



Cyclone and Flood

Teachers' Guide Years 4 – 7

Building Disaster Resilience in Young People



FOR A SAFER STATE

Content

Contacts.....	2
About this resource	2
Adding ‘disaster’ to your schools’ resilience education program	3
Links between home, school, and community	5
Children and young people’s experience with cyclone and/or flood.....	7
Cyclone and flood classroom resources learning outcomes	7
Modules	9
School and home cyclone and/or flood emergency planning	10
Inviting guests into the classroom.....	11
Parent/Carer Information Sheet – FAMILY CYCLONE PLAN.....	12
Parent/Carer Information Sheet – FAMILY FLOOD PLAN.....	13
Curriculum Links	14
Module 1: Understanding Tropical Cyclones	19
Module 2: What’s in a name? Tropical Cyclones	23
Module 3: Understanding Floods	27
Module 4: Staying Safe in Cyclone and Flood	30
Module 5: Have a Plan – Cyclone and Flood.....	34
Module 6: Responding to Cyclone and Flood	40
Cyclone and Flood Worksheets	46

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About this resource

This Department of Fire & Emergency Services' (DFES) resource was developed for teachers to use in classrooms across Western Australia. Its focus is on natural hazards education and lessons cover cyclone and flood.

For FLOOD only, omit Modules 1 and 2.

For TROPICAL CYCLONE, consider doing all six modules.

The program serves as a teaching resource for students in Years 4 -6 in primary schools and links to the Western Australian Curriculum.

The overarching outcomes of the resources is to give students the knowledge and understanding of cyclone and food risk, including the consequences of risky behaviours during cyclone and flood season; as well as knowing their school and home emergency plan. The program aims to develop a range of skills to help students prepare and respond to cyclone and/or flood. This includes packing an emergency kit.

This education resource is aimed at teachers and provides lesson plans, video links, fact sheets and worksheets for upper primary school in Years 4-6. The lessons are ideally delivered as a whole unit of work, so that students are better able to work towards achieving all disaster risk outcomes.

Before beginning any part of the program, we recommend sourcing photographs of images of cyclones and/or floods that have occurred in your region. Use these to introduce the topic and have students identify what they know and don't know about cyclones and/or floods and what they would like to find out. Revisit this information throughout the learning process and reflect on what they have learnt so far and what they still need to find out. Prompt students with questions, such as:

- What does a tropical cyclone and/or flood look like, sound like and feel like?
- How do tropical cyclones and/or floods occur?
- Where and when do tropical cyclones and/or floods occur?
- How often do tropical cyclones and/or floods occur in WA?
- What is the most dangerous tropical cyclone or largest flood to occur in WA?
- Could you have a tropical cyclone and/or flood where you live?
- Can you prepare your home for a tropical cyclone and/or flood?
- How can you prepare your home for a tropical cyclone and/or flood?
- What do you do in a tropical cyclone and/or flood emergency?

Adding 'disaster' to your schools' resilience education program

Children and young people are recognised as a vulnerable group in a world in which we are experiencing a global increase in disasters¹. The 2021 Children's Climate Risk Index (CCRI)² indicates that almost every child on Earth is exposed to at least one climate and

¹ UNESCO & UNICEF, 2014. *Towards a Learning Culture of Safety and Resilience: Technical guidance for integrating disaster risk reduction in the school curriculum*. New York: UNESCO

² UNICEF, 2021. [The climate crisis is a child rights crisis: Introducing the Children's Climate Risk Index.](#)

environmental hazard, such as floods, cyclones, severe storms, bushfires, earthquake and or tsunami.

These Disaster Resilience Education (DRE)³ resources aim to provide opportunities for children and young people to identify and solve problems with respect to their own cyclone and flood preparedness, at school and at home. A national survey⁴ of children and young people in 2020 found that those surveyed felt they had learnt more about earthquakes in school than the natural hazards that present the most risk to them, that is, flood and bushfire. Children and young people surveyed wanted to know more about the actions they could take to be better prepared for flood and bushfire; and to be able to look after themselves, others, and animals.

Cyclone and Flood education traditionally fits the Human and Social Science (HASS) curriculum, in both Year 5 Geography (flood) and in Year 7 Additional Content (tropical cyclone, severe storms and flood); as well as Year 6 Science as a Human Endeavour.

Year 5 HASS ACHASSK114 (Geography)

- The impact of ...floods on environments and communities, and how people can respond.
 - Mapping and explaining the location, frequency, and severity of flooding in Australia
 - Researching how the application of principles of prevention, mitigation and preparedness minimizes the harmful effect of ...flooding.

Year 7 HASS Additional Content ACHGK042 (Geography)

- The causes, impacts and responses to an atmospheric (tropical cyclone or severe storm) or hydrological hazard (flood).
 - Explaining the physical causes and the temporal and spatial patterns of an atmospheric or hydrological hazard through a study of storms, tropical cyclones, or floods
 - Explaining the economic, environmental, and social impacts of a selected atmospheric or hydrological hazard on people and places, and describing community responses to the hazard

Year 6 Science / Science as a Human Endeavour / Use and Influence of Science ACSHE100

- Scientific knowledge is used to solve problems and inform personal and community decisions

³ Australian Institute for Disaster Resilience (AIDR, 2021). Disaster Resilience Education for Young People Handbook https://knowledge.aidr.org.au/media/8874/aidr-handbook_dreyp_2021.pdf

⁴ Australian Institute for Disaster Resilience (AIDR, 2020). *Our World Our Say: National survey of children and young people on climate change and disaster risk.*



- researching the scientific work involved in global disaster alerts and communication, such as cyclone, earthquake, and tsunami alerts (severe storm and flood)
- investigating how understanding of catastrophic natural events helps in planning for their early detection and minimising their impact
- recognising that science can inform choices about where people live and how they manage natural disasters

However, if students live in areas commonly impacted by cyclones and floods, parts of this resource are relevant to students across all years of schooling as part of your school's resilience education program within Health and Physical Education (HPE) curriculum.

In HPE, children learn about safe and unsafe behaviours and who can help them in an emergency; and strategies they can implement to keep themselves safe in different situations from childhood through to late adolescence. Throughout late childhood and adolescence, students examine how to respond when peers encourage them to take unnecessary risks; and collaborate with their classmates to come up with strategies they can use in emergencies or when they feel unsafe. For adolescents, peer pressure can determine whether they participate in unsafe practices such as swimming in floodwater, going outside in a severe tropical cyclone or driving through floodwater.

Links between home, school, and community

Research into children and young people's experience of disasters across Australia shows that the impacts of cyclone and/or flood can be significantly reduced if communities are well prepared and equipped with the knowledge and skills to respond before and when these hazards occur.

Children and young people who have experienced floods or bushfires in QLD, NSW and Victoria have told researchers that they want to be involved in emergency planning at school and at home. They also need to be assured that their parents/carers, teachers, and principals are well prepared and can remain calm in a cyclone and/or flood emergency.

Adults can encourage children and young people to be involved in cyclone and/or flood plans by including them in the planning process from a young age, giving them active roles in preparing themselves, their homes, and schools. Meaningful activities can include cleaning up; putting things away; and putting together emergency kits and relocation kits for their classroom and their homes. When given the chance to contribute to cyclone and/or flood planning and executing the plan, children and young people are less likely to be anxious and more likely to be prepared for a cyclone and/or flood emergency.

These resources provide a crucial link between your school's cyclone and/or flood risk management plans and your students' own family cyclone and/or flood survival plans. It uses



a whole of school / community approach to help build disaster resilience across all years of schooling, not just Years 4 to 7. It provides opportunities for schools to connect with their local government, community groups and their local emergency services.

By means of interactive and engaging learning activities, the activities in these resources encourage students to invite and include all school staff and students to be part of the learning process and works towards building positive and respectful partnerships with families and the wider community.

To encourage a whole of school approach, you will find:

- Opportunities to help guide children to talk with their families about what they have learnt.
- Ideas on how students can engage with their school and wider community
- Child-parent interactive homework to develop household emergency plans.
- Activities which encourage a 'kids teaching kids' model where students can teach others about cyclone and/or flood risks and the importance of having a plan.
- Suggestions on how to engage non-teaching school staff in the cyclone/flood program.
- Ideas on how to engage with local emergency services and DFES regional offices.

To encourage household and family involvement in the learning program, a *Parent Information Sheet* is provided, for teachers to send home with students.

This program reflects an inquiry approach where students are directing their learning and applying it to their own location. The key outcomes include:

- Understanding the causes and effects of cyclone and/or flooding in Western Australia
- Identifying cyclone and/or flood risk
- Developing personal behaviours and strategies for staying safe when there is a cyclone and/or flood
- Knowing your schools plan for a cyclone and/or flood emergency and putting it into practice
- Developing a family plan for a cyclone and/or flood emergency and having an emergency kit
- Discovering how science and technology is used to measure, predict and warn us about cyclone and/or flood risk
- Knowing where and how to find information, alerts, and warnings prior to, during and after a cyclone or flood emergency.



Children and young people's experience with cyclone and/or flood

In some school communities, there are families who may have had challenging personal experiences with cyclone and/or flood. Please be aware of any students in your class who may find the topic distressing. Providing there is no psychological trauma, it may be possible to invite family members of students into the classroom to share their stories about cyclone and/or flood, how they prepared and what they learned and would do different next time.

Cyclone and flood classroom resources learning outcomes

Disaster risk reduction education is about building students' understanding of the causes, nature and effects of hazards while also developing a range of skills to help prevent and lessen the impact of a disaster.

DRR education has the following dimensions⁵:

- Dimension 1: Understanding the science and mechanisms of natural disasters – why they happen; how they develop; where they occur; their frequency; and their physical impacts.
- Dimension 2: Learning and practising safety measures and procedures
- Dimension 3: Understanding risk and how hazards can become disasters
- Dimension 4: Building community risk reduction capacity by identifying local hazards and developing plans to respond to them
- Dimension 5: Building a culture of safety and resilience

The intended Disaster Risk Reduction Outcomes of the *Cyclone and Flood* program are:

1. Students stay indoors during a cyclone until the All Clear.
2. Students stay away from and do not play in floodwater.
3. Students seek help from an adult when there is a cyclone and/or flood.
4. Students know to call Triple Zero in a life threatening emergency and the State Emergency Service (SES) 132 500 when there is a cyclone and/or flood risk.
5. Students understand the causes, effects and frequency of cyclones and/or floods.
6. Students are able to inform others of how weather can increase cyclone and/or flood danger and create unsafe conditions.
7. Students know to remain alert to their surroundings, especially near waterways.
8. Students know how to find alerts and warnings on the Emergency WA website (and other sources) and communicate these warnings to an adult.
9. Students develop a cyclone and/or flood emergency plan with their families.

⁵ UNESCO & UNICEF. 2012. *Disaster Risk Reduction in School Curricula: Case studies from thirty countries*. Geneva: Switzerland. <http://unesdoc.unesco.org/images/0021/002170/217036e.pdf>



Short for time?

Familiarise students with the DFES website:

Tropical Cyclone

(dfes.wa.gov.au/cyclone)

What are cyclones?

