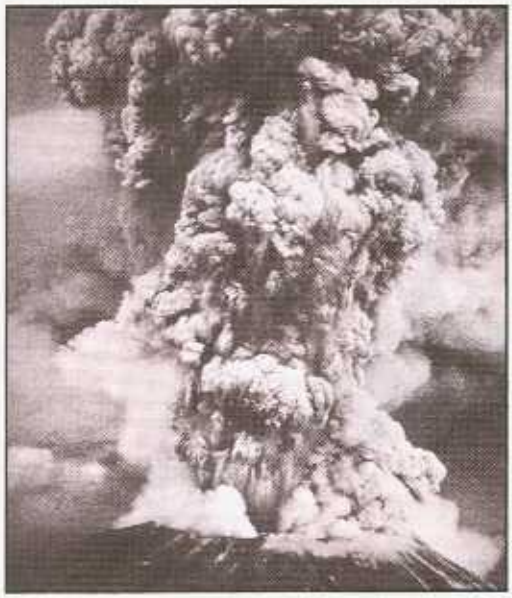
# Section 8



# The Volcano Hazard

## In this section .....

# Volcanoes: Glossary of Key Terms

**Active volcano:** Volcano which has a history of regular eruption (e.g. Japan's Mt Aso is the world's most active volcano with 162 recorded eruptions).

**Caldera:** A collapsed volcanic cone.

**Composite volcano:** A cone-shaped mountain built up by many volcanic eruptions and consisting of layers of lava and ash .

**Cone:** The hill or mountain built up by the deposition of volcanic material.

**Crater:** A circular depression around the top of the vent of a volcano. The crater forms the summit of most volcanoes.

**Cinder cone:** A steep-sided, cone-shaped hill built up by cinders (fragments of solidified lava) ejected from a volcano .

**Cinders:** Fragments of solidified lava.

**Dome volcano:** A tall, convex-shaped volcanic cone formed by thick and treacle-like lava cooling quickly and so not flowing far away.

**Dormant volcano:** Volcano which has erupted in the past, but has been inactive for a long period of time (e.g. Lassen Peak, USA).

**Dyke:** In a volcano, a vertical intrusion of magma which forces its way towards the surface through cracks or openings in the crust.

**Extinct volcano:** Volcano which has been inactive since the beginning of recorded history (e.g. Mt Kilimanjaro in Tanzania).

**Lava:** Molten rock which has flowed from the interior of the earth onto the surface.

**Magma:** Molten rock below the earth's surface, held in the magma chamber.

**Shield volcano:** A broad, flat volcanic cone formed by runny lava coming slowly to the surface and spreading widely before cooling.

**Sill:** A horizontal intrusion of magma which forces its way between layers of rock.

**Tephra:** Solid materials in various sizes which have been ejected from a volcano during an eruption (e.g. ash, ciders, lapilli and volcanic bombs)

**Vent:** An opening in the earth's crust through which volcanic material flows. Some volcanoes may have a single central vent while others may have a number of smaller vents, called subsidiary vents.

# What is a Volcano?

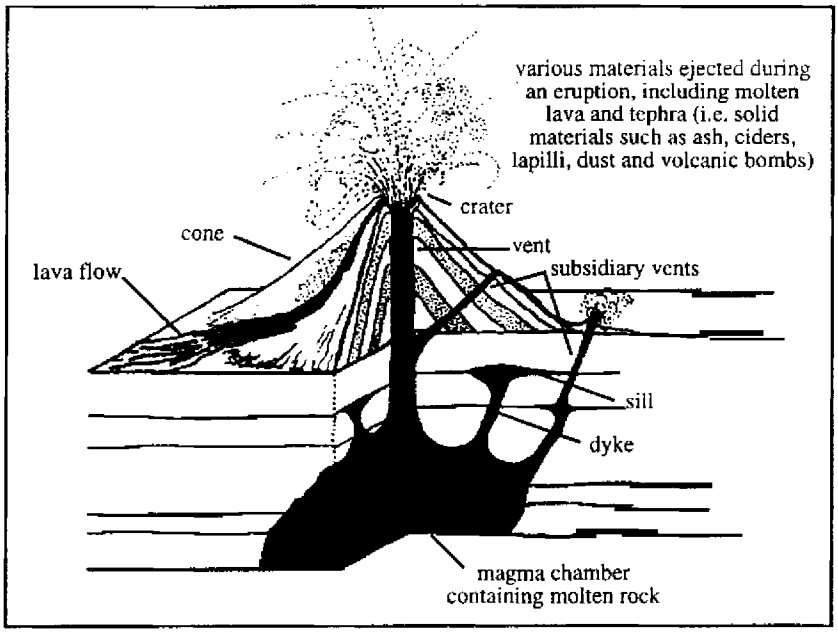



**Figure 1:** Cross-section through a volcanic cone

## Shield Volcano

A broad, flat cone formed by runny lava coming slowly to the surface and spreading widely before cooling.

## Dome volcano

A tall, convex-shaped cone formed by thick and treacle-like lava cooling quickly and so not flowing far away.

## Composite Volcano

The most common volcano. A cone-shaped mountain built up by many eruptions and consisting of layers of lava and ash .

