Each integrated unit contains:

- 6 pages of teaching notes in an integrated teaching sequence
- 10 practical blackline masters
- National Profile outcomes
- A useful resource list
Natural Disasters
by Jane Campbell

Learning Area Focus Science

Topic Students will be encouraged to research the different natural disasters that happen around the world. They will become aware that earthquakes, volcanoes, bushfires, floods, drought, damage and diseases caused by pests, and storms such as cyclones, hurricanes and tornadoes can cause an enormous threat to both lives and property. Students will investigate why these disasters can occur and why some people knowingly live in these areas. The benefits these disasters can bring is also examined, for example the floods in Egypt used to bring fertile silt and water to the people around the Nile. Throughout this unit, students will develop an awareness of the fragility of our environment and how important it is to look after it.

National Profile Outcomes

Students will:

- **Science 3.1** Describe situations where people have altered the landscape for their own needs and in doing so increased the likelihood for a natural disaster.
- **Science 3.2** Relate changes in the physical environment to the physical process when making a model of a flood.
- **Science 3.13** Suggest ways of finding information by listing sources of information such as CD-ROMs and factual books.
- **Science 3.14** Organise and use equipment to gather and to present information about droughts.
- **Science 3.18** Identify ways science is used responsibly in the community by finding out about occupations such as glaciology and vulcanology.
- **Technology 3.2** Generate designs of one or more natural disasters that use a range of technical terms.
- **Technology 3.7** Match characteristics of materials to the requirement of their own designs when building models of natural disasters.
- **SOSE 3.2** Present a timeline of natural disasters.
- **SOSE 3.5** Describe how natural features affect the ways people live in particular places.

Resources

Factual Books

- Nick Arnold, *Volcano, Earthquake and Hurricane*, Wayland.

Picture Books

- Richard Tulloch, *Rain for Christmas*, OUP.

Novels

- Helen Brinsmead, *When You Came to the Ferry*, Hodder and Stoughton.
- June Epstein, *When Tracy Came for Christmas*, OUP.
- Kylie Tennant, *All the Proud Tribesmen*, Macmillan.
Natural Disasters
Teaching Notes

Overview

Disaster discussion

Write ‘natural disasters’ on a large piece of chart paper and display it on the wall. Place students into small groups and ask them to discuss what these words mean. Also encourage students to name different types of natural disasters. Once groups feel they cannot go any further with their discussions, come together as a class. Ask students:

■ What is meant by the term ‘natural disaster’?
■ Can accidents such as car crashes or train derailments be classified as natural disasters?
■ When does something become a natural disaster?

With students, brainstorm different types of natural disasters. Write these on the chart paper. Then create a class definition for a natural disaster and write it underneath. Ensure students realise that something becomes a disaster when it threatens either a large number of lives or properties, or both, and in doing so creates a long recovery or rebuilding process. A natural disaster (as opposed to other types of disasters such as train crashes) is something that happens because of nature. They can be classified as geological (earthquakes, volcanoes, landslides, tsunamis, etc), meteorological (flood, drought, hailstorms, cyclones, fires, etc) or biological (plagues, famine, parasitic infections of plants and animals, etc).

Discuss what is meant by these terms. Place students into pairs and using BLM 1, ask them to classify the disasters listed on the chart paper. Challenge each pair to find other types of disasters and to include them on their lists. When lists are completed, ask for volunteers to read them out. Ask students if some disasters can fall into more than one category. Explain, for example, that a fire can be caused by lightning or an earthquake.

Finding information

Ask students if they know where to find books about natural disasters. Do they know how to search for books using the on-line catalogues, and then how to locate them on the shelf? Do they know how to find information on the Internet? Organise a trip to the school library or a public library. With students, find and retrieve books on natural disasters. By using aids, such as the index and contents pages of the books, ask students to investigate different types of natural disasters.

During the course of this unit, encourage students to browse through newspapers to see if they can find information about natural disasters that have recently happened somewhere in the world. Students could cut out the articles to compile a class scrapbook. Discuss the size of these disasters and how it affects the people involved.