Dangers

Know your risk

Travelling

Stay informed

Prepare for a cyclone

- *When to prepare*
- *Your cyclone plan*
- *Emergency kit*
- *Your property*

During a cyclone

- *What to expect*
- *Cyclone alerts*
- *Leaving early*
- *Sheltering*
- *Stay informed*
- *In life threatening situations*
- *Wait for the all clear*

Recovering from a cyclone

- *What to expect*
- *Damaged homes*
- *Insurance and repairs*
- *Your wellbeing*

Flood

(dfes.wa.gov.au/flood)

When to prepare

Alerts and warnings

Your flood plan

Emergency Kits

Your property

Prepare for a flood

- *When to prepare*
- *Alerts and warnings*
- *Your flood plan*
- *Emergency Kit*
- *Your property*

During a flood

- *Leaving early*
- *Travelling*
- *Staying at home*
- *In life threatening situations*
- *Wait for the cancellation*
- *Stay informed*

Recovering from a flood

- *After a flood*
- *Damaged home*
- *Insurance, repairs, and rebuilding*
- *Your wellbeing*

Emergency Alerts and Warnings - EmergencyWA

(emergency.wa.gov.au)

- DFES and the [Bureau of Meteorology \(BoM\)](https://www.bom.gov.au) work together to inform the community when there is a cyclone or flood risk. Once BoM issue a Tropical Cyclone or Flood Watch or Warning, DFES will provide warnings and advice on Emergency WA.



Modules

This resource includes six modules:

Module 1: Understanding tropical cyclones

Module 2: What's in a name (TC)?

Module 3: Understanding floods

Module 4: Staying safe

Module 5: Having a plan

Module 6: Responding to cyclone and flood

Each module is structured as illustrated below:



Title of Module
Subtitle



About this lesson

- Overview of the lesson

Background information

- Information needed to teach the lesson or complete activities
- May include links to online content, including images and video

Key messages

- Key messages featured in the module

Learning outcomes

- Student learning outcomes

Things you will need

- What you will need to gather or organise for students to complete all of the module

Activity #:

- Each module contains a number of activities

Extension:

- Opportunities for students to apply the information further or extend their knowledge and understanding

In the community:

- Opportunities for students to engage with their school community, home or local community and demonstrate what they have learned



School and home cyclone and/or flood emergency planning

If your school is in a coastal area in North West Western Australia, cyclones are a real risk to you and your students and your school buildings and grounds. Although flooding is associated with cyclones in the north and with severe storms and heavy rainfall in the south-west and Great Southern, any part of Western Australia is subject to flooding at any time of the year. Speak to your school management team about your school's cyclone and/or flood plan.

It would be highly valuable for you to organise and conduct school or classroom cyclone and/or flood drills while undertaking this learning program. Make sure that students understand what a drill is and why it is important. Involve students in an activity where they reflect on how effective the drill was and how it could be improved.

Armed with this knowledge, they are then better able to initiate and/or discuss their own cyclone and/or flood emergency plans with their families.

DFES encourage all households in coastal areas in the Kimberley, Pilbara, and Midwest Gascoyne to have a Cyclone Plan. This should also include planning for a flood emergency. Families in the southwest and Great Southern are encouraged to have a Flood Plan for their household.

Module Five (*Having a Plan – Cyclone and/or Flood*) asks students to develop a basic Cyclone and/or Flood Plan with their families as a homework task. A plan will help families make important decisions like, when to go, which way to travel, where to go and what to take. This is a particularly important component of the learning program as a household Cyclone/Flood Plan will give families the best chance of surviving a cyclone and/or flood.

It is recognised that this activity may be difficult for some students where parents or guardians are unwilling or unable to participate. Instead, encourage students to chat together, to share ideas and consider:

- Who do we need to contact in an emergency?
- Where is the safest place in our home during a cyclone or flood?
- If needed, where will we relocate to, which way will we go and how will we relocate safely?



Inviting guests into the classroom

Inviting guests into the classroom is a wonderful opportunity for students to ask questions of an expert. Students can gain a better understanding about local cyclone and/or flood risks in their community; Aboriginal and Torres Strait Islander stories of cyclone and flood; environmental risks to plants, animals, and the places they love; risks to homes, other buildings, and infrastructure; and are able to share their own acquired knowledge, skills, and plans.

When inviting guests, communicate clearly with them before they visit to ensure they understand what you require and what they can expect. It may even be helpful to provide them with a list of students' questions if possible.

Guests could include:

- Local State Emergency Services (SES)*
- A visit from your local DFES regional office District or Area Officer
- Local Aboriginal Elders to provide information about the seasons and the impact and benefits of cyclone and flood on Country
- Local government representative
- Parks and Wildlife volunteers to discuss impact of cyclones and floods on native animals and habitats. (Visit the Department of Biodiversity, Conservation and Attractions).
- Staff and parents who can share their own cyclone and/or flood experiences and emergency plans.
- Students from other schools in Australia who have experienced either cyclone and/or flood and are willing to share their experiences and to answer students' questions.

*Contact your local [State Emergency Service \(SES\) or DFES regional office](#) to organise a school visit. Please note that SES members are volunteers, with many of them working full-time and they may not be available to visit your school. The purpose of an SES visit is to reinforce key messages of the Cyclone and Flood resources, as well as enable students to ask pre-planned questions of volunteers. They can use this time to discover how and why people volunteer in their community, and how communities can work together to help prepare themselves for cyclone and/or flood.

An SES visit is designed to be delivered to one class at a time. The effectiveness of the presentation relies on students being able to interact with the volunteers and is not suitable for a large audience. Whilst SES volunteers may have some experience in working with children, they will need your help to make sure their session goes well. To ensure that all students benefit from this presentation, teachers are asked to take responsibility for their students' behaviour. SES volunteers may bring a troop carrier and arrange for your students to look through it and explore the equipment they use. This may not be possible, nor suitable for all lessons.





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Parent/Carer Information Sheet – FAMILY CYCLONE PLAN

Dear Parent/Carer

Our students are learning about cyclones and floods in Western Australia.

They have been asked to:

- **Complete a cyclone emergency plan with their families**
- **Put together an emergency kit**

If you already have a cyclone emergency plan, please give your child the opportunity to go through your plan with you and allocate them with some tasks. If you can: test or practise some, or all of the plan with them.

Make an emergency plan

To get started, visit dfes.wa.gov.au/cyclone or click on this [Prepare your Cyclone Plan](#) link.

The best plan is one that everyone in your household knows and has practised.

Find accurate cyclone and flood information before, during and after a cyclone.

- Visit Emergency WA emergency.wa.gov.au or listen to your local ABC radio.

Kind regards

73% of children and young people (surveyed) in Australia want to know how to plan and prepare for bushfire and other natural hazards, including cyclone and flood.

(Our World Our Say Youth Climate & Disaster Report, World Vision, 2020)

‘Children and young people want their families to have clear emergency plans and want to know where they can get accurate information...’ (Children & Young People’s Experience of Disaster, Office of the Advocate of Children & Young People, NSW, 2020)





FOR A SAFER STATE

Parent/Carer Information Sheet – FAMILY FLOOD PLAN

Dear Parent/Carer

Our students are learning about floods in Western Australia.

They have been asked to:

- **Complete a flood emergency plan with their families**
- **Put together an emergency kit**

If you already have a flood emergency plan, please give your child the opportunity to go through your plan with you and allocate them with some tasks. If you can: test or practise some, or all of the plan with them.

Make an emergency plan

To get started, visit dfes.wa.gov.au/flood or click on this [Prepare your Flood Plan](#) link.

The best plan is one that everyone in your household knows and has practised.

Find accurate flood information before, during and after a flood

- Visit Emergency WA emergency.wa.gov.au or listen to your local ABC radio.

Kind regards

73% of children and young people (surveyed) in Australia want to know how to plan and prepare for bushfire and other natural hazards, including cyclone and flood.

(Our World Our Say Youth Climate & Disaster Report, World Vision, 2020)

‘Children and young people want their families to have clear emergency plans and want to know where they can get accurate information...’ (Children & Young People’s Experience of Disaster, Office of the Advocate of Children & Young People, NSW, 2020)



Curriculum Links

HEALTH AND PHYSICAL EDUCATION: Personal, social and community health			
Year	Strand	Content Descriptors	Module
Year 4	Being healthy, safe and active	<ul style="list-style-type: none"> Personal behaviours and strategies to remain safe in uncomfortable or unsafe situations (being alert and aware of unsafe situations) Knowing who or where to go for help in the community Strategies to ensure safety and wellbeing at home and at school 	Four: Staying Safe in Cyclone and Flood Five: Have a Plan – Cyclone & Flood Six: Responding to Cyclone & Flood
	Communicating and interacting for health and wellbeing	<ul style="list-style-type: none"> Strategies to cope with adverse situations 	Four: Staying Safe in Cyclone and Flood Five: Have a Plan – Cyclone & Flood Six: Responding to Cyclone & Flood
Year 5	Being healthy, safe and active	<ul style="list-style-type: none"> Reliable sources of information that inform health, safety and wellbeing 	Six: Responding to Cyclone & Flood
Years 5/6	Contributing to healthy active communities	<ul style="list-style-type: none"> Preventive measures that promote and maintain and individual's safety 	Four: Staying Safe in Cyclone and Flood Five: Have a Plan – Cyclone & Flood
Year 7	Being healthy, safe, and active	<ul style="list-style-type: none"> Help-seeking strategies that young people can use in a variety of situations Strategies to make informed choices to promote safety. 	Four: Staying Safe in Cyclone and Flood Five: Have a Plan – Cyclone & Flood Six: Responding to Cyclone & Flood



SCIENCE: Science Understanding			
Year	Strand	Content Descriptors	Module
Year 4	Earth and space sciences	<ul style="list-style-type: none"> Daily and seasonal changes in our environment affect everyday life Earth's surface changes over time as a result of natural processes and human activity Sudden geological changes and extreme weather events can affect Earth's surface 	One: Understanding Tropical Cyclone Three: Understanding Flood
Year 6	Earth and Space Sciences	<ul style="list-style-type: none"> Sudden geological changes and extreme weather events can affect Earth's surface 	One: Understanding Tropical Cyclone Three: Understanding Flood

SCIENCE: Science as a Human Endeavour			
Years 3/4	Nature and Development of Science	<ul style="list-style-type: none"> Science involves making predictions and describing patterns and relationships 	One: Understanding Tropical Cyclone Two: What's in a Name?
	Use and Influence of Science	<ul style="list-style-type: none"> Science knowledge helps people to understand the effect of their actions 	Four: Staying Safe in Cyclone and Flood Six: Responding to Cyclone & Flood
Years 5/6	Nature and Development of Science	<ul style="list-style-type: none"> Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions 	One: Understanding Tropical Cyclone
	Use and Influence of Science	<ul style="list-style-type: none"> Scientific knowledge is used to solve problems and inform personal and community decisions 	Two: What's in a Name?



			Six: Responding to Cyclone & Flood
HUMANITIES AND SOCIAL SCIENCE: <i>Civics and Citizenship</i>			
Year	Strand	Content Descriptors	Module
Year 4	Government and Society	<ul style="list-style-type: none"> The purpose of government and some familiar services provided by local government The importance and purpose of laws 	Three: Understanding Flood (Extension) Six: Responding to Cyclone & Flood
Year 5	Roles, responsibility and participation	<ul style="list-style-type: none"> How regulations and laws affect the lives of citizens Why people work in groups to achieve their aims and functions, and exercise influence, such as volunteers who work in a community group. 	Three: Understanding Flood (Extension) Four: Staying Safe in Cyclone and Flood Six: Responding to Cyclone & Flood

HUMANITIES AND SOCIAL SCIENCES: <i>Geography, Knowledge and Understanding</i>			
Year	Strand	Content Descriptors	Module
Year 5	Factors that shape the environmental characteristics of places	<ul style="list-style-type: none"> The impact of cyclone and/or floods on environments and communities and how people can respond. 	Four: Staying Safe in Cyclone and Flood Five: Have a Plan – Cyclone & Flood Six: Responding to Cyclone & Flood
Year 7	The causes, impacts and responses to an atmospheric (tropical cyclone or severe storm) or hydrological hazard (flood).	<ul style="list-style-type: none"> Explaining the physical causes and the temporal and spatial patterns of an atmospheric or hydrological hazard through a study of storms, tropical cyclones, or floods 	Modules One to Six.



