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 6

Things You Will Need
- Internet access
- 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?
3. 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**

1. 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.

2. 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.

3. 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).

**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 in they were faced with the same circumstances and why?