As an extension activity, students could watch the Frequently Asked Questions section of the 'Questacon Tsunami Awareness Show' DVD (duration 11 minutes) and prepare a project/report about tsunami.

Research the difference between tsunami waves and normal ocean and wind swell waves

Provide students with the opportunity to research the difference between tsunami waves and normal ocean and wind swell waves. Suggested websites are included under the 'Further Information' heading. Information could also be requested from different Agencies. Students could present their research to the class. This activity may be better suited for Years Five and Six students.

Tsunami Quiz – True or False?

Ask your students to answer true or false to the following sentences.

1. I should go to the shore to watch a tsunami. [FALSE]
2. All undersea earthquakes cause tsunami. [FALSE]
3. If a small tsunami is coming, I should get out of the water and wait until I hear it is safe to return. [TRUE]
4. Is a big tsunami is coming, I should move as far inland as I can or to higher ground. [TRUE]
5. If I am swimming when a small tsunami comes, I could get dragged out to sea by the strong rips and currents. [TRUE]
6. The Joint Australian Tsunami Warning Centre can detect if a tsunami is coming towards Australia. [TRUE]
7. A tsunami is most often caused by undersea earthquakes. [TRUE]

Assessment Guide

Teachers can assess with questioning, through group discussion and direct observation how students have gained an understanding of what a tsunami is, the difference between small and big tsunami and what they would need to do if a tsunami occurred in their area.

To make learning interactive, students could be broken into groups, assigned a set of questions and brought back together to present their answers to the classroom.

Allow some time for each group to discuss how they would react to their situation in order to survive and assist others before they present their findings.

Teachers can also observe individual participation in each of the groups as they present their responses.

Further Information

You can find more information about tsunami at the following websites:

- Emergency Management Australia — www.ema.gov.au/tsunami, www.ema.gov.au/schools (website appropriate for school children)
- Bureau of Meteorology — www.bom.gov.au/tsunami
- Geoscience Australia — www.ga.gov.au/hazards/tsunami

Disclaimer The purpose of this Lesson Plan is to provide general information and advice. Following the procedures in this Lesson Plan will not guarantee protection against the consequences of tsunami or their aftermath. In case of tsunami, you should follow instructions and advice from competent authorities. The Australian Government does not accept any legal liability or responsibility for loss, damage, injury or death arising from, or despite, the use of the information in this Lesson Plan. Although all due care has been taken, this Lesson Plan may contain technical inaccuracies or typographical errors.

Australian Government

TSUNAMI AWARENESS LESSON PLAN

This Tsunami Awareness Lesson Plan provides teachers and students in remote Aboriginal coastal areas with an opportunity to investigate how tsunami occur and how to stay safe in the event of a tsunami.

An Assessment Guide for teachers is also included within this Lesson Plan.

Key Learning / Subject Areas

- Science
- Studies of Society and Environment

Possible Year Levels

Years Three (3) to Six (6)

Objectives

The objectives of this Lesson Plan are to:

- **create** an understanding amongst students of what a tsunami is and how it can impact people on or near the coast
- **teach** students the difference between the three categories of tsunami warnings: no threat, marine threat and land inundation threat; and about the cancellation of a tsunami warning
- **teach** students what to do in the event of a tsunami warning.

Support Materials

The 'Tsunami Community Education Kit for Aboriginal Australians in Remote Coastal Communities'* includes:

- Two educational DVDs about tsunami:
  1. 'Questacon Tsunami Awareness Show'. This DVD contains the 30 minute tsunami education presentation shown at Questacon - the National Science and Technology Centre in Canberra.
  2. 'Tsunami Warnings…What You Should Do (for Aboriginal Australians in Remote Coastal Communities)'. This DVD focuses on the key messages about tsunami community safety for remote coastal Aboriginal communities.
- Three posters that show how communities should respond to tsunami warnings. These posters have been designed by an Aboriginal artist and can be used individually or joined together as one large poster.
- One blank poster template which can be copied for class members to write/draw their own story about tsunami.
- Twenty stickers – great for reminding the community on what to do if there is ever a tsunami.

Information for the Teacher

What is a tsunami?

"Tsunami" is a Japanese word that means harbour wave. Tsunami is pronounced "soo-nah-mee".

* This Kit can be ordered through the Attorney-General's Department.

FOR TEACHERS IN REMOTE ABORIGINAL COASTAL AREAS

Image courtesy of
Anders Grawin 2004

A tsunami is a series of fast, low and long ocean waves that move out from a central area, due to a sudden displacement of a large body of water. This is most often caused by undersea earthquakes but can also be caused by landslides, volcanic eruptions or even asteroid impacts.

The passage of tsunami involves the movement of a wall of water all the way to the ocean floor. In the deep ocean, tsunami waves may go unnoticed and waves are not very high – usually no bigger than one metre - but a tsunami wave may be hundreds of kilometres in length and can travel as fast as 950 kilometres per hour. That is almost as fast as a passenger jet!

As a tsunami wave approaches the shoreline it slows down but does not lose its energy. The height of the waves build. This is called 'shoaling'. It is the energy in the wave that makes tsunami so dangerous to people on or near the coast. When a tsunami reaches land, it may behave like a series of breaking waves or a large, powerful wave. The tremendous energy of a tsunami can also cause great quantities of water to surge inland, far beyond where even the highest tides would commonly reach. An example of one of the largest tsunami waves occurred in 1883 when a volcano erupted at Krakatoa, Indonesia. The tsunami reached a height of 37 metres!