Natural times

Explain to students that natural disasters have occurred throughout history. Place students into pairs or in small groups and ask them to create a timeline of natural disasters. You might like to suggest a starting point for them or leave it to individual groups to decide how far back in time to go and how comprehensive to make it. Another option is to give each group one type of natural disaster to research, such as earthquakes. When completed, have students present their timeline to class members. Display them around the room. Encourage students to revisit these timelines as the unit progresses as they should provide useful sources of information.
Types of natural disasters

Earthquakes

Ask students if they know why an earthquake happens. Explain to students that the Earth has an outer layer or crust. This crust is formed from a number of separate thick plates of solid rock that sit on another layer of the Earth, the mantle. The mantle consists of hot molten rock called magma. The continents were created by the movements of the plates coming together and splitting apart. They are still moving today. When plates run into each other, the underground collision can cause the ground above to move. When this happens, it’s called an earthquake.

Allow students to browse through the books on display. Brainstorm places earthquakes have occurred. Ask if anyone knows why earthquakes occur at certain places. Explain that earthquakes form along fault lines such as the San Andreas fault. Fault lines form when rocks break apart, or crack, under the pressure of plate movement. Encourage students to find out the names of the other fault lines and where they are located. What areas are at risk from earthquakes?

Moving apart

Demonstrate to students a simple example of how fault lines work. Place two towels, or mats, on the floor. Sit a student on each towel. Ask class members to pretend that these towels are houses and that the students are neighbours in San Francisco. (You could place a map of the world on the wall and point out where San Francisco is.) Explain that although these towels are neighbouring houses, one towel is on the Pacific Ocean plate while the other towel is on the American continental plate. Encourage students to imagine they are back in 1906 when the San Andreas Fault suddenly moved three metres. The resulting earthquake and fire killed over 450 people and seriously damaged San Francisco. Have class members hold one end of each towel and drag them three metres apart. Explain these are the continental plates moving in opposite directions. Discuss with students what would happen if a house or a road covered both of these plates.

Shaky living

There have been many disastrous earthquakes throughout history. Place students in pairs and ask them to research earthquakes. They could use the following questions as a guide.

- How long can an earthquake last?
- What happens during an earthquake?
- What are aftershocks?
- In what parts of the world do earthquakes happen?
- Can earthquakes be measured?
- Can we predict earthquakes?
- Can earthquakes be prevented?
- Are buildings, roads and people safe from earthquakes?
- What might happen if there was an earthquake near a mountain?
- Why do tsunamis (giant waves) occur?

Measuring earthquakes

How can the strength of an earthquake be determined? With students, brainstorm methods of measuring earthquakes, for example scientific methods using the Richter scale or a seismograph; economic methods such as the costs of repairing houses and roads; and by counting the number of injuries and fatalities, etc. Have students complete BLM 2 to show that they understand some of the different ways of measuring earthquakes.
Volcanoes

With students, brainstorm all they know about volcanoes. If necessary, explain that a volcano forms when there is a gap in the Earth’s crust. Molten rock, ash and gas can rise out of the gaps onto the surface. The molten rock is known as lava. Volcanoes are usually mountains formed from the lava that has risen to the surface of the Earth. Like earthquakes, volcanoes are usually found along the edge of huge plates which make up the Earth’s crust. To further their understanding of volcanoes, ask students to complete BLM 3.

Volcanoes vary

There are different ways of classifying volcanoes, for example by shape: shield, cinder cone, composite and lava cone; by eruption: Pelean, Vulcanian, Strombolian, Hawaiian and Icelandic; or by activity: dormant, active and extinct. Encourage students to find out what these terms mean.

There are about 500 active volcanoes in the world today. Give each student a copy of BLM 4 and ask them to select and research a particular volcano. Students might like to make their own volcano to include in the class presentation.

Once all students have presented their work, write the headings, ‘similarities’ and ‘differences’ on chart paper and have students compare the volcanoes by giving examples.

Give students BLM 5 and ask them to mark the location of all the major volcanoes.

Avalanches and landslides

With students, discuss avalanches and landslides. Establish that they consist of an enormous mass of snow, rock or mud that crashes down from a mountain or a hillside at an incredibly fast speed. They can engulf and destroy entire villages in a matter of minutes. As students learnt earlier in this unit, landslides and avalanches can be triggered off by an earthquake, but there are other reasons. Discuss what these might be. Can people cause landslides? (e.g. landslides might occur because of quarrying, building roads, deforestation or heavy rain.) Is there anything that can be done to prevent landslides and avalanches?