HUMANITIES AND SOCIAL SCIENCES: <i>History, Knowledge and Understanding</i>			
Year	Strand	Content Descriptors	Module
Year 5	The pattern of colonial development and settlement and how this impacted on the environment and daily lives of different inhabitants. The economic, social and political impact of one significant event on a colony and the potential outcomes created by 'what if...?' scenarios (e.g. TC Alby, 1900 Western Australia floods)	<ul style="list-style-type: none"> The impact of cyclones and/or floods on environments and communities and how people can respond. 	One: Understanding Tropical Cyclone Five: Have a Plan – Cyclone & Flood Six: Responding to Cyclone & Flood

Cross Curricula Subjects

Mathematics: Measurement and Geometry, Statistics and Probability; Scientific Enquiry; English: Creating Literature, Expressing and Developing Ideas, Interacting with Others, Creating Text; Humanities and Social Science Skills; Technologies

General Capabilities

Literacy; Information and communication technology capability; Critical and creative thinking; Personal and social capability; Ethical understanding; Intercultural understanding

Cross Curriculum Priorities

Aboriginal and Torres Strait Islander histories and cultures; Sustainability





Module One

Understanding Tropical Cyclone

About this Module

Students take part in a collection of activities, designed to give them a basic understanding of the impact a tropical cyclone has on Western Australian coastal areas. They discover when, where and how often tropical cyclones occur in Western Australia and the type of weather associated with tropical cyclones.

Background Information

A tropical cyclone is a natural hazard that brings with it damaging winds, heavy rainfall, flooding and storm surge. Cyclone activity produces strong onshore winds and flooding rains, which increases the threat of storm surge. Sea levels can rise rapidly as a tropical cyclone makes landfall resulting in storm surge impacting low-lying coastal areas during and after a cyclone. The heavy rainfall associated with cyclones can result in flash and broad-scale flooding.

Communities who do not experience a direct tropical cyclone impact can still experience widespread flooding. Western Australia experiences tropical cyclones every year, normally affecting the coast in the Kimberley, Pilbara and Midwest Gascoyne regions. Cyclones can also affect inland parts of northern WA and can travel down the coast and threaten communities further south. The coastline between Exmouth and Broome has the highest incidence of cyclones anywhere in Australia. This area is commonly referred to as 'Cyclone Alley'.

On average, five tropical cyclones are expected to form in waters off the northwest coast of WA each season between November and April. Two of these cyclones are likely to cross the northwest coast, with one crossing as a severe tropical cyclone. The average life cycle for most cyclones is one week. Many powerful tropical cyclones do not make it to land at all but complete their life cycle over water.

Tropical cyclones form in the warm tropical waters (at least 27 °C) north of Australia where they begin as a cluster of thunderstorms. If conditions are right, more thunderstorms form, winds increase and the system grows as it gathers its energy from the warm ocean and begins to spin in a clockwise direction. The cyclone's low-pressure centre (the eye) is calm, however the dense eye wall surrounding it is the strongest part of a cyclone.

The word 'cyclone' comes from the Greek word, 'Cyclops' – a giant with only one eye. The eye is usually 40km in diameter but depending on the size of the cyclone, ranges from 3km to up to 320km across. Tropical cyclones are the most powerful and destructive weather systems on the planet and can affect thousands of square kilometres of land. One severe tropical cyclone can release energy equal to two hundred times the world capacity to generate electricity.



Western Australia's most powerful and destructive tropical cyclone in recent years was Tropical Cyclone (TC) George. On 8 March 2007, TC George approached the Pilbara coast east of Port Hedland as a Category 5 cyclone. It crossed the coast 50km northeast of Port Hedland. Destructive damage occurred to mining camps and to many homes. Three people died and TC George left a damage bill of over eight million dollars.

A tropical cyclone can be frightening and traumatic. The wind can turn anything (trees, pot plants, trampolines, roofs, cars, etc.) into dangerous missiles, making it necessary and helpful for people to tidy up and prepare their homes and yards each season and before impact. Tropical cyclones can cause injury and/or death; cause major destruction to buildings and infrastructure; and, disrupt services such as power, water, telephone and mobile telecommunications.

Key Messages

- A tropical cyclone is a natural hazard bringing with it damaging winds, heavy rainfall, storm surge and flood.
- Tropical cyclones affect people, property and infrastructure.
- Tropical cyclones can impact coastal areas in the Kimberley, Pilbara and Midwest Gascoyne regions and affect inland parts of northern WA as well as communities further south.
- Western Australia experiences an average of five tropical cyclones between November and April each year, with two crossing the northwest coast.

Learning Outcomes

- Students are able to explain when tropical cyclones are most likely to occur in the northwest of Western Australia
- Students able to explain the average frequency of tropical cyclones in Western Australia.
- Students understand the impacts of tropical cyclone on people, places and infrastructure.
- Students are able to identify the main features of a tropical cyclone.

Year Level

Year 4 to 7

Things You Will Need

- Internet access
- Video: [Learning from the Past, Preparing for the Future](#)
- A class map of Western Australia or Australia
- *Tropical Cyclone Facts* and *Cyclops - a giant with one eye* information sheets
- Disaster Mapper <https://knowledge.aidr.org.au/disasters/>
- Bureau of Meteorology: <http://www.bom.gov.au/cyclone/about/>



Activity One: *Cyclone Facts*

- Students view the video: Learning from the Past, Preparing for the Future (watch the first two minutes of the video, from 00:00-2:08) and discuss the following:
 - When is the cyclone season? (November to April)
 - How many tropical cyclones do we expect to form in the ocean off the coast each year? (5 on average)
 - How many tropical cyclones are likely to cross the coast? (2)
 - How many severe tropical cyclones (very powerful cyclone, winds $\geq 165\text{kmh}$) are likely to occur? (1)
- Discuss where cyclones are most likely to occur in Western Australia. Cyclone Alley is the highest cyclone risk area in the world. Locate Cyclone Alley (from Broome to Exmouth) on a class map.
- Discuss what kind of weather cyclones bring with them? (Damaging winds, heavy flooding and storm surges). Search the internet for images of cyclone damage and examples of each of these phenomenon. Ask students to think about the similarities and differences between riverine flooding and storm surge.
- Divide the class into five groups, and using the information sheet *Tropical Cyclone Facts*, give each group a paragraph to read. Using highlighter pens, students highlight key words and phrases. Ask students to make bullet points, drawing out the key points, main ideas or pieces of information. Ask groups to report their findings back to the class and share what they have learned.

Activity Two: *The Anatomy of a Cyclone*

- Using a variety of pictures of a cyclops, ask students to use descriptive words to describe what a cyclops looks like (a giant with one eye, lives in warm places, a monster, etc.). Ask students to discuss what a cyclops has in common with a cyclone.
- Place the information sheet *Cyclops – a giant with only one eye* on the electronic whiteboard. Read through the page with the class. Discuss what is meant by the 'eye of the storm'. Discuss the size of a cyclone eye. Use areas on a class map to help students understand the scale of a tropical cyclone.
- Use the image of Tropical Cyclone Fay to draw and label the main features of cyclone formation (include the eye, the eye wall, main cloud bands and arrows showing the rotation of the cyclone).

Activity Three: *Major Tropical Cyclones in Western Australia*

- Go online and visit Disaster Mapper at <https://knowledge.aidr.org.au/disasters/> to investigate major tropical cyclones that have occurred in Western Australia.
- Ask students to explore the size and damage of Tropical Cyclone Seroja (2021) and determine how the state and local governments measured the cost of the disaster. Compare TC Seroja with other tropical cyclones that have impacted WA. How was this cyclone different from previous cyclones? (two tropical lows, the size of the cyclone, the



location of the cyclone, emergency situation declared for 45 local government areas, asbestos, number of homes and business without power, number of homes and businesses without telecommunications, number of personnel involved in the response, DFES response from Perth in COVID lockdown, etc.). Also consider, were there any fatalities, any people injured, insurance costs, the extent of damage to homes and building and infrastructure).

Extension

- Students consider a 'what if...?' scenario. Today we have scientists who predict tropical cyclones and the Department of Fire and Emergency Services is able to warn and provide advice to communities about potential cyclones. What if these warnings had been available one or two hundred years ago? Students use Disaster Mapper (or alternative) to identify a cyclone (e.g., Balla Balla Cyclone, 1912) that occurred in the past and think how outcomes would have been different had the cyclone occurred today? Consider fatalities, people injured, property destroyed, etc.

In the Community

- Ask students to design a poster informing new members to their community when the cyclone season is and what important information they need to be aware of. Place these posters in appropriate places around the school.
- Familiarise yourself with your school emergency plan for cyclone and/or flood. Start thinking about having a cyclone and/or flood drill for your school (or class). Having a drill helps students understand what they could do in an emergency situation (when not at school) and gives them the opportunity to provide input into school emergency management practices.





Module Two

What's in a Name? (Tropical Cyclone)

About this Module

Students explore the names of huge storms in different parts of the world and discover how cyclones that form in warm tropical Australian waters are named. Students explore the five different cyclone categories and damage they cause. Students learn about the roles of the Bureau of Meteorology and the Department of Fire and Emergency Services in Western Australia.

Background Information

Australia has tropical cyclones; America has hurricanes and the Philippines has typhoons, but did you know that cyclones, hurricanes and typhoons are the same thing? Their name indicates the oceans from which they originate. *Tropical cyclones* form over the South Pacific and Indian Oceans. *Hurricanes* form over the Atlantic, and, North and North East Pacific Oceans, whilst *typhoons* form over the North West Pacific Ocean.

The Bureau of Meteorology (BoM) provides a Tropical Cyclone Seasonal Outlook for Western Australia, northern Australia and Queensland in October or November each year. Tropical Cyclone Seasonal Outlooks predict the frequency and impact of cyclones for the coming season. BoM names all cyclones that form in the Australian region. They have pre-formed lists where names are in alphabetical order and alternate between male and female names. If a cyclone starts outside the Australian region, BoM will continue to use the name it was first given by another country. For example, in 2017, Cyclone Cook was named by Fiji's meteorological organisation before it entered the Australian region.

Wind speed is used to measure the severity of a tropical cyclone. Average winds must be at least 63 kilometres per hour near the cyclone centre (in the eye wall) for a system to be called a cyclone. Cyclones are categorised by the speed of their strongest wind gust. Category 5 cyclones are the strongest cyclones. Categories 3-5 are named 'Severe Tropical Cyclones'.

BoM provides forecasts, warnings, weather observations and advice to Australian communities from the Tropical Cyclone Warning Centres in Perth, Darwin and Brisbane. BoM issues tropical cyclone advices and warnings, as well as a Forecast Track map of the cyclone.

The Department of Fire and Emergency Services (DFES) in Western Australia is responsible for the planning, preparedness and response around tropical cyclones. DFES provides warnings and advices to communities in the cyclone's path. The Department of Fire and Emergency Services (DFES) work with Western Australian communities and other government agencies to help prevent, prepare for, respond to and recover from cyclones. The DFES State Emergency Service (SES) are volunteers who help us in a cyclone emergency.



Key Messages

- Cyclones, typhoons and hurricanes are all tropical storms. They are all the same but their names help us identify in which part of the world they formed.
- In Australia, the Bureau of Meteorology names tropical cyclones from pre-formed lists that alternate between male and female names.
- Wind speed is used to measure the severity of a tropical cyclone. There are five categories of cyclones, with Category 5 being the strongest.
- The Bureau of Meteorology (BoM) uses science to predict and monitor cyclone activity in the Australian region, providing forecasts, warnings, weather observations and advice to Australian communities.
- DFES is responsible for the planning, preparedness and response for tropical cyclones in Western Australia.

Learning Outcomes

- Students are able to explain the difference between cyclones, typhoons and hurricanes.
- Students are able to determine how tropical cyclones are named and can identify what the next tropical cyclone is likely to be called.
- Students can identify the typical wind effects and impacts of cyclone categories 1 – 5.
- Students can explain some of the roles that DFES and the Bureau of Meteorology (BoM) have before, during and after the event of a tropical cyclone.

Year Level

Year 4 to 7

Things You Will Need

- Internet access
- Images/newspaper articles on the largest storms on the planet (include typhoons, hurricanes and tropical cyclones)
- A class map of the world
- Video: [Learning from the Past, Preparing for the Future](#)
- *Tropical Cyclone Damage* - information sheet
- *Tropical Cyclone Damage* - worksheet
- A picture of a cyclops (source from the internet or picture book)
- Bureau of Meteorology Useful Links:
 - <http://www.bom.gov.au/cyclone/about/>
 - Understanding tropical cyclone categories
 - Cyclone names (see References & Guides)
 - Understanding tropical cyclone forecast track maps



Activity One: *What's in a Name?*

1. Discuss huge storms that occur in the world. Use examples or have students search online for them. (You could include Super Typhoon Tip (Philippines, 1979), Hurricane Katrina (USA, 2005) and Tropical Cyclone Yasi (QLD, 2011 or Tropical Cyclone Joan (WA, 1975). Investigate the difference between a tropical cyclone, a hurricane and a typhoon. Using a class map of the world, locate the geographical location where each name is used.
2. Visit the Bureau of Meteorology (BoM) website to learn how tropical cyclones get their names. Before showing the video to students, ask them to look at the lists of names. Can students see any patterns in the names? (Names are in alphabetical order, male and female names alternate). Invite students to think about why BoM would need to have more than one list of names. [Tropical Cyclone Names \(BoM\)](#)
3. In 2017, on the east coast of Australia, Cyclone Cook came after Cyclone Debbie. How did that happen? Ask students to find out the name of the most current cyclone (which has formed in Australia) and the likely name of the next cyclone. Identify the names of cyclones that have occurred in Western Australia in the past two or three cyclone seasons.

Activity Two: *Cyclone Categories*

1. Students view the Bureau of Meteorology Video, [Understanding Tropical Cyclone Categories](#). (Go to Understanding Cyclones / What is a tropical cyclone and scroll down)
2. As a class, examine the information sheet, *Tropical Cyclone Damage* and the damage that tropical cyclones can bring. Ask students to examine the 'typical wind effects' and using the worksheet, draw a picture depicting the level of cyclone damage that could occur within each Tropical Cyclone Category.
3. Alternatively, ask students to develop a brochure to help people with English as a 2nd Language how to understand cyclone categories (or choose another audience).

Activity Three: *The Role of the Bureau of Meteorology and DFES*

1. Use the following examples to discuss the role of community members, BoM and DFES.
 - Find out about tropical cyclones in Port Hedland, with particular reference to TC Joan (1975). View the Video: [Learning from the Past, Preparing for the Future](#). (2:09-5:16)
 - Find out more about tropical cyclones Vance (1999) and Olwyn (2015) in the Exmouth area. View the Video: [Learning from the Past, Preparing for the Future](#). (5:31-7:09; 7:09 -8:00)



Extension

- Investigate how scientists use science to predict cyclones each year. (The Bureau of Meteorology (BoM) issues a [Tropical Cyclone Seasonal Outlook](#) for Australia in October or November each year).
- Students access the BoM website, [Cyclone tracks - Southern Hemisphere](#) and put in different seasons to view and compare the tracks of cyclones in different cyclone seasons. These are the actual tracks of cyclones, however, the BoM forecasts how a cyclone will track and produces a Forecast Track Map for each cyclone. How do communities, oil and gas operations, mining camps and emergency responders benefit from weather forecasting and how helpful is a Forecast Track Map for communities?

In the Community

- Ask students come up with a list of interview questions to find out more about a community member's firsthand experience of cyclone. Students organise and interview someone in their community. Students need to take care to acknowledge other people's point of view, particularly if they differ from what students are learning in class. Ask students to share their findings with the class.
- Ask students to investigate their local indigenous calendar, finding out how seasons change and what changes (to fauna, flora, weather, etc.) are evident during the cyclone season.





Module Three *Understanding Flood*

About this Module

Students gain a basic understanding of how floods impact Western Australia. They are introduced to types of floods (including flash flood, large-scale flood and storm surge), historic floods and how flood risk is determined in Western Australia.

Background Information

Flooding can occur anywhere in Western Australia at any time of the year. It occurs when an area of land that is normally dry is inundated with water. In the north of Western Australia, flooding occurs mostly during the *wet season* (November to April) from the heavy rains that come with tropical cyclones and monsoonal lows. Heavy rain can continue as a cyclone moves over land, so flooding is possible over widespread areas. In the southwest, flooding mostly occurs during winter storms (May to September). During summer, a cyclone in the northwest that has been downgraded to an 'ex-tropical cyclone' can also bring extensive rain and flooding to the southwest.

The most common form of flooding in Australia is the flooding of the rivers following heavy rainfall. Flooding commonly occurs during and after a tropical cyclone, where low lying coastal areas may flood due to storm surge from the ocean and heavy rain. Storm surge can occur during a cyclone or severe storm, when strong winds 'pile up' the ocean and push it onshore into areas normally safe from tides or flooding. Storm surge is especially dangerous to low lying coastal communities. A storm surge is a large, quick moving body of water that piles up against the shore when a cyclone hits the coast. It can damage and destroy homes and buildings, wash away access roads and run ships aground. Globally, powerful storm surge has killed many people in the world, wiping out villages, destroying buildings and washing away roads and infrastructure.

Thunderstorms can produce very intense rainfall that can cause flooding of streams and small rivers. Larger storm systems, bringing prolonged or heavy rainfall can cause flooding over much larger areas of land. In coastal areas, tsunami can also cause flooding. Other flood risks include flash flooding and dam burst. Flash flooding occurs within six hours of heavy rain, often the result of intense local rain causing rapid rises in water levels. Flash flooding can affect cities and towns by flooding roads, buildings and natural environments. It can be difficult to predict accurately and gives little time for warning and effective preventive action.

Flooding can result in people being stranded for many days until floodwaters subside (go down). Some remote areas can be isolated for months. Homes near waterways or on low-lying land could be flooded, even if they have never seen floodwaters there before. A water catchment is an area where rainfall lands and makes its journey towards rivers, creeks, lakes, dams and wetlands. As rain fills up rivers, creeks, lakes and dams, it also seeps deep into the ground. Even if you have had little or no rainfall, if another area within your water catchment has been affected, it can impact on other areas within the catchment and cause flooding.



The Department of Fire & Emergency Services State Emergency Service (SES) is responsible for responding to flood emergencies in Western Australia. The Bureau of Meteorology (BoM) provides flood forecasting and warning services for most major rivers in Australia. DFES coordinates the emergency response to flood in Western Australia.

Key Messages

- Flood can occur anywhere in Western Australia at any time of the year.
- Floods include flash flood, large-scale flood, storm surge and tsunami.
- Tropical cyclones in the northwest of Western Australia produce heavy rain and large-scale flooding as well as storm surge.
- Major flooding in the southwest of Western Australia is generally the result of localised storms or from heavy rainfall because of a cyclone further north.

Learning Outcomes

- Students are able to explain different types of flooding that occur in Western Australia.
- Students have an understanding of the history of flooding in their local area.
- Students investigate what people do before, during and after a flood emergency.

Year Level

Year 4 to 7

Things You Will Need

- Internet access
- Video: *Flood* <https://youtu.be/DYmPCBGq6PU>
- *Types of Flood* and worksheet
- *Town Engineer for a Day!* information sheet
- *Before, During and After a Flood* worksheet

Activity One: *Types of Floods*

1. View the video footage, *Flood*. Students discuss and make a class list of different types of flood and how they can happen: flash flood, large-scale flood, storm surge and tsunami. Ask students to complete the worksheet, *Types of Flood*.
2. Ask students to investigate what could happen before, during and after a flood? Consider these questions:
 - If there was a flood at your school, what things could happen?
 - What damage could occur at school?
 - Could there be any dangers that occur on the way home?
 - What dangerous things could happen at home?
 - What damage could occur at home?
 - How else could flood affect us at home?



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Department of Fire & Emergency Services



- Use *think, pair and share* to discuss how a river could flood, even when there has been no rain in the area. Discuss ideas with the class.

Activity Two: **Historic Floods in Western Australia**

- Floods are more likely to occur in certain seasons of the year. Ask students to investigate when (and why) floods are most likely to occur in the southwest and northwest of the state.
- Students investigate a historic flood that occurred in their community (or another part of Western Australia). (Consider the Swan/Avon River, Murray River, Collie River, Preston River, Blackwood River, Greenough River, Gascoyne River and Fitzroy River). Did the community learn from their experience? Students research newspaper clippings, talk to local members of the community and use the internet to find information.
- Floods are often referred to as a 10-year flood, 50-year flood or 100-year flood. This is the ARI or Average Recurrence Interval (estimated average number of years between the occurrence of a flood of a given size or larger). Investigate floods that have occurred in Western Australia in terms of their ARI. Examples include the Swan/Avon Rivers 100 year flood (1872) and Carnarvon 50 year flood (2010). Ask students to think about how knowing the history of flooding in an area can help scientists.

Extension

- What can local governments do to minimise the future risk of flood? Students are set the task of being 'town engineers' for the day to determine the best place to build a new housing development. Follow the instructions on *Town Engineer for a Day!* information sheet. (Please note: additional equipment and resources are required for this activity. We suggest you experiment with this activity before trying it in class).
- Due to the 2022 floods in eastern Australia, experts are now saying that terms of 'One-in-100-years' flood are misleading and, in fact, what it really means is that a one-in-100-year flood has a 1 per cent chance of occurring in any year and a one-in-50-year flood has a 1 in 50 chance (or 2 per cent) chance of occurring in any year. Discuss.

In the Community

- Students prepare questions to ask of someone who has experienced flooding. The questions need to include what happened before, during and after the flood. Students conduct their interview and afterwards complete the activity sheet, *Before, During and After a Flood*. Ask students to consider if they would act the same or differently if they were faced with the same circumstances and why?





Module Four

Staying Safe in Cyclone & Flood



About this Module

Students are introduced to risky behaviours and how to stay safe in a flood. Students create a list of rules which will help them stay safe in a cyclone. Students consider what a three metre water level could mean to their classroom.

Background Information

It is extremely dangerous to be outside, during and immediately after a cyclone. Cyclones can be unpredictable and can intensify rapidly. They are frightening and traumatic. Cyclones can be so loud that you won't be able to hear each other speak. You need to be able to think clearly in order to keep safe during a cyclone. You **must** shelter inside during a cyclone (red alert) and not come outside until authorities have given the all clear. This could be for many hours, possibly days.

Families need to prepare themselves, their property and their pets for impact even if it doesn't look like it is coming their way. Cyclones can cause death, injury, major structural damage and disruption to essential supplies that families rely on like electricity, water and gas. Strong winds can tear off wall cladding or the roof. Loose objects can turn into missiles and can damage your roof or walls. Windows can blow in and walls can move. Horizontal rain can get in under doors and windows and between joints and gaps. The wind can blow sand at force causing injury and damage to people and property.

Floodwaters of any kind are potentially dangerous. They are unpredictable and destructive and they can happen in regions that didn't experience any rainfall. Floodwaters can also contain sewage and pollutants, which can ruin crops, contaminate drinking water and spread disease. Flooding can last from several hours (flash flooding) to several weeks (broad scale flooding) and isolate homes and towns. Once land is already very wet from rain, more forecast rain could mean increased runoff and therefore flooding. Fast flowing water with currents and turbulence can cause injuries, drowning (of both people and animals), cause roads to wash away, as well as damage to buildings, bridges, power and water supplies.

Drowning in floodwaters is a serious risk. People can drown from being in or playing in floods or storm drains, risking injury from submerged items in the water, or from snakes and spiders. Water travelling at just 6 kilometres per hour (medium walking pace) at 15 centimetres deep can knock you over. Research commissioned by DFES in 2017 found that males (children to age 60) who live in northern parts of Western Australia are the demographic most likely to walk or swim in floodwater. It is important that children, particularly boys, are educated regarding the dangers of swimming or playing in floodwaters.



Driving through floodwaters, or crossing flooded rivers or creeks can be very dangerous and many people put themselves at risk every year by driving through floodwater. Drivers of four-wheel drive vehicles are more likely to enter dangerous floodwaters. Most drivers do not know the depth of water that would be safe for their vehicles to enter. Research by the University of NSW¹ in 2016, found that even water moving at a slow walking pace (3.6 k/h) could float a small motor vehicle in water 15cm deep, whereas a 2.5 tonne four-wheel drive became unstable at 45cm deep water and floated away with water 95cm deep.

DFES encourages people to plan their journey, check and follow weather warnings (including road signs advising road closures), gain a better understanding of the risks of driving through floodwater and not drive through floodwater.

Key Messages

- Flooding can cause injuries and drownings; roads can be washed away and houses and infrastructure can be damaged.
- It is not safe to play or be in floodwaters. Water less than 15cm deep can knock a grown man over.
- It is not safe to drive through floodwaters. Slowly moving water the depth of a pen length can float a small car away.
- It is life threatening to go outside during and immediately after a cyclone – wait for the all clear from authorities.

Learning Outcomes

- Students can explain that it is difficult to know what floodwater is when you can't see beneath it.
- Students can identify flood risks and demonstrate how a flood risk can be avoided.
- Students create a set of rules on how to stay safe in cyclones.
- Students identify risky behaviours in a range of situations.

Year Level

Year 4 to 7

Things you will need

- Internet access
- DFES Website: dfes.wa.gov.au/flood
- *Risky Behaviours – Turn Around Don't Drown* worksheet
- DFES [Cyclone and Flood Driving in Flood Waters Factsheet 04](#)

¹ <https://www.engineering.unsw.edu.au/news/unsw-engineers-demonstrate-the-dangers-of-floodwaters> (accessed 14 February 2018)



- DFES Website: Travelling during or after a flood dfes.wa.gov.au/flood (scroll down to heading)
- *What could a 3-metre water level mean to your classroom?* Worksheet
- Find your car's float point at 15tofloat.com.au (video)

Activity One: *Turn Around, Don't Drown*

1. Students search the internet to find images of floodwater and as a class discuss:
 - What does it look like?
 - How deep is it?
 - Can you see what's in it?
 - How fast is it moving?
 - Can it knock you over?
2. Students visit the DFES website and look at 'Dangers of flooding' and 'Know your risk'. Discuss the dangers of flooding (e.g., Driving through, walking, swimming or playing in floodwater) and the risks (e.g., How often does it flood, when did it last flood, what's happening with the weather, are certain places likely to flood, will I be safe at home, will there be somewhere else safer to go to before it floods, where's the catchment area closest to my home?).
3. Use the *Turn Around Don't Drown* worksheet cartoon images to identify and describe various flood risks. Ask students to discuss as a group what they think could have been done to avoid or eliminate the risk.
4. Ask students to draw a cartoon to demonstrate how one of the risks (in question 3) could be avoided.

Activity Two: *Staying Safe in a Cyclone*

1. Discuss as a group what could be considered risky behaviour during a tropical cyclone or severe storm. Come up with a list of top five behaviours to avoid. (For example: not tidying up your yard resulting in garden equipment flying about as missiles; going outside in a cyclone (during a Red Alert); standing next to a window; sheltering in a caravan during a cyclone, etc.)
2. Ask students to create a set of rules based on these behaviours to stay safe in cyclones or in a severe storm.
3. Students present their findings. This could be presented as a poster or assembly announcement to share with your school community.

Activity Three: *A 3 Metre Water Level and your Classroom*

1. Discuss how scientists measure cause/effect/risk and determine community flood risk. Imagine your classroom is built alongside a riverbank. If there was the flood, the river could overflow. How would that impact on your classroom? If the riverbank is 2.75m high, what does a 3 or 4 or 5 metre water level mean?
2. As a class, ask students to make a river height gauge out of card. It will start at 2.75m and finish at 5.0m with 25 cm intervals. Place it outside the classroom on the ground.



At a river height of 3 metres, water has already reached 25cm above the top of the riverbank. If the water river height was 3 metres, what impact would that have on your classroom?

3. Have students work in groups to fill out the worksheet *What could a 3 metre water level mean to your classroom?* Students discuss and compare their results.

Extension

- Conduct a poll to find out how deep students think slow-moving water needs to be to float a small car or a four-wheel drive vehicle. Then, watch the video 15tofloat.com.au to see how much water is needed to float a car. Discuss the cars your family owns and how much water it would take to float each one.

In the Community

- Ask students to explore and develop a campaign to educate adults in the community about the dangers of driving through floodwater OR to educate children in the community about the dangers of playing/swimming in floodwater.





Module Five

Have a Plan – Cyclone & Flood



About this Module

Students discover the importance of planning ahead in a natural hazard emergency. Students develop a list of emergency contact numbers and practise a mock evacuation drill at school. Students prepare an emergency kit and discuss having an emergency plan with their families.

Background Information

A **Family/Household Emergency Plan** helps families prepare for a cyclone's impact and/or the rapid onset of flood and rising floodwaters. A Family/Household Emergency Plan should include everyone in the family, including pets and other animals. Prepared families will have a greater knowledge of cyclone and/or flood survival and will reduce their risk of personal injury and property damage. A good plan will include how households will prepare their house and property; where they will shelter, looking after precious items and what essential food and supplies are needed. Every family member can be involved in developing an emergency plan and be given specific tasks like, for example, clearing the yard, finding torches or pet cages, and, buying food and water, etc. An emergency plan for tropical cyclone should be written before the start of the cyclone season and be reviewed annually.

Schools in areas that are cyclone and/or flood prone school should have an Emergency & Critical Incident Plan for Cyclone and/or Flood. All teachers should be familiar with emergency planning and procedures in their school. A Family/Household Emergency Plan should include the special needs of family members. Some families may need to make special plans for elderly grandparents or a child with an illness or disability.

A plan helps family's list what action they need to take in a cyclone and/or flood emergency and when it is safe/unsafe to evacuate. Some things an Emergency Plan can include are:

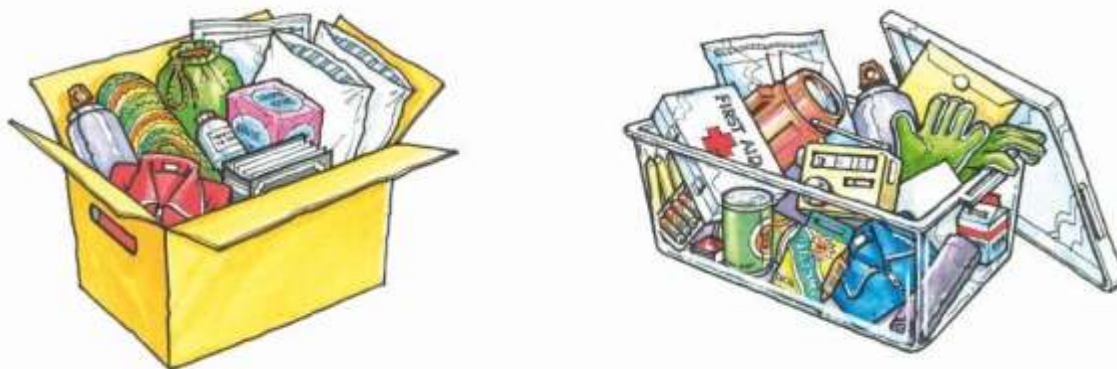
- When the plan should be put into action?
- Who will collect the children from school?
- Where you will shelter, if you can't get home?
- Where your emergency kit is kept; who is responsible for checking and stocking it?
- Where do pets and animals go?
- Where to shelter inside the house?
- Where the nearest welfare centre is and more than one route to get there?
- What items will need to be secured and how (e.g. boats, caravans, trailers, garden shed, rainwater tanks, LPG bottles, etc.)?
- What items need to be brought inside?
- Where to move furniture, clothing and valuables to the highest point in the house?



There are additional steps that individuals and families can do before, during and after a cyclone and/or flood that can ensure their own safety and to protect their home from damage. Some of these include placing sandbags around homes to minimise flood damage, placing sandbags in toilets and over drains to prevent sewage backflow, placing items in plastic bags or containers up high and away from floodwaters, as well as preparing an Emergency Kit for short-term survival. Sometimes people do need to relocate during a flood emergency to a Relocation Centre. This can be made easier by families being prepared by preparing a Relocation Kit in advance so they can leave safely and quickly before it is too late to travel.

Visit dfes.wa.gov.au/cyclone or dfes.wa.gov.au/flood, click on *Prepare* and select *Emergency kit*.

Packing an Emergency Kit



Families need an emergency kit to survive in a cyclone and/or flood, whether you decide to shelter/stay at home or relocate to a safer place. People who have prepared an emergency kit before the cyclone season increase their chances of survival for themselves, their families and their pets.

An emergency kit needs to include:

- A waterproof bag containing important documents like passports, ID and insurance documents
- Portable battery operated AM/FM radio
- Waterproof torch
- New spare batteries
- First aid kit with manual
- Medications, toiletries and sanitary supplies
- Special requirements for infants, elderly, injured and disabled people and pets
- Mobile phone and charger (or phone card)
- Cash and bank cards
- Emergency contact numbers
- Spare house and car keys



- Combination pocket knife
- Drinking water – at least 12 litres per person
- At least 5 day's supply of food for your household
- A can opener, cooking gear and eating utensils
- Portable gas stove or BBQ
- Water container for storing washing and cooking water
- Water, food and bedding for pets and animals
- Mobile phone charger

Some people will plan to relocate and shelter at their nearest Relocation Centre. A Relocation Kit is particularly important with flood, as it is common for people to have to relocate during a flood emergency. It is important that students understand that relocation needs to happen early, as roads can become blocked off and impossible, if not extremely dangerous to drive through. Relocation Centres offer emergency accommodation, registration of your whereabouts and support services. If families decide to relocate, they need to have a relocation kit. Add these items to your emergency kit:

- Sleeping bags, blankets and towels
- Waterproof ponchos or coats
- Spare clothing
- Tent or tarpaulin
- Pen and paper
- Books, playing cards and/or games

Key Messages

- A *Family/Household Emergency Plan* helps families prepare for a cyclone or severe storm's impact and/or the rapid onset of flood and rising floodwaters.
- Every family member can be involved in developing an emergency plan
- There are many things people can do to keep themselves, their families and their homes safe during a cyclone and/or flood
- People who have prepared an emergency kit before the cyclone season increase their chances of survival for themselves, their families and their pets.

Learning Outcomes

- Students recognise four steps they can take to planning ahead in a natural hazard emergency
- Students practise a mock evacuation drill and relocate to the highest sheltered area in their school, as outlined in the school's emergency plan.
- Students develop a list of emergency contact numbers.
- Students are able to prepare an emergency kit.
- Students can list additional items they can include in a relocation kit.



- Students have a five minute Cyclone and/or Flood Chat with their families

Year Level

Year 4 to 7

Things you will need

- Internet access
- DFES Website dfes.wa.gov.au/cyclone and dfes.wa.gov.au/flood Prepare pages.
- A copy of your school's *Emergency and Critical Incident Management Plan* for tropical cyclone and/or flood OR *Your School's Emergency Plan* example.
- *Your School's Emergency Plan* information sheet
- *Look at your School's Emergency Plan* worksheet
- *Emergency Contact Numbers* worksheet
- *Emergency Kit and Relocation Kit* worksheet
- Video: [Learning from the Past, Preparing for the Future](#) (9:04-12:25).
- Large waterproof crates (one for each group)
- Real items or cut out images, etc. that students can pick and choose from to create an emergency kit. For things to include, see Teacher's Guide. You could ask students to bring certain items from home to go into their kit. Also include items that wouldn't go in an emergency kit. Include board games, electronic equipment, medication, hair dryer, toys, books, etc.
- DFES [Cyclone and Flood Emergency Kit \(Factsheet 02\)](#)
- DFES [Cyclone and Flood Relocation Kit \(Factsheet 03\)](#)
- *How can you PREPARE for cyclone and/or flood emergencies?* Worksheet
- *My Household/Family Plan* and/or *Parents/Carers Are you prepared for cyclone/flood?* templates.

Activity One: *Plan Ahead – Four Steps to Safety*

1. As a class, watch the Video [Cyclone Preparation and Safety](#). Discuss the four steps to keeping your family safe by planning ahead:
 - Prepare a Plan
 - Have an Emergency Kit
 - Prepare Your Property
 - Keep Informed
2. Ask students to think about how these steps could be applied to any natural disaster or emergency (e.g. bushfire, flood, cyclone).

Activity Two: *Prepare a Plan*

1. Find out if your school plan has an Emergency Plan for Cyclone and/or Flood? As a class, examine your school's cyclone and/or flood emergency plan. Would everyone in your school know what to do if there was a cyclone and/or flood? (If you cannot locate



it look at *Your School's Emergency Plan* example provided). Ask students to look at the template, *Look at your School's Emergency Plan* and list the activities that need to be completed before, during and after a flood or cyclone.

2. Ask students to discuss how they could make sure everyone knows about the school plan. Carry out a mock evacuation drill for their own class, with another class or with the whole school. Have the students discuss if and how the plan could be improved upon?
3. Ask students if they have a home plan for cyclone and/or flood. Have your students develop a list of emergency contacts. Ask students to identify any people in their family or extended family (or neighbours) who might need help in a cyclone and/or flood, or who could help them? (Students may need to take this home).

Activity Three: *Have an Emergency Kit*

1. Discuss the possibility of having to stay inside (at home) for 3 or 4 days due to a cyclone and/or flood emergency (without power or running water). Brainstorm what students would need to survive (e.g. water, food, etc.) and why they would need it? How much water do they need to cater for each person? Without power, how will they know when it is safe to go outside? How would they get this information from the outside world? (wind-up or battery operated transistor radio).
2. In groups, students pack an emergency kit. To contain the activity, limit groups to ten items they can include. Students may need to justify certain items to the group. Groups present their ten items to the class, justifying each item as to why it was given priority. As a class, discuss what items are essential and what items vary depending on individual family needs (e.g. asthma medication).
3. Families are not limited to ten items in an emergency kit but do need essential items. Ask students to come up with their final list. Students read through the *DFES Cyclone and Flood Emergency Kit Factsheet 02* and revise the list again. As a class, discuss what changed.
4. If water levels are rising or your house is badly damaged you may need to relocate to a Relocation Centre. Students think about basic needs (water, food, shelter, clothing, etc.) and prepare a classroom Relocation Kit by bringing things from home and photographing their kit. Alternatively, they can draw and label their kit using the template provided. Students then compare their relocation kit to what DFES suggests in the *DFES Cyclone and Flood Relocation Kit Factsheet 03*.

Activity Four: *Preparing Your Property*

1. Students view video: [Learning from the Past, Preparing for the Future](#) (9:04-12:25). Discuss. Students read the Cyclone and Flood Preparing Your Home and Property Factsheet 05. Walk around your school and discuss any preparations that could be done to prepare your school for cyclone and/or flood.
2. Ask students to work in groups to discuss how they could prepare for cyclone and/or flood emergencies at home. Using the worksheet, *How can you PREPARE for cyclone and/or flood emergencies*, ask students to create a checklist about the things their families could do to prepare for cyclone and/or flood.



3. Ask students take home their checklists and the *Parent/Carer letter* and have a 5-minute chat with their families about planning for cyclone and/or flood. (The letter provides links for parents who want to find out how to do a more in depth plan. Encourage students to complete a comprehensive plan with their families). Ask students to report back to class.

Extension

- Ask students to create an emergency kit for their pets. 63% of households in Australia have at least one pet, one of the highest rates of pet ownership in the world. Most relocation/welfare centres will not house pets.

In Your Community

- In groups, students discuss how prepared their families are for cyclone and/or flood. As a class, decide how you can measure this and how you could present information on a graph.
- In groups, ask students to create a graph for their group and then to transfer their group's information onto a class graph. Discuss as a class how they feel their level of preparedness has changed.





Module Six Responding to Cyclone & Flood



About this Module

Students find out how to access public emergency information, including cyclone and flood alerts and warnings. Students learn about flood risks in their local community, the role of State Emergency Service (SES) volunteers and what the SES can do to help communities in a cyclone and/or flood emergency.

Background Information

Cyclone

In Western Australia, the Department of Fire and Emergency Services (DFES) is responsible for activating and coordinating the emergency response to tropical cyclone.

The Bureau of Meteorology (BoM) has three Tropical Cyclone Warning Centres (TCWCs) located in Perth, Darwin and Brisbane. These centres use weather stations and observers on land, ships, aircraft, offshore oilrigs, satellite and radar imagery to detect cyclones and confirm their location and intensity. When a cyclone is within 250 kilometres of Western Australia it is tracked by radars located along the coastline at Wyndham, Broome, Port Hedland, Karratha, Dampier, Learmonth and Carnarvon. BoM is responsible for Tropical Cyclone Advice and Warnings and provide a Forecast Track Map to indicate where the cyclone is, where it is forecast to go, how intense it is likely to be and which communities are under threat. BoM issue a Cyclone Watch when damaging winds or gales are expected to affect communities within 48 hours and a Cyclone Warning within 24 hours.

The DFES' **Community Alert System** uses colour-coded alerts to provide warnings and advice to communities in the cyclone's path. The four stages of alerts are:

- **Blue Alert** – you need to start preparing for cyclonic weather, strong winds may occur within 48 hours. Be ready to change your travel plans.
- **Yellow Alert** – there is a high risk of destructive winds, take action and prepare to shelter from the cyclone.
- **Red Alert** – take shelter from the cyclone, destructive winds are likely to occur very soon.
- **All Clear with Caution** – the cyclone danger has passed but take care to avoid the dangers caused by damage.

(Visit www.dfes.wa.gov.au/safetyinformation/cyclone to and download the *Cyclone Smart* guide for more details about alerts).



Flood

Flood forecasting and warnings are provided by BoM's national flood forecasting and warning service. BoM uses weather forecasts and hydrologic models, as well as observing rainfall and streamflow to forecast and warn DFES about potential and ongoing flood situations.

BoM issues flood warnings to the public in the form of a Flood Watch or Flood Warning. DFES then issues Community Alerts to keep people informed and safe, including advice about what people need to do before, during and after a flood.

Preparedness and general information on cyclones, floods and other natural hazard emergencies can be found online at www.dfes.wa.gov.au/safetyinformation.

Where to find Alerts and Warnings

Emergency WA Website (www.emergency.wa.gov.au)

Emergency WA is a quick and easy way to access emergency information, including current cyclone and flood alerts and warnings. This is a Western Australian map-based site coordinated by DFES. Information on the site is provided by DFES, the Department of Biodiversity Conservation and Attractions Parks and Wildlife Service, BoM and Geoscience Australia.

Emergency Information Line and Social Media

DFES provides an Emergency Information Line 13 DFES or 13 3337, as well as twitter (@dfeswa) and Facebook (Department of Fire and Emergency Services WA) accounts. Satellite phones can call +61 8 9395 9395 for emergency information.

Radio and Television

Emergency alerts and warnings are broadcast on ABC local radio and 6PR (in the Perth metropolitan area). It is important to have a **battery-operated (or wind-up) radio** to listen for cyclone alerts as there is often a high chance of the power supply being disrupted.

Emergency Alert – Phone and Mobile Alerts (www.emergencyalert.gov.au)

Emergency Alert is another way of warning people about cyclones, floods, bushfires and other severe weather emergencies in (or near) their community. Emergency Alert is the national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area about likely or actual emergencies. Students may receive these calls (when answering their home phone) or as text messages (on their personal mobile phone) and there is no opt out option. It is important to explain to children what to do if they receive an emergency warning call or message. If a child receives an emergency warning on their mobile phone while they are at school, they must tell a teacher straight away and follow the emergency procedures in place at their school. If they receive this message while home alone, they must find and tell a responsible adult (for example a neighbour), follow the directions of the message and move to a safer place. Children can call Triple Zero if an adult is not available to assist. People should not rely on receiving a warning message on their phone before they act.



Standard Emergency Warning Signal (SEWS)

SEWS is a distinctive siren [sound](#) to alert the community to the broadcast of urgent safety messages relating to a major emergency or disaster. It is played on the radio, television, public address systems and mobile sirens. If you hear a SEWS broadcast: stop what you are doing, listen carefully to the information provided and act as directed. SEWS is only sounded if there is a possible loss of life or a major threat to a larger number of properties, impact is expected within 12 hours, a large number of people need to be warned, or one or more incidents are classified as destructive.

State Emergency Service (SES) Assistance

SES is a volunteer division of DFES. SES volunteers play a vital role in responding to natural disasters and emergencies on behalf of the community. The SES will support communities under threat of cyclone and/or flood and will help them before, during and after impact. Call 132 500 for State Emergency Service (SES) assistance. Always call 000 in a life-threatening situation.

SES can help with the following emergencies: collapsed roofs and ceilings; making temporary emergency repairs to homes and buildings; removing fallen trees that have damaged homes and cars; sandbagging areas in danger of flooding; pumping out flood water; rescuing trapped or injured people; and, helping people relocate if they are in danger.

SES does not help with clearing debris and organising permanent repairs; fixing broken fences or removing trees that have fallen on fences; and, basic repairs that you can manage yourself.

No matter how you become aware of an emergency, take immediate action for your own safety. Do not rely on receiving a message on your phone.

Key Messages

- DFES produces safety information and emergency community alerts to help keep people informed and safe; advising them what to do before, during and after a cyclone and/or flood emergency.
- People can call triple zero (000) in a life threatening emergency or the State Emergency Service (SES) volunteers in a cyclone and/or flood emergency on 132 500.
- The Bureau of Meteorology (BoM) provides forecasts, warnings, weather observations and advice to the Western Australian community.

Learning Outcomes

1. Students understand what each coloured Cyclone Alert means and the urgency/immediacy for each alert.
2. Students understand the role of DFES and the Bureau of Meteorology in providing cyclone and/or flood alerts and warnings.



- Students can list the various ways to find safety and emergency information about cyclones/floods and can explain/show how to find it.
- Students discover their local risk for cyclone and flood through discussion with a representative from their local State Emergency Service (SES) or a local government representative.

Year Level

Year 4 to 6

Things you will need

- Internet access
- Video: [Learning from the Past, Preparing for the Future](#)
- DFES [Cyclone and Flood Cyclone Alert System Factsheet 01](#)
- *DFES Cyclone Smart Community Alerts* worksheet (enlarge to A3 size, if needed)
- *From Rain to Warning* information sheet
- [Emergency WA](#) website
- [Standard Emergency Warning Signal \(SEWS\)](#)
- DFES website www.dfes.wa.gov.au
- Emergency WA website www.emergency.wa.gov.au
- Emergency Alert website www.emergencyalert.gov.au
- ABC website www.abc.net.au/news/emergency/
- Social Media
 - @dfes_wa (twitter)
 - Department of Fire and Emergency Services WA (Facebook)
- Bureau of Meteorology website (BoM) www.bom.gov.au

Activity One: *Cyclone Alerts and Warnings*

- Students view video: [Learning from the Past, Preparing for the Future](#) (8:00-9:03). Discuss as a group the four alerts (Blue, Yellow, Red and All Clear) and the important message for each alert.
- Using this information and the DFES [Cyclone and Flood Cyclone Alert System Factsheet 01](#), have students complete the *Worksheet DFES Cyclone Smart Community Alerts*.
- Introduce students to the BoM website's Tropical Cyclone Warning Services. (www.bom.gov.au/cyclone) Find out if there are any current cyclones.

Activity Two: *Flood Alerts and Warnings*

- In Australia, BoM provide flood forecasting and warning services in each state and territory. In Western Australia, DFES will then issue Community Alerts to advise communities on what you need to do before, during and after a flood. Have students look at the *From Rain to Warning* information sheet. Students investigate the role of scientists (meteorologists,



hydrologists) who forecast rain and predict river height and DFES' role in advising communities what to do.

2. Floods are unpredictable and destructive and they can happen in regions that have never seen rain. They can cause death and injuries, isolate communities, damage major infrastructure, cut essential services, destroy property and livelihoods. Students investigate what is a Flood Watch and when is it issued? What is the difference between a Flood Watch and a Flood Warning?

Activity Three: *Where to Find DFES Alerts and Warnings*

1. Students visit the DFES website (www.dfes.wa.gov.au) and in groups (or individually) investigate where they can find information about current warnings.
 - 132 500 (for SES emergency assistance)
 - 13 DFES (emergency information line)
 - Emergency WA (access from DFES website)
2. Students visit Emergency WA (www.emergency.wa.gov.au) to find current alerts and warnings in Western Australia. Students investigate:
 - Are there any cyclone and/or flood warnings?
 - Are there warnings for other hazards?
 - Are any of these warnings in your region or location?
 - Click on a warning and identify its location on the map and read advice or warning. Notice the information it includes: e.g. time, date, location, alert level, threat to lives or homes, what to do, road closures, conditions, what DFES is doing, any extra information, etc.
 - What other information can you find on this page?
3. What radio stations provide emergency alerts and warnings? (your local ABC)
 - ABC also provides an emergency page, where you can search warnings by each state www.abc.net.au/news/emergency/
 - Do other radio stations broadcast warnings in Western Australia?
4. Investigate whether DFES uses social media (twitter and Facebook)
 - What kind of information is posted on twitter and Facebook?
5. Students visit Emergency Alert www.emergencyalert.gov.au, the national telephone warning, sending out public warnings (voice messages to landlines and text messages to mobile phones)
 - Students investigate when these messages are sent and where to
 - Find out if you have to register to receive these messages
6. Students listen to SEWS [Standard Emergency Warning Signal \(SEWS\)](#).
 - Students investigate what 'situations of extreme danger' the SEWS warning would be used in.

Extension



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- BoM provides various warning services for tropical cyclones to the public. Students investigate the differences between a tropical cyclone seasonal outlook, a tropical cyclone outlook, a tropical cyclone watch and a tropical cyclone warning.
- How can DFES and communities benefit from having a tropical cyclone seasonal outlook?

In Your Community – *Meet your local State Emergency Service (SES)*

- If you can, organise a visit from the State Emergency Service (SES) to your school. Students can draft questions and provide them to the SES prior to their visit. (Alternatively, ask a WA Police, local government representative or other community member to discuss the importance of alerts, warnings and preparing for tropical cyclone or flood).
- Discuss the State Emergency Service's (SES) role in a cyclone and/or flood emergency. Explain the SES role in preparing and responding to a tropical cyclone event and their active involvement in assisting the community during the colour-coded alerts. Ask your guest speaker to discuss the importance of following the alerts. Include when people should call 000 and when they should call the SES for assistance.
- Discuss SES's role and equipment. Discuss areas that are at risk of flooding in your local community. Is your community (or parts of your community) likely to become isolated? Investigate whether your local shire has a relocation plan – what is it? Where would community members relocate? As a class, discuss what it is about this location that the local shire would choose it.





Worksheets Cyclone and Flood



Module One: Understanding Tropical Cyclones

- *Tropical Cyclone (TC) Facts* information sheet
- *Cyclops – a giant with one eye* information sheet
- *Tropical Cyclone Fay* worksheet

Module Two: What's in a name?

- *Tropical Cyclone Damage* – information sheet
- *Tropical Cyclone Damage* – worksheet

Module Three: Understanding Flood

- *Types of Flood* – worksheet
- *Types of Flood* – answer sheet
- *Town Engineer for a Day!* – information sheet
- *Before, During and After a Flood* – worksheet
- *Before, During and After a Flood* – answer sheet

Module Four: Staying safe in Cyclone and Flood

- *Risky Behaviours – Turn Around, Don't Drown* – information sheet
- *What could a 3 metre water level mean to your classroom* – worksheet

Module Five: Have a plan - Cyclone and Flood

- *Your School's Emergency Plan* – information sheet
- *Look at your School's Emergency Plan* – worksheet
- *Emergency Contact Numbers* – worksheet
- *Emergency Kit and Relocation Kit* – worksheet
- *How can you PREPARE for cyclone and/or flood emergencies?* – worksheet

Module Six: Responding to Cyclone and Flood

- *DFES Cyclone Smart Community Alerts* – worksheet
- *From Rain to Warning* – information sheet

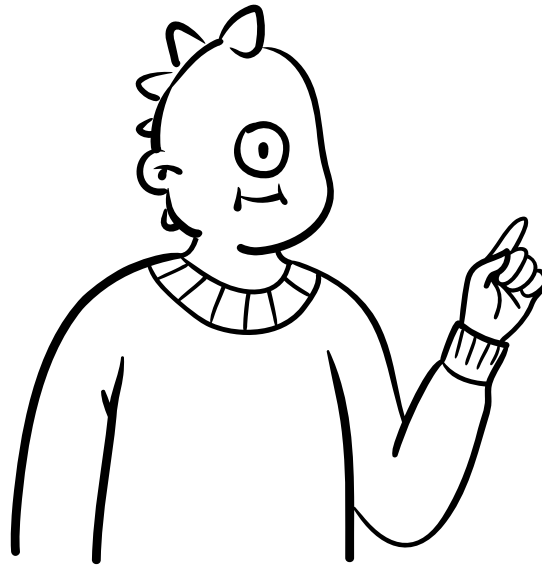


Tropical Cyclone (TC) Facts (Cut along dotted lines)

1. Tropical cyclones are storms that form over warm tropical waters and have gale force winds near their centre. Gale force winds are winds moving at 63 kilometres per hour (km/h) or greater. Above the equator (in the northern hemisphere), cyclones spin in an anti-clockwise direction and in the southern hemisphere they spin in a clockwise direction.
2. In Western Australia, cyclone season starts in November and continues through to April. The North West coastal region is most at risk of cyclones. Many powerful tropical cyclones do not make it to land at all but complete their life cycle over water. The average life cycle for most cyclones is one week.
3. Western Australia's most powerful and destructive tropical cyclone in recent years was Tropical Cyclone (TC) George. On 8 March 2007, TC George approached the Pilbara coast east of Port Hedland as a Category 5 cyclone. It crossed the coast 50km northeast of Port Hedland. Destructive damage occurred to mining camps and to many homes. Three people died and it left a damage bill of eight million dollars.
4. A tropical cyclone can be frightening and traumatic. The wind can turn anything (trees, pot plants, trampolines, roofs, cars, etc.) into dangerous missiles. Tropical cyclones can cause injury and/or death; cause major destruction to buildings and infrastructure; and, disrupt services such as power, water, telephone and mobile telecommunications.
5. To stay safe during a cyclone, shelter indoors in the strongest part of your house. In winds at 120 kilometres per hour (km/h), it would be difficult to walk forward without losing your balance. At 170 km/h, the noise would be deafening and you would find it nearly impossible to keep your eyes open and stand without holding onto something. At 220 km/h, the wind would be far too strong to stand in, and the noise so loud that even when you shouted as loud as you could you would not be able to hear anything except the roar of the wind.



Cyclops – a giant with only one eye



The word “cyclone” comes from the Greek word, “Cyclops” – a giant with only one eye.

The centre of the cyclone is called the ‘eye’.

Cyclone eyes can be as small as 3km to 320km across. The average diameter of a cyclone eye is 50 kilometres (km) across. Winds around the eye’s wall are the strongest but the winds inside the eye are the weakest or lightest.

A tropical storm is called a cyclone when the winds surrounding the eye reach speeds of 63 kilometres per hour and spiral rain bands start to form.



Tropical Cyclone Fay – Draw a circle and arrow to highlight each of the main features of cyclone formation with the image of Tropical Cyclone Fay below.

The main features of cyclone formation:

Eye	Eye Wall	Main Cloud Bands	Arrows to show the direction the cyclone is spinning.
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Tropical Cyclone Fay Image courtesy of NASA



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Tropical Cyclone Damage – There are five categories of Tropical Cyclone, with Category 5 being the strongest category.

Category	Strongest Gust (km/h)	Typical Wind Effects
1	< 125 km/h gales 'Damaging' winds	<ul style="list-style-type: none"> • Negligible house damage. • Damage to some crops, trees and caravans. • Boats and craft may drag moorings.
2	125 – 164 km/h 'Destructive' winds	<ul style="list-style-type: none"> • Minor house damage. • Significant damage to signs, trees and caravans. • Heavy damage to some crops. • Risk of power failure. • Small craft may break moorings.
3	165 – 224 km/h 'Very destructive' winds	<ul style="list-style-type: none"> • Some roof and structural damage. • Some caravans destroyed and blown away. • Power failure likely.
4	225 – 279 km/h 'Very destructive' winds	<ul style="list-style-type: none"> • Significant roofing loss and structural damage. • Many caravans are destroyed and blown away. • Dangerous airborne debris. • Widespread power failure.
5	More than 280 km/h 'Extremely destructive' winds	<ul style="list-style-type: none"> • Extremely dangerous with widespread destruction. • A lot of damage to homes and structures



Tropical Cyclone Damage — Write down the *strongest wind gust* for each Tropical Cyclone Category and under the heading *Typical Wind Effects* draw pictures that depict the level of cyclone damage that could occur within each Tropical Cyclone Category.

CATEGORY	STRONGEST WIND GUST (KM/H)	TYPICAL WIND EFFECTS
		
		
		
		
		



Types of Flood - After viewing the video footage, list the types of flood that occur in Western Australia. Think about **WHERE** this type of flooding has occurred in Western Australia. **WHEN** did it happen? To help you, you may need to research the internet or use newspaper clippings that you or your teacher has collected.

Different TYPES of FLOODING:	WHERE did it happen?	WHEN did it happen?



Answers:

Types of Flood - Below are sample answers. Students can use the Bureau of Meteorology website (www.bom.gov.au) to find information.

Different TYPES of FLOODING:	WHERE did it happen?	WHEN did it happen?
Broad scale flooding after a tropical cyclone	Moora Flood – as a result of ex-tropical cyclone Elaine	March 1999
River flooding after heavy rainfall	Gascoyne River –its most severe flood on record	December 2010
Flash flooding	Perth Storm – flash flooding in the city	22 March 2010
Storm surge after a tropical cyclone	Storm surge peaked west of Onslow at 5m after TC Vance	22 March 1999

Flood – What could happen? - After viewing the video footage, think about what could happen before, during and after a flood. Here are some ideas:

How can FLOOD happen? – broad scale flooding after a tropical cyclone, river flooding after heavy rainfall, flash flooding after heavy rainfall, storm surge after a tropical cyclone, poor drainage, etc.
What could happen at school? – this would be specific to your school grounds. E.g. low lying parts of the school where water will run off to, poor drainage in an area that often floods, blocked drains, etc.
What damage could occur at school? – specific to your location. E.g. the library could flood, roads/pathways blocked.
List any dangers that could occur on the way home. -blocked drains, fast moving water, flooded road, traffic lights failed due to power cuts.
What dangerous things could happen at home? – blocked gutters, low lying areas of house or yard where water will run to may get flooded, water pouring into the house, garage and/or patio.
What damage could occur at home? – wet carpets need to be replaced, plaster board walls need to be replaced, damage to your belongings and household items such as TV, books, photos, clothes, etc. our car may be submerged.
How could we or our families be affected by flood at home? – we might need to leave our home; we might be stranded at home with no food/supplies, etc.



Town Engineer for a Day! – Students work in groups to determine the best place for a new housing development in their town/community.

In this activity, students test a variety of soil types to see how much water the soil will absorb.

Tools:

- water
- measuring cups
- funnels
- coffee filters
- potting mix
- clay
- sand

Method:

1. You are a group of town engineers and you have been given the task of planning a new housing development in your town/community. Some people in the community are not happy about the development and feel that the soil will not be able to withstand heavy rainfall. They think the new homes will be subject to localised flooding.
2. Your task is to decide where the best place is to build the development. You are going to do this by testing different soil types and investigating how much water they will absorb.
3. One proposed area has a soil rich in clay (Area 1), one area is very sandy (Area 2) and the other has an earthy rich soil (Area 3).
4. First test the dry soil. Measure one cup of soil for each soil type.
5. Place the first soil type in to a funnel lined with a coffee filter. Pour a measured amount of water through it. (You will need to use the same amount of water each time). Let the water drain through the soil in the funnel and collect the water in another measuring cup. Record how much water flows through the funnel.
6. Repeat the test with each soil type.
7. Repeat the test again, this time testing the soil in its saturated state.
8. Record your results and discuss which soil held the most water when dry and which soil held the most water when saturated.
9. Which type of soil, do you think, is likely to create a bigger flooding issue?
10. Students write a report explaining which area would be best suited for the housing development.



Before, During and After a Flood - Use the answers from your interview questions. After further research, add what you would do if you were in the same situation. *(Complete the 'To stay SAFER' section after completing Module Four)*

BEFORE the flood _____ did these things:

To stay SAFER, I would

DURING the flood _____ did these things:

To stay SAFER, I would

AFTER the flood _____ did these things:

To stay SAFER, I would



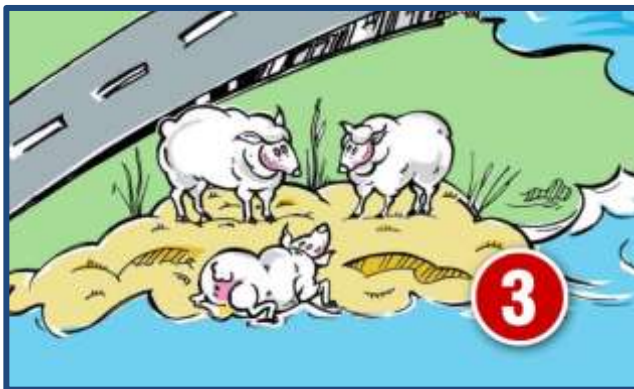
Before, During and After a Flood – Here are some example answers. Use the DFES website and the DFES brochure, *Flood Smart* (www.dfes.wa.gov.au) for more ideas.

BEFORE	<ul style="list-style-type: none"> • Prepare an Emergency Kit • Have a Family/Household Plan • Secure hazardous items
DURING	<ul style="list-style-type: none"> • Move furniture/valuables to a high place • Listen to warnings • Don't play or drive in flood waters
AFTER	<ul style="list-style-type: none"> • Help out friends and neighbours • Seek SES assistance by calling 132 500 • Seek support if needed



Risky Behaviours – Turn Around Don't Drown

Look at the images and IDENTIFY the flood risks. Discuss if and how the risk could be avoided. Choose one of the images and DRAW your own cartoon, demonstrating how the risk could be avoided or eliminated.



What could a 3 metre water level mean to your classroom? –

Imagine your classroom is built alongside a river bank. If there was the flood, the river could overflow. How would that impact on your classroom? As a class you will need to make a river height gauge out of card. It will start at 2.75m and finish at 5.0m with 25 cm intervals. Place it outside the classroom on the ground.

1. At a river height of 3 metres, water has already reached 25cm above the top of the river bank. If the water river height was 3 metres, what impact would that have on your classroom?

2. Use the table below to record what impact the river height would have on your classroom:

River Height (metres)	Impact on classroom	How can you minimise the damage?
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
4.75		
5.00		



3. How do you think you could minimise the amount of damage?

4. Is there anything you couldn't save?

5. You might like to do a similar activity using your school grounds. At 3 metres, would any of your school be under water. Draw a mud map of your school and shade any areas that could be flooded with water. You may need a separate A4 sheet.

6. What important messages might need to be included in a Flood Alert for other students in your school to help keep everyone safe?



Your School's Emergency Plan – This is an example of what your School's Emergency Plan for Cyclone/Flood could include:

CYCLONE/FLOOD

In cyclone-prone areas, principals/site managers should establish links with their local State Emergency Services (SES) and familiarise themselves with the various actions required under each “alert stage”.

- If flooding is imminent, make contact with the local SES and education regional office as soon as possible.
- If the school is still occupied, ensure students and staff are located in the highest sheltered areas.
- Where possible, ensure that high value equipment and records are relocated away from impending floodwaters.
- Ensure potential electrical hazards have been eliminated (for example, isolate power supply) (ONLY WHEN IT IS SAFE TO DO SO).
- Remain at the safe location while it continues to offer protection.
- Do not allow anyone to enter the floodwaters.

(from [Emergency and Critical Incident Template](#), accessed from Department of Education website 8 February 2018)



Look at your School's Emergency Plan — As a group, discuss what your school's plan is for **BEFORE**, **DURING** (when there is an cyclone and/or flood) and **AFTER** (once it is safe) a cyclone and/or flood and record your discussion in the table below:

Emergency Plan	
(Put your school's name here)	
BEFORE	
DURING	
AFTER	



Emergency Contact Numbers — Find the phone numbers you and your family might need in a cyclone and/or flood emergency. Remember 000 is only to be used in the event of fire or when someone's life is in danger or it is likely to be in danger. List other numbers you think you might need.

EMERGENCY CONTACT NUMBERS

POLICE, FIRE, AMBULANCE (for life threatening emergencies only)	
STATE EMERGENCY SERVICES (SES)	
Electricity Company _____	
GAS Company _____	
Phone Company _____	
Water Company _____	
Main Roads	
RSPCA	
Rivers and Waters	
HOSPITAL	
YOUR DOCTOR _____	
PARENT _____	
PARENT _____	
PARENT _____	
SCHOOL _____	
SCHOOL _____	
FAMILY	
FRIENDS	

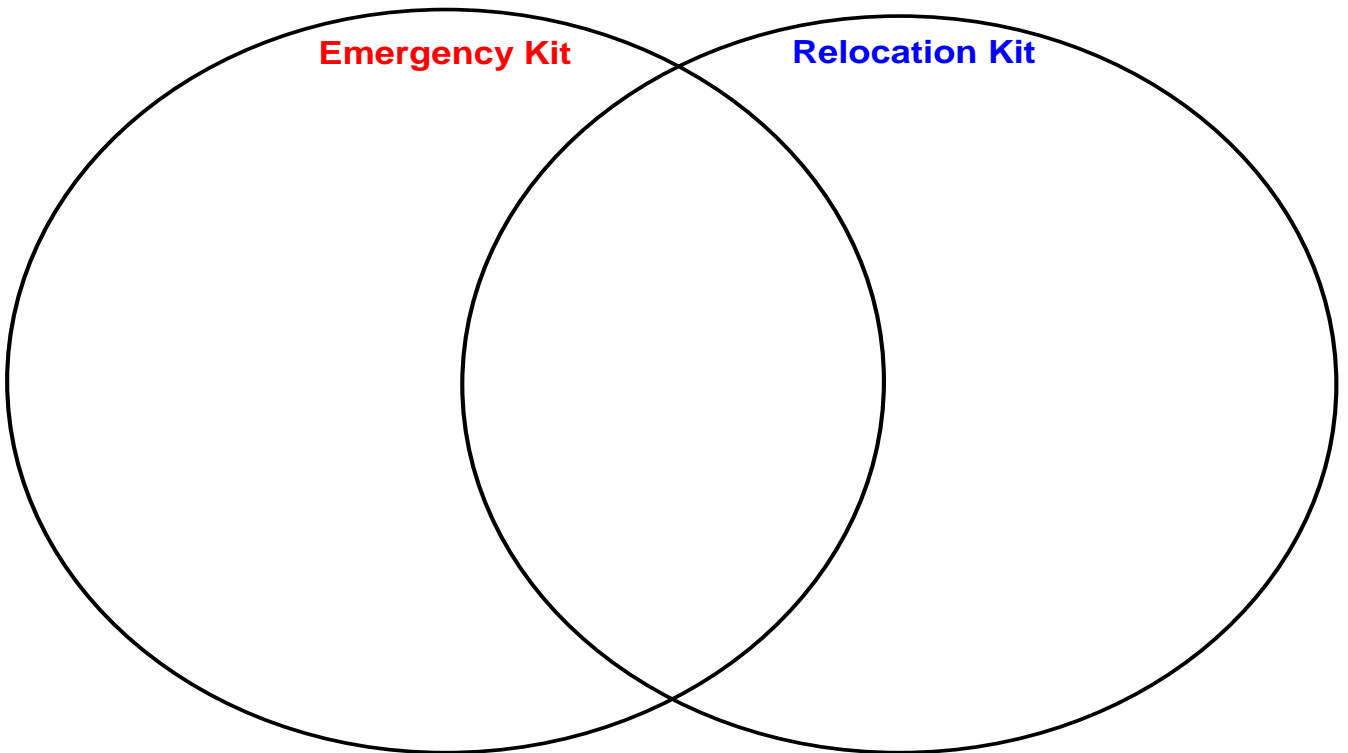


Emergency Kit and Relocation Kit

Complete the Venn Diagram to show the items which belong in an Emergency Kit and a Relocation Kit



Images courtesy of Emergency Management QLD



When would you use an Emergency Kit?
When would you use a Relocation Kit?



How can you PREPARE for cyclone and/or flood emergencies? — Make a checklist of the things you can do to prepare your home and your family for a cyclone and/or flood emergency.

CHECKLIST: Preparing OUR home for a CYCLONE and/or FLOOD EMERGENCY

WHAT CAN YOU/YOUR FAMILY DO?	

Find the DFES Flood Cyclone Smart brochures on the DFES website at www.dfes.wa.gov.au/safetyinformation/flood and www.dfes.wa.gov.au/safetyinformation/cyclone — Compare your checklist with the information provided and REFLECT on what you did/didn't include.

I didn't include:

Something else we can do as a family:



Government of Western Australia
Department of Fire & Emergency Services



DFES Cyclone Smart Community Alerts – Use the DFES *Cyclone and Flood Cyclone Alert System* Factsheet 01 or DFES *Cyclone Smart* brochure or DFES website to find information about the DFES four stages of alerts – **Blue, Yellow, Red and All Clear with Caution**. Write in each coloured section what communities should do in each of the alert stages. Use the white spaces for illustrations. You can find more detailed information online at www.dfes.wa.gov.au.

CYCLONE SMART

When is Cyclone Season? _____
What are the four stages of alerts? _____
What radio station should you listen to? _____

Blue

Yellow

Red

All Clear with Caution

From Rain to Warning - How do scientists determine Flood Risk?