Tsunami Warnings for Australia

The Joint Australian Tsunami Warning Centre (JATWC) is jointly operated by the Bureau of Meteorology and Geoscience Australia. It operates 24 hours a day, seven days a week. It detects and verifies tsunami threats from undersea earthquakes to the coastline of Australia and its offshore territories.

The JATWC is responsible for issuing tsunami warnings to the Australian public. If they issue an official warning, this means a tsunami may have been detected. They will work with State/Territory emergency authorities to advise the public what to do.

Warnings will be issued via the radio, TV, 1300 TSUNAMI (1300 878 6264), the Bureau of Meteorology's website www.bom.gov.au/tsunami and through local emergency workers and community leaders. It is important that you listen carefully to the warnings and continue to follow the advice from emergency workers and community leaders. They will advise when it is safe to return to the affected area.

In Australia, tsunami threat levels are categorised as follows:

- **No threat**
  An undersea earthquake has been detected. However, it has not generated a tsunami, or the tsunami poses no threat to Australia.
- **Marine threat**
  This warns of potentially dangerous waves, strong ocean currents and the possibility of some water overflow onto the immediate foreshore.
- **Land inundation threat**
  This warns of dangerous waves, strong ocean currents and major land inundation (ie great quantities of water that overflow onto normally dry land).

What should you do if a tsunami warning is issued?

- **No threat**
  When you hear this message, you can go back in or near the water again.
- **Marine threat**
  When you hear this warning, you need to get out of the water and move away as the dangerous rips and currents could drag you out to sea. If you're in a boat in the deep ocean, maintain your position and do not return to the shore until further advised. If you're in a boat in shallow water, return to shore, make sure your boat is secured and move all people away from the water's edge. Monitor the radio or TV, or wait to receive information from local emergency workers and community leaders. Do not return to the water until they advise it is safe to return.
- **Land inundation threat**
  When you hear this warning, it means a big tsunami is on its way. You should move away from the water and head quickly for higher ground or inland. Take only essentials that you can carry such as food, water and any medical items you may need.

Remember that a tsunami is not a single wave so you will need to stay away from the water's edge until an official "all-clear" has been issued by the radio, TV, 1300 TSUNAMI, the Bureau's website www.bom.gov.au/tsunami or through an emergency worker or community leader. Never go to the shore to watch a tsunami. If you can see it, you may be too close to escape.

Cancellation of a Tsunami Warning

When the main threat has passed, or if a tsunami did not occur, the JATWC will issue a Tsunami Warning Cancellation. Your local emergency authority or community leader will let you know when a tsunami warning is cancelled. This means it is safe for you to go back in or near the water again. Caution should still be exercised however, as strong waves, currents and unusual sea levels may still affect some shorelines for hours or even days after the event.

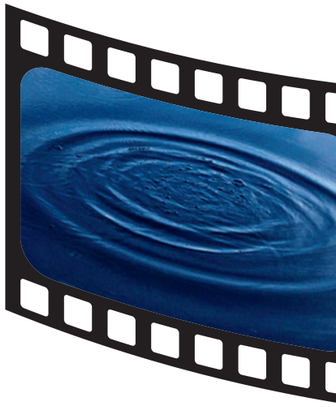
Natural warning signs

There are also natural warning signs that may be noticed before a tsunami occurs. You may:

- **Feel an earthquake** If the ground shakes under your feet in a coastal region, a tsunami may have been caused by a strong undersea earthquake. However, you may not feel an earthquake if the event is far away.
- **See ocean water disappear from the beach, bay or river** Before a tsunami arrives, water may recede from the shoreline before returning as a fast-moving wall of water. If you notice the water is disappearing, tell your family and friends and prepare to move inland or to higher ground.
- **Hear an unusual roaring sound** If you hear a loud roar approaching (a bit like a passenger jet or a train), tell your family and friends. It could be a tsunami approaching.

If you hear a tsunami warning or see a wall of water coming, move away from the water immediately as far inland as you can, or to higher ground and wait until you hear when it is safe to return.

Possible Activities



Let's make a tsunami

What you will need: a large bucket or tub of water, medium-sized rock or small, heavy item.

Allow several students, or each student, to drop the heavy object into the tub of water and observe how the ripples move out from where the object has been dropped in water. This activity is a good visual aid in helping students understand about tsunami.

Imagine if an undersea earthquake occurred in the middle of the ocean. Tsunami waves could move out from that disturbance in the same way that these ripples move away from the place where the object was dropped into the water.

Watch the 'Tsunami Warnings…What You Should Do (for Aboriginal Australians in Remote Coastal Communities)' DVD

Watch this short DVD with your class. This DVD focuses on the key messages about tsunami community safety for remote coastal Aboriginal communities.

Have the class review the three associated posters from the Kit. These posters show how communities should respond to tsunami warnings. Then ask students to create their own tsunami story and share it with the class. They can use the blank poster template as a guide.

You could ask the class the following questions:

- What did the people do to get out of danger in each of the posters?
- How did they hear the warning?
- What did the people do when they heard the warning?

Watch the 'Questacon Tsunami Awareness Show' DVD

Watch this tsunami education presentation with your class (duration 25 minutes). Have a class discussion about what a tsunami is, types of tsunami warnings, natural warning signs and required actions should a tsunami occur.