Wild winds

Hurricanes, cyclones, willy-willies and typhoons are all storms with incredibly strong and powerful winds. Place students into pairs or groups and allocate one type of storm to each. The following questions could be used as a guide.

- What is the difference between hurricanes, cyclones, willy-willies and tornadoes?
- What causes the storm?
- Where do they occur?
- Is wind the only natural element involved?
- What is the eye of the storm?
- What damage can these storms do?
- Give examples of some of the major storms, e.g. Cyclone Tracy hit Darwin in 1974. (These could be added to the class timelines.)

Encourage students to present their information in any format they consider appropriate, for example an information report, an interview, etc.

Stormy times

Have students design their own tropical storm warning poster. You might like to suggest that it includes advice on how to prepare for a storm and what to do when one hits.

Floods

Ask students what is a flood (a flood happens when water pours over land that is normally dry). Ask them to give reasons why floods might occur, for example because of an earthquake, tsunamis, storms and heavy rain, melting glaciers, human neglect (such as not maintaining dam walls) and human interference (draining wetlands, cutting rivers off from their natural flood plains).

Brainstorm methods of controlling or preventing floods, for example building dams, barriers and dykes in areas that are prone to flood; reforestation; building on high ground; changing farming methods, etc.
Ask students to research floods and to make a model of one. Try to ensure that students model their floods on events that occurred in different countries around the world, for example the banks of the Mississippi River breaking or a storm in the Netherlands causing the sea level to rise above the dykes. So as not to flood the classroom, go into the playground when models are being demonstrated. With students, discuss the different models and list the reasons why these floods occurred. Ask students if floods are always disastrous. Explain that floods can be natural occurrences that benefit the Earth. For example, before a dam was made in Egypt, the Nile River used to flood in June every year. The floods brought water and fertile silt for the crops, as well as water for drinking, swimming and washing.

Droughts

Ask students what a drought is. Establish that a drought can occur when there is a severe dry spell during which the expected rain does not fall and the ground water seeps further down and away from the surface. This causes the surface of the ground to get drier and dustier and contributes to the impact of soil erosion and dust storms. Provide students with BLM 6 and ask them to predict what will happen to the water. Then ask them to complete the experiment and to comment on what happened.

Dry work

Have students, either individually or in pairs, find out about droughts. Questions to research might include:
■ What is a drought?
■ What causes a drought?
■ What are the effects of a drought on people, plants and animals?
■ How long can droughts last for?
■ Can we predict droughts?
Ask students to present their research in an entertaining yet informative way. They might like to present their information as an interview or a play.

Water – more or less?

Explain to students that water is continually being circulated around the world. The water in the ocean, rivers, lakes, etc is heated by the sun and it evaporates into the air. The vapour condenses and forms tiny droplets of moisture which form into clouds. The droplets fall back to Earth in the form of moisture such as rain, snow or hail. This is called precipitation. The moisture falls onto both the land and the water systems. The sun heats up the water and the cycle continues. Have students complete BLM 7.

Fiery debate

There are many different ways in which fires start. Have students suggest some of them, for example, lightning, burning lava from a volcano, earthquakes, arson, etc. Organise a polarised debate around the statement: ‘Fires benefit the land’. During the debate, encourage students to keep a journal to write down their thoughts and opinions. Pause the debate periodically to allow students to write in their journals.

To set up the debate, place students in a horse-shoe shape. Have students who agree with the statement to sit on the right-hand side of the shape, those who disagree can sit on the left-hand side while those are undecided can sit in the middle. Begin the debate with a person who agrees with the statement, followed by someone who disagrees, then by a speaker who is undecided, etc. Allow students the opportunity to change positions in the room, according to their point of view. Emphasise to students that it is quite acceptable to change or modify their opinions as the debate progresses.
**Pests**

Explain to students that biological elements can cause natural disasters. Farmers, in particular, can be seriously affected by plagues of pests, such as locusts and mice. A big swarm of locusts, for example, can wipe out entire crops. Other insects can carry diseases, for example mosquitoes can carry malaria and the tsetse fly can cause sleeping sickness. Have students research types of insects and the diseases they can carry. Encourage students to think of possible solutions to control one of these diseases. Ask them to think of an imaginative remedy and to present it to the class. Class members can pretend they are part of a panel of health experts who will be asked to evaluate the remedies put forward.

**Humans and homes**

Students should now be aware of some of the many natural disasters that can occur around the world. Divide the class into groups and allocate one type of natural disaster to each group and explain that there is a community of people living near the potential disaster, for example the city of San Francisco is on a fault line; people living in the Australian bush are facing drought conditions; people in an area of South America are experiencing a crisis with malaria, a volcano in Hawaii is about to erupt, etc. Have each group research and discuss:

- why people continue to live near these potential disasters
- what precautions and preventative methods can be taken to reduce the risk of a disaster happening (by both the residents and the authorities)
- whether anything has been learnt from previous disasters?

Have students present their findings to the class. Encourage them to add visual effects, such as maps, models of the disaster, etc to make the presentation memorable (and you might like to incorporate the next activity with the presentation).

**Drawing a disaster**

Cover sections of the wall with chart paper (or perhaps use the playground fence). Ask members of the above groups to work together to research and draw, or paint, two pictures of their allocated disaster. One side of the chart paper could be the more technical drawing, with labels, explaining how the natural disaster is formed. The other side of the chart paper could represent the reality of the disaster. Students might like to include to use collage materials such as crepe paper, material, leaves and branches to make their painting more effective.

**A concept map**

To finish off this unit, place students into groups and ask each group to create a concept map of ‘natural disasters’. Encourage students to think logically and to be organised in the way they write their information. Suggest that they think of relevant headings and group words under these headings. Additional headings can be included as new concepts arise. When students have completed their maps, ask them to present them to class members. After the presentations, make a class concept map on a large sheet of chart paper. Compile all the ideas thought of by students. Display the map next to the timelines and models of natural disasters. These will make an excellent summary of the concepts learnt throughout the unit.
## Classification of disasters

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A geological disaster is

A meteorological disaster is

A biological disaster is
Measuring earthquakes

What does a seismograph measure?

How does it work?

What is the Richter scale?

What does it measure?

How does it work?

Draw and label a picture of either:
- a seismograph
- the print-out produced by a seismograph.

How else can earthquakes be measured?
Cross-section of a volcano

Use these words to label the volcano.

- layers of lava and ash
- main vent
- magma chamber
- lava bombs
- side vent
- lava flow
- hot ash
- crater

Choose three of the labels and define them.

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For all your teaching needs visit www.blake.com.au
Investigating volcanoes

Pick a major volcano to research.

Name: ...............................................................................................................................................................

Location: ..........................................................................................................................................................

What shape is it? .............................................................................................................................................

How was it created? ........................................................................................................................................

How does, or did, it erupt?

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Is it dormant, active or extinct?

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Interesting facts:

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Draw a picture of the eruption.
Volcanoes around the world

Mark the major volcanoes on the world map.

What is the Pacific Rim of fire?
Up and down – evaporation and precipitation

You will need one cup and two bowls.

**Method:**
1. Pour one cup of water into each bowl
2. Place one bowl in a warm place
3. Place the other bowl in a cool place

Before you begin this experiment, predict the outcome.
Which cup of water will evaporate first: the water in the sun or the water in the shade? Why is this?

What happened?

This is because:

Would it make any difference if a fan (wind) was placed near each bowl?

What does this experiment have to do with droughts?
The water cycle

Label the water cycle and write a brief explanation:

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Match the job to the definition

Meteorologists
scientists who study earthquakes

Seismologists
scientists who study volcanoes

Geologist
scientists who study rocks

Glaciologist
scientists who study ice

Vulcanologists
scientists who study weather

If you had to choose one of these jobs which one would you choose? ............................................................................................................
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Why? ........................................................................................................................................
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A world of disasters

What natural disasters can occur in these countries? Remember that the three countries can experience the same types of disasters. Add any other natural disasters you have come across in your research.

cyclones, hurricanes, typhoons, tornadoes, tsunamis, earthquakes, volcanoes, floods, droughts, bushfires, hailstorms, blizzards, avalanches, locust plagues.

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<th>Australia</th>
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Choose a natural disaster

Name:..............................................................................................................................................................................................................................

Area or country it happened:..................................................................................................................................................................................

When it happened:......................................................................................................................................................................................................................................................

How long it lasted for:......................................................................................................................................................................................................................................................

Damage:......................................................................................................................................................................................................................................................................................................................
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Could it have been prevented?.......................................................................................................................................
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