## Cinder Cone

A steep-sided, cone-shaped hill built up by cinders (fragments of solidified lava) ejected from a volcano .

**Figure 2:** Types of volcanoes

*contd.....*

## *What is a Volcano? (contd)*

### *Activities*

1 Using the information provided in Figure 2, construct diagrams of each type of volcano in the space provided. On each diagram:
- label *vent, crater, magma reservoir and cone*, using Figure 1 to help you;
- add shading and additional labels to show particular characteristics of each type.

2 Study Figure 3, and complete the following:
- a Write a brief description of the eruption scene shown.
- b How would you account for each of the following destructive effects of the Mt St Helens eruption of 1980
  - The collapse of houses and other building.
  - Mud and rock avalanches on the sides of the snow-covered volcano.
  - Widespread flooding of rivers.
  - Flattening of forests.
  - Loss of animal, fish and insect life.
- c How would you classify Mt St Helens using the types of volcanoes shown in Figure 2? Give reasons for your answer

3 Complete the puzzle on the right by adding the missing words to each of the following clues, and then finding the words in the puzzle.

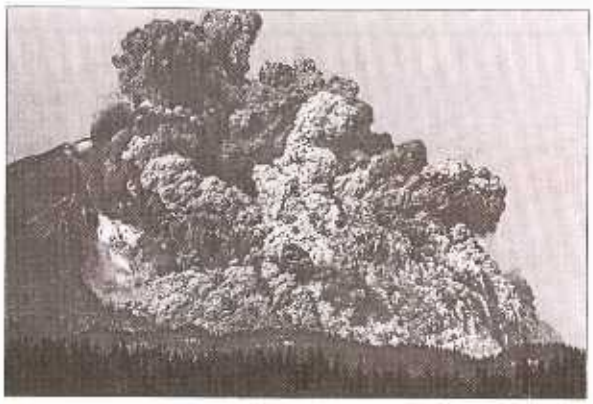


**Figure 3:** The massive ash, rock and steam eruption of Mt St Helens, USA, 1980


| C | O | M | P | O | S | I | T | E | S |
|---|---|---|---|---|---|---|---|---|---|
| H | T | N | O | I | T | P | U | R | E |
| A | C | I | N | D | E | R | S | R | C |
| M | S | H | I | E | L | D | C | E | O |
| B | X | C | A | S | H | O | O | T | N |
| E | E | O | P | S | R | M | N | A | D |
| R | V | M | B | H | R | E | E | R | A |
| E | N | M | L | A | V | A | Y | C | R |
| A | O | O | A | M | G | A | M | A | Y |
| B | C | N | I | L | L | I | P | A | L |

### Clues

1 Molten rock underground is called _ _ _ _ _
2 The _ _ _ _ _ _ is the opening at the top of a volcano.
3 During an _ _ _ _ _ _ _ _ lava and ash may be ejected from a volcano
4 A _ _ _ _ _ _ _ _ _ cone may appear on or close to the main cone of a volcano.
5 The _ _ _ _ is opening in the earth's crust through which volcanic material flows.
6 The magma _ _ _ _ _ _ _ holds molten rock below the earth's surface
7 A _ _ _ _ _ _ _ _ _ volcano consists of layers of ash and lava.
8 _ _ _ _ _ _ _ are fragments of solidified lava.
9 A _ _ _ _ _ _ volcano is broad and flat.
10 Small fragments of rock ejected from a volcano are called _ _ _ _ _ _ _
11 Volcanic _ _ _ _ _ are large rocks ejected from a volcano.
12 Composite volcanoes are the most _ _ _ _ _ _ type of volcano.
13 In the Mt St Helens volcano, tonnes of _ _ _ were dumped on the surrounding countryside.
14 Dome volcanoes are _ _ _ _ _ _ in shape.
15 In a composite volcano, _ _ _ _ _ _ of ash and lava are deposited during different eruptions.
16 The mountain or hillside formed by volcanic action is called the _ _ _ _
17 Molten rock which flows over the earth's surface during volcanic activity is called _ _ _ _
18 A _ _ _ _ volcano is formed when thick lava cools quickly to form a tall, convex cone.

The remaining letters form a word which describes all solid material ejected from a volcano:

_ _ _ _ _ _

# How Do Volcanoes Form?

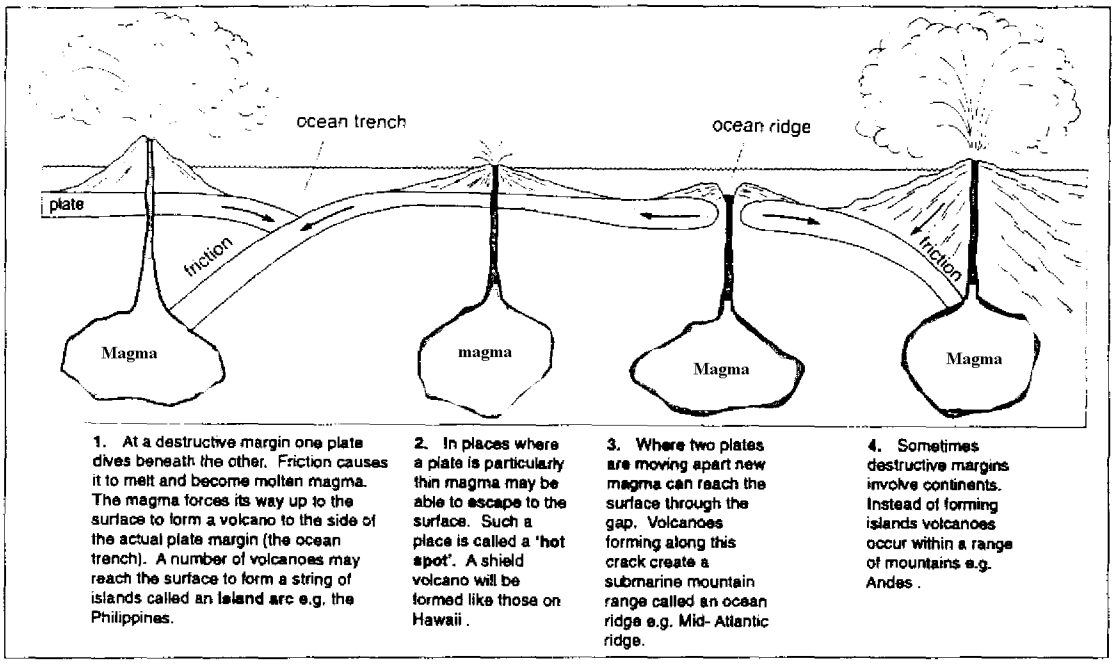



**Figure 1:** The formation of volcanoes
*(adapted from Dolan, C.* Hazard Geography, *Longman Cheshire, 1994)*

## Activities

1 Obtain a copy of a map showing the plates of the earth's crust (one can be found on page 85 of this book). Using this map, and the information in Figure 1, answer the following:
   a Explain the formation of the following.
      - Volcanoes in the Andes mountains, along the west coast of South America.
      - The Mid-Atlantic Ridge.
      - Mt Fuji in Japan.
   b Iceland is one of the most volcanically active countries in the world. Explain why vocanic activity occurs so frequently in this country.
   c Find out where the 'ring of fire' is located, and why the name is given to this region. Would you include (i) Australia and (ii) New Zealand in this region? Explain your answer.

2 Using information in Figure 1, answer the following:
   a What is a 'hot spot'? How can volcanic activity on Hawaii be linked to a hot spot?
   b Explain the formation of island arcs, such as those found in the Philippines.
   c What are 'ocean trenches'? Explain their formation. Why do you think ocean trenches are found close to very active volcanic regions?

3 Match each of the following statements to one (or more) of the formation processes (i.e 1, 2, 3 or 4) in Figure 1.
   - *Submarine mountain ranges are an associated landform.*
   - *Gentle eruptions are most common if magma reaches the surface.*
   - *Explosive volcanoes may occur to the side of the actual plate margin.*
   - *Friction causes plate material to melt and become molten magma.*
   - *Likely to occur where plate material is particularly thin.*
   - *Occur where plates are moving apart.*
   - *Result from continental plates moving against each other.*
   - *This formation process occurs at a constructive plate margin.*

# *The Destructive Effects of Volcanoes*

## VOLCANOES: Range of destruction

Volcanoes can be dangerous, not only to their immediate vicinity, but also to areas further afield. In the immediate area, main dangers come from blast effects, lava flows and volcanic earthquakes. Ash deposits and tsunamis can cause hazards much further away.

Compared to many other kinds of disasters, the death toll from volcanoes is relatively low, depending on how close people are to the volcano, and how many people live in the general area. The destructive power of volcanoes is immense, however, destroying whole villages, crops, forests, roads and often creating a large number of evacuees who have to be sheltered, fed and eventually resettled. There is an added danger too that lava flows may distort the natural contours of the land, fill in water courses and cause floods, mudflows and landslides.

A great deal of research has been done on volcanoes and in many countries, active and dormant volcanoes are being monitored to note any changes in levels of activity. In this way scientists hope to give people greater warning time if eruptions are likely.

*from 'Hazards, Disasters and Survival' Natural Disasters Organisation, 1992*

**Figure 1**

## *Activities*

Fill in the blanks in the following sentences using information in Figure 1. Check your answers by finding them in the puzzle on the right.

1 These huge waves can result from volcanoes under the sea: _ _ _ _ _ _ _ _
2 Volcanoes cause the destruction of _ _ _ _ _ _ _, _ _ _ _ _ and _ _ _ _ _
3 Two associated effects of volcanic activity, particularly on steep slopes are _ _ _ _ _ _ _ _ _ _ and _ _ _ _ _ _ _ _
4 If the _ _ _ _ _ of the land is altered by lava flows, _ _ _ _ _ _ can result.
5 Two types of material commonly ejected from volcanoes: _ _ _ _ and _ _ _
6 Volcanic eruptions can force the _ _ _ _ _ _ _ _ _ _ of large numbers of people.
7 A volcano with a history of regular eruptions would be classified as _ _ _ _ _ _
8 Volcanic _ _ _ _ _ _ _ _ _ _ _ cause shaking of the ground.
9 The _ _ _ _ _ toll from volcanoes is _ _ _ compared to many other types of disasters.
10 _ _ _ _ _ villages can be destroyed by volcanoes.
11 Ash can be carried great distances by the _ _ _ _
12 The death toll from an eruption depends mainly on the size of the _ _ _ _ _ _ _ _ _ _ living _ _ _ _ _ to the volcano.
13 Two of the basic needs of evacuees after a volcano: _ _ _ _ and _ _ _ _ _ _ _
14 Eventually, people left homeless after a volcano will need to be _ _ _ _ _ _ _ _ _
15 If lava flows alter the slope of the land, _ _ _ _ _ _ may flood.

answers in back of book

| T | L | A | N | D | S | L | I | D | E | S | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M | S | L | O | P | E | E | R | P | D | S | V |
| U | P | U | T | C | M | L | I | O | E | E | A |
| D | O | I | N | O | I | O | V | P | L | K | C |
| F | R | D | E | A | T | H | E | U | T | A | U |
| L | C | F | V | S | M | W | R | L | T | U | A |
| O | C | A | L | T | W | I | S | A | E | Q | T |
| W | L | C | F | O | R | E | S | T | S | H | I |
| S | O | T | L | F | O | O | D | I | E | T | O |
| A | S | I | W | I | N | D | E | O | R | R | N |
| S | E | V | R | O | A | D | S | N | O | A | N |
| H | U | E | R | P | S | H | E | L | T | E | R |

16 Tsunamis are most likely to affect people living on the _ _ _ _ _
17 If scientists can predict eruptions it will give people more warning _ _ _ _

The remaining letters form a word which desribes the forcing of materials through the vent of a volcano and onto the earth's surface.

_ _ _ _ _ _ _ _

# *Case Study: Mt Pinatubo, the Philippines, 1991*

## The big one: Pinatubo's deadly eruption

Thousands of people fled as Mt Pinatubo, in the north-western Philippines, again exploded into life yesterday. The latest, and biggest explosion yet, set off deadly pyroclastic flows (clouds of white hot dust and gas) and ejected red hot tephra, ranging from grapefruit-size volcanic bombs to fine particles of ash.

Mudflows taller than houses swept down valleys, as heavy rain combined with the tonnes of ash dumped on the sides of the mountain. Earthquakes followed the eruption as parts of the mountain collapsed into the caverns left by escaping lava.

By mid-afternoon the sky was black as night as far south as Manila (85km away), as a relentless 'rain' of pumice pebbles poured down, while thunder and lightning from a tropical storm alternated with brilliant orange flashes from the volcano.

Dormant for more than 600 years, Mt Pinatubo has now extracted a terrible toll during the deadly eruptions of the last month. Over 700 people have been killed and 42,000 homes have been destroyed, as mudflows have wrecked foothill villages and the weight of ash has collapsed flimsy houses. Another million people have been forced to flee their homes and 40,000 hectares of cropland have been buried by ash.

*Mt Pinatubo ejects a cloud of gas and ash*

*Ash deposits cause buildings to collapse*

### Successful prediction

Pinatubo showed its first signs of awakening back in April, as small steam eruptions drew local scientists and vulcanologists from the USA to the mountain.

This joint team, which set up a monitoring station on the volcano, is now credited with predicting the major eruptions of the last month.

Their predictions were based on a range of new and improved techniques designed to give warning of the movement of hot, molten rock (called magma) beneath the ground surface These techniques included.

- seismometers linked to computers to accurately detect earth tremors caused by magma movement below the land surface;
- special sound equipment, again linked to computers, to detect the low rumble associated with magma moving up the vent of the volcano;
- tiltmeters to detect even the slightest change in the ground surface caused by pressure from rising magma;
- pollution detectors, like those used on factory chimneys, used to measure sulphur emissions - a sign of rising magma.

The result of successful prediction has been a death toll far less than expected from such major eruptions Locals have heeded the warnings of scientists and evacuated in huge numbers to safer ground

*13/6/91*

*contd*

## *Case Study: Mt Pinatubo, the Philippines, 1991 (contd)*

### *Activities*

1 Using the information and photographs in Figure 1, answer the following:
   a What are 'pyroclastic flows'? Suggest some of the damaging effects which may result from these flows.
   b Explain the formation of the following during the major eruption of Mt Pinatubo:
      • huge mudflows;
      • earthquakes.
   c What are 'pumice pebbles'? How are they formed? What uses can be made of pumice?
   d What does it mean to say that Pinatubo had been 'dormant'? How is a dormant volcano different from (i) an active and (ii) an extinct volcano?
   e How did the successful prediction of Mt Pinatubo's eruption help reduce the death toll which resulted?
   f Explain in your own words how each of the following pieces of equipment were used to help predict the eruption of Mt Pinatubo:
      • seismometers
      • sound equipment
      • tiltmeters
      • pollution detectors.

2 Using the information in Figure 2, explain how the gases from the eruption of Mt Pinatubo could contribute to a reduction in the earth's temperature (construct a diagram to help your explanation).

## The Atmospheric Effects of Pinatubo

Mt Pinatubo's massive eruption was the largest on record in the Philippines and on a world scale, produced the largest cloud of climate-modifying gases since mighty Krakatoa erupted in Indonesia in 1883

The eruption of Mt Pinatubo, June 1991

Scientists estimated that Pinatubo's explosion added more aerosols (light gases and particles) than all man-made 'greenhouse gases' since the Industrial Revolution began!

An average reduction of 0.5°C to the earth's temperature was recorded by satellite within months of Pinatubo's eruption and within a year, a fall of one degree was noted. This cooling effect was expected to persist for several years, not even allowing for possible future similar eruptions by Pinatubo or other volcanoes.

*adapted from 'Hazards, Disasters and Survival', Natural Disasters Organisation, 1992.*

**Figure 2**

# *Volcanoes: Benefits and Attractions*

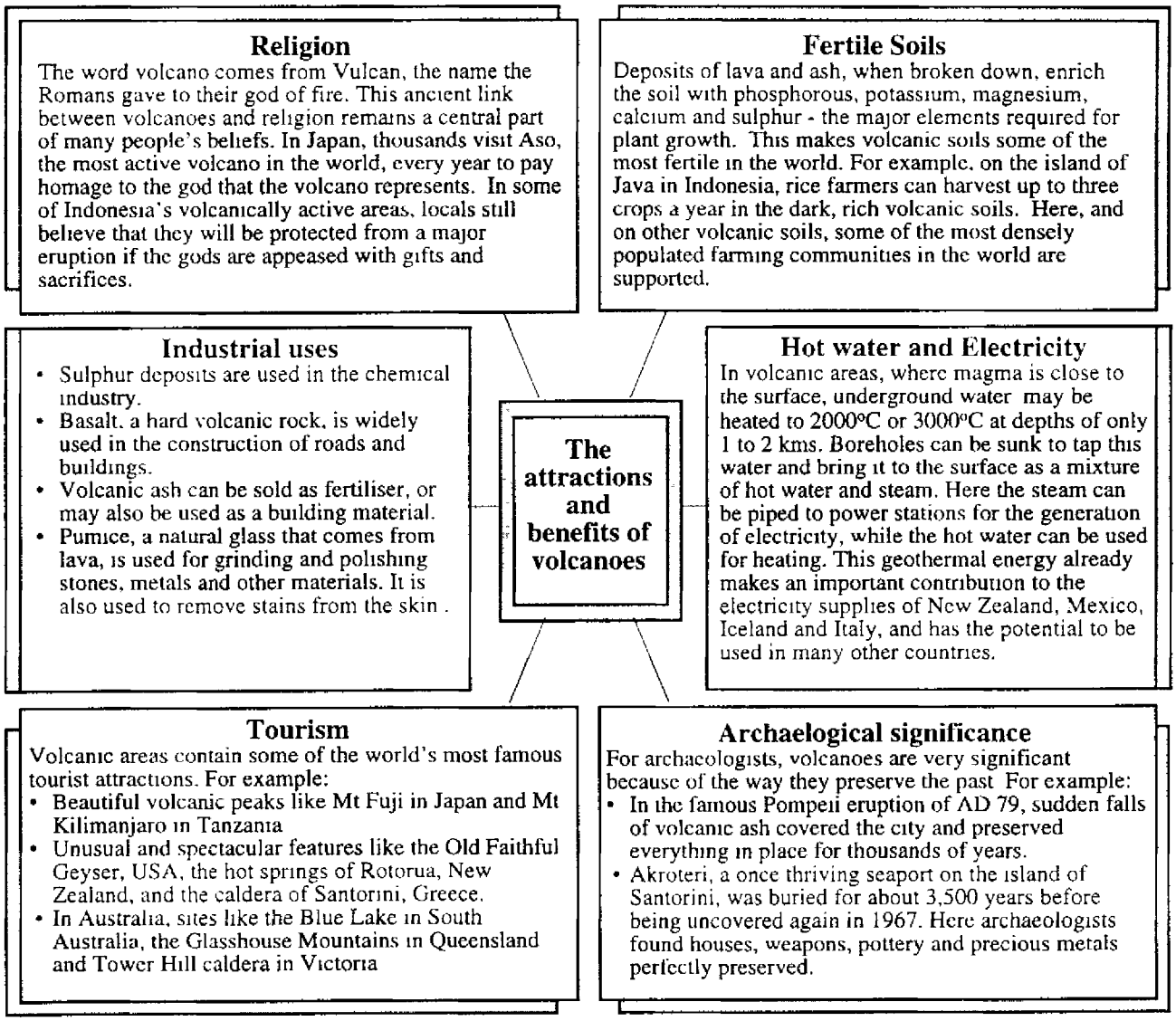



**Figure 1**

## *Activities*

1 From the information in Figure 1 , explain why some of the most densely populated farming areas in the world are in volcanically active areas.

2 Conduct some research into the following:
- The generation of geothermal energy (electricity generated from underground sources of water and steam in volcanically active areas). Try to find out:
  - how the electricity is generated (use a diagram to help your explanation);
  - the advantage(s) of geothermal energy over electricity from coal burning power stations;
  - the disadvantages and limitations of geothermal energy.
- The archaeological sites at Pompeii and Akatori For each site try to find out:
  - the volcanic history;
  - when archaeological work started and how it proceeded,
  - the significance of discoveries made.
- A famous volcanic site either overseas (e.g. Mt Fuji, Old Faithful Geyser, Santorini) or in Australia (e.g. the Blue Lake, the Glasshouse Mountains or Tower Hill) Try to find out:
  - the location of the site;
  - its volcanic history,
  - its significance (e.g. tourist destination, scientific research, recreation).

# *Predicting Volcanoes*

## Possibilities for predicting volcanic eruptions

### Visible signs
Rising magma is indicated by bulging of the ground (Figure 2). This is measured using a tiltmeter. Small ash and lava emissions may also precede a major eruption.

### Gas emissions
Eruptions may be preceded by increases in volcanic gases such as hydrogen sulphide and sulphur dioxide Gas detectors are used to measure these emissions.

### Historical records
Records of past eruptions can give broad indication of the likelihood of eruptions in the future. Such predictions are unlikely to be accurate enough to be acted upon.

### Electric and magnetic changes
A magnometer and electrodes can be used to detect changes in the electrical and magnetic properties of rocks, which typically precede an eruption.

### Magma movement
Small earthquakes (measured using a seismometer) and changes in temperature at the surface both indicate rising magma and the possibility of an eruption

**Figure 1**

**Figure 2:** The initial lateral blast of hot glowing gas on the north slope of Mt St Helens, USA, 18 May 1980.

## Vulcanologist repeats warning

LEGAZPI, Philippines The Government's chief vulcanologist has defended his predictions about Mayon volcano and said thousands of refugees should stay in evacuation centres at least a week before returning to their homes near the slopes

The Philippines Institute of Vulcanology and Seismology had warned of a possible major eruption on Sunday due to gravitational influences of a full moon and high tides. No eruption occurred

About 42,000 people fled their homes after a mild eruption on February 2 killed 68 people, because of forecasts of another eruption.

Institute Director Raymundo Punongbayan said forecasting activity at Mayon was difficult because the volcano has an open vent, meaning that instruments cannot accurately detect changes in pressure or movement of magma

Officials said there were no epidemics among refugees, most of them impoverished farmers. But health officials said about 400 people were suffering from acute respiratory infections due to sulphur and ash inhalation.

*Source. Canberra Times, February 10, 1993*

**Figure 3**

## *Activities*

1 Using the information in Figure 1, and additional research if necessary:
   a Describe each of the following instruments and explain their function in the prediction of volcanic activity:
      - seismograph
      - tiltmeter
      - magnometer
      - gas detector.
   b Explain the limitations of using historical records in the prediction of volcanic activity? What other uses could be made of such records to help reduce the impact of a major eruption?

2 a In April 1980, a bulge appeared on the side of Mt St Helens, USA. The bulge grew at a rate of about 2 metres a day until the May 18 eruption shown in Figure 2. What was the probable cause of the bulge? The bulge was high on the north slope of the mountain. What happened to it when the volcano erupted?
   b Conduct some research into the Mt St Helens eruption. Focus on attempts by scientists to predict when the volcano would occur. Evaluate the success of their predictions, in terms of reducing the impact of the eruption.

3 Using the information in Figure 3 to help you, explain some of the difficulties associated with predicting volcanic activity.

## *Reporting Disasters: Rabaul Volcanic Eruptions, 1994*

# Looting gangs raid volcano town

**from RORY CALLINHAN**

VUNAPOPE, New Britain: Riot police will move into Rabaul today to stop armed gangs looting what is left of the town devastated by volcanic eruptions.

Gangs of criminals, known as rascals, are roaming the provincial capital of the Papua New Guinea island of New Britain, pillaging shops and houses, stealing cars and robbing remaining residents.

A squad of 20 riot police was airlifted into nearby Tokua yesterday.

Australian expatriate Ms Tanya Bereny said gangs were 'running around' Rabaul, armed with knives and wearing balaclavas.

She and a group of locals had driven out of the hotel to Vuapope, a village south-east of Rabaul, late on Tuesday.

'We ran into roadblocks manned by people with knives who threatened to take our vehicle' Ms Bereny said. 'We didn't think we would make it.'

As the last surviving residents were snatched from beneath clouds raining scorching sulphur yesterday, a lone Australian trapped for two days under the sagging roof of his home waded to safety - and pronounced the town officially dead.

'Rabaul is destroyed, it's gone, it's finished. It just doesn't exist anymore,' engineer Mr Michael Jasny told his wife and family in a phone call to their Townsville home.

And dramatic pictures of a dust-covered wasteland confirmed Rabaul was not just dead, but buried

Meanwhile, emergency aid centres around the Rabaul district were being swamped by refugees seeking food and shelter.

More than 45,000 people have been evacuated from Rabaul to nearby villages since the volcanoes - Vulcan and Tavurvur - began erupting on Monday.

The survival of Mr Jasny, a 49 year old Vietnam veteran and aircraft maintenance engineer, was one of the most astonishing stories to emerge from the chaos.

He had waited for rescue, terrified and alone, as his house disappeared under a mountain of ash.

Speaking from an emergency camp at Kokopo, about 20km from Rabaul, Mr Jasny told how he struggled knee-deep in ash through the town, leaving his house just as it finally crumbled.

**"Rabaul is destroyed, it's gone, it's finished. It just doesn't exist anymore."**

**Australian engineer Michael Jasny**

Suddenly, through the dust clouds, he saw a four-wheel-drive vehicle. At the wheel was his father-in-law, Mr Hans Van Der Drift, who had gone searching for him after other rescue missions had failed

Mr Jasny's nightmare began early on Monday, when he woke to find the entire town centre deserted.

A code 4 alert had been issued while he slept No-one woke him and he was left stranded

Until he made phone contact with his family, no-one knew of Mr Jasny's plight until Mr Van Der Drift called the Foreign Affairs Department and told them he was stranded

As the dust, ash and mud began to bury his home, Mr Jasny's only lifeline was the telephone. Talking to his family from the house as it collapsed around him, Mr Jasny told them that he had 'better speak now because I could be dead in a couple of hours'.

A football field in Vunapope has become a makeshift refugee camp crammed with homeless families.

Up to 1000 people are camping at the airstrip at Tokua, waiting to catch planes out. Hundreds of others have fled in boats and larger vessels.

Helicopter pilot Mr Tony Aldridge said a 'rain of fire' sent terrified villagers fleeing into the sea.

Mr Aldridge, who has been ferrying people and supplies to evacuation centres, said about 600 people had been caught under a huge cloud of burning ash.

'They paddled out to sea and clung to barrels to avoid the ash. They were picked up by ship, he said

Commercial ships operating near Rabaul yesterday made several dramatic rescue missions, picking up more than 3000 villagers.

An Australian RAAF Hercules made two trips to Vunapope yesterday, carrying clothes, water, food, oxygen cylinders, telecommunications technicians and a generator for the Vunapope hospital, which has also become a major evacuee centre.

On the return flight to Port Moresby, the plane carried critically ill patients from local hospitals.

Meteorologists are monitoring the path of the massive ash cloud as it heads south-west toward the mainland of Papua New Guinea.

Airlines have been warned, and Qantas has diverted a 'handful' of flights to Japan to avoid the dangerous ash particles, which cause engine failure in jets.

*Source. The Advertiser , September 22, 1994*

**Figure 1**

*Reporting Disasters: Rabaul Volcanic Eruptions, 1994 (contd)*

## Reporting on Disasters: Some common features

**Disasters are given major coverage**
Stories about disasters are often prominent in newspapers and on television and radio. The media are able to provide information, graphic film and pictures, expert opinion and eyewitness accounts very soon after the event has occurred

**Local events are preferred**
Disasters which happen in Australia, even if they are not significant, are often given preferred coverage over those which happen overseas. This is particularly the case if the overseas event is in a developing country or a country with which Australians are not familiar

**Disasters are oversimplified**
The complex nature of a disaster is rarely conveyed through media reports Ambiguous information is removed so that the story is easy to follow This is commonly done by highlighting the spectacular survival (or terrible plight) of one, or a few, people

**Sensational aspects are highlighted**
Gruesome death, spectacular escape and heroic rescue are common features of disaster stories. These are often highlighted at the expense of important information about the cause, duration and effects of the disaster, and people's efforts to minimise its impacts.

Figure 2

## *Activities*

1 Read Figure 1. 'Looting gangs raid volcano town', on the previous page, and then answer the following:
   a Which of the features of disaster reporting shown in Figure 2 are represented in the story? To support your answer, underline or highlight sections of the story which show each of these features.
   b Comment on the headline of the story. Why do you think it was chosen? Is it a good indication of the information which is contained in the article?
   c Why do you think a large part of the story is devoted to Mr Jasny's experiences during and after the volcano?
   d What is the function of the large text highlight in the centre of the article? Comment on the ability of the person quoted to make such a claim, and therefore, its likely accuracy.
   e Choose at least two examples of sentences or phrases used to describe the volcanic eruptions and their aftermath. Comment on (i) the language used in the descriptions and (ii) the amount of information they provide about the disaster.
   f Why do you think this disaster was given far greater prominence in the Australian media than in the media in the USA, Britain and Europe?
   g Disaster reporting has been described as 'infotainment' rather than news What do you think is meant by this? Would you describe Figure 1 as 'infotainment' or 'news'? Explain your answer.

2 Study the information in Figure 2 and answer the following:
   a Why do you think a disaster such as a major volcanic eruption is likely to receive more media coverage than a less spectacular event such as a drought?
   b In reporting disasters, what advantages do newspapers, television and radio have over other information sources such as books and magazines?
   c In 1989, the Armenian earthquake which killed 25,000 people, was pushed off of the front pages of the English newspapers by a rail crash in London. Why do you think the decision was made to give the local event greater prominence? Why would aid agencies trying to raise money for relief work in Armenia have been particularly concerned by this decision?

3 Conduct some research of your own into the reporting of disasters in the media. The following steps can be used as a guide:
   (i) Collect a series of newspaper articles or video segments which report on disastrous events.
   (ii) Analyse your collection in terms of the features listed in Figure 2. e.g.
      - Which features are most prominent?
      - What are some of the examples of reporting according to each of these features?
      - Which features are not represented?
      - Can you suggest additional features of disaster reporting not listed in Figure 2?
   (iii) Comment on other characteristics of your collection: e.g. headlines, film/photographs used and length, timing and prominence of the items reported.

# Self Check Answers

## Section 1

## An Introduction to Hazards and Disasters

### Pages 6, 7
*Find-a-word: Hazards and Disasters*

1 Avalanche
2 Famine
3 Subsidence
4 Army
5 Smog
6 Earthquake
7 Heatwave
8 Plague
9 Hobart
10 Volcano
11 Soil Erosion
12 Tracy
13 Tornado
14 Oil Spills
15 Hurricane
16 Flood
17 SES
18 Ozone
19 Murray
20 Drought
21 Rescue
22 Pollution
23 Bushfire
24 Tsunami
25 Acid Rain
26 Eyre
27 Tropical cyclone
28 Nuclear
29 Landslide
30 Rabbits
31 Mali
32 Newcastle
33 EMA
34 Cane
35 Japan
36 Hailstorms
37 Locusts
38 Shock
39 Faults
40 Algae
41 Salinity
42 Dust
43 Flash
44 Brisbane
45 Seismograph
46 Dams
47 Bangladesh
48 Richter
49 Vesuvius
50 Levee
51 Typhoon
52 Severe
53 Monsoon
54 Lava
55 Surge
56 Forest
57 Bombing
58 Low
59 Spot
60 Ash
61 Salt
62 Dome
63 Cone
64 Magma
65 Eucalypts
66 Vent

The remaining letters make up the word.

*Prediction*

## Section 2

## The Bushfire Hazard

### Page 21 *Word Puzzle: Bushfires*

1 North winds
2 Humidity
3 Woollen
4 Eucalypts
5 Uphill
6 Livestock
7 Victoria
8 Retardent
9 Dehydrate
10 Controlled
11 Firebreaks
12 Forests
13 Television
14 Inhalation
15 Protection
16 Precautions
17 Tasmania
18 Ignition
19 Wednesday

The sentence down the centre of the puzzle is therefore.

*Will I stay or evacuate?*

## Section 3

## The Flood Hazard

### Page 31 *The destructive effects of floods*

1 Drowning
2 Oil
Mud
3 Currents
Turbulent
4 Debris
5 Foundations
Weak
Mortar
Earth
6 Sewerage
Water
Disease
7 Saturation
Landslides
8 Floodplains
9 Power
10 Penned
Crops
11 Depth
12 Cultural
13 Fishing

The remaining letters form the word

*Coastal*

# *Self Check Answers (contd)*

## The Flood Hazard (contd)

### Page 35 *Controlling Floods (Activity 4)*

| | | | |
|---|---|---|---|
| 1 | Education | 8 | Forecasting |
| 2 | Flash flood | 9 | Insurance |
| 3 | Evacuation | 10 | Barrages |
| 4 | River Murray | 11 | Brisbane |
| 5 | Protection | 12 | Diversion |
| 6 | Storm Surges | 13 | Saturation |
| 7 | Levee banks | | |

The words down the centre of the puzzle are therefore:

*Thames Barrier*

### Page 40 *Crossword: Floods*

| Across | | Down | |
|---|---|---|---|
| 1 | Diversion | 2 | Silt |
| 6 | Tsunami | 3 | Waterlogged |
| 7 | Evacuation | 4 | Catchment |
| 12 | Levees | 5 | Forests |
| 13 | Murray | 8 | Floodplain |
| 14 | Bangladesh | 9 | Brisbane |
| 16 | Nile | 10 | Flash |
| 17 | Aid | 11 | Eyre |
| 19 | New South Wales | 15 | Mississippi |
| 22 | Cities | 18 | Runoff |
| 23 | Roads | 20 | Sediment |
| 25 | Barrier | 21 | Storm |
| 26 | Erosion | 24 | Dams |
| 27 | Proofing | | |

## Section 4

## The Severe Storm Hazard

### Page 43 *What are Severe Storms?*

| | | | |
|---|---|---|---|
| 1 | Land | 7 | Debris |
| 2 | Lightning | 8 | Boats |
| 3 | Cyclones | 9 | Trees |
| | Earthquakes | 10 | Flash |
| | Floods | | Rain |
| | Bushfires | 11 | Hail |
| 4 | Area | 12 | Tornadoes |
| 5 | Frequently | | Deaths |
| | Hazard | 13 | Force |
| 6 | Costs | 14 | Thunder |

## Section 5

## The Tropical Cyclone Hazard

### Page 56 *Tropical Cyclones Explained (Activity 4)*

| | | | |
|---|---|---|---|
| 1 | Tropics | 7 | Predict |
| 2 | Isobars | 8 | Circulate |
| 3 | Hurricane | 9 | Eyewall |
| 4 | Direction | 10 | Queensland |
| 5 | Typhoon | 11 | Cloud cover |
| 6 | Depression | | |

The name down the centre of the puzzle is therefore:

*Port Hedland*

### Page 62 *Storm Surges*

| | | | |
|---|---|---|---|
| 1 | Tropical | 5 | Drowning |
| 2 | Sea | 6 | Normal |
| | Low | 7 | Angle |
| | Buildings | | Shape |
| 3 | Bays | 8 | Dome |
| | Headlands | | Tide |
| | Islands | 9 | Wave |
| 4 | Intensity | 10 | Winds |