Related links

What is severe weather?
http://www.ga.gov.au/scientific-topics/hazards/severe-weather/basics/what

What causes severe weather?
http://www.ga.gov.au/scientific-topics/hazards/severe-weather/basics/causes

Severe thunderstorms in NSW and ACT
http://www.bom.gov.au/nsw/sevwx/index.shtml

Severe thunderstorms
http://www.bom.gov.au/info/thunder/

Severe storms archive
http://www.bom.gov.au/australia/stormarchive/

Australia severe weather
http://australiasevereweather.com/

Severe weather basics
http://www.ga.gov.au/scientific-topics/hazards/severe-weather/basics

Severe weather response
http://www.ses.sa.gov.au/site/about_us/what_ses_does/severe_weather_response.jsp

Storm safe
https://www.ses.vic.gov.au/get-ready/stormsafe

Tasmania storm safe
http://www.ses.tas.gov.au/h/em/awareness/storm/stormsafe

Storm spotters
http://www.bom.gov.au/storm_spotters/index.shtml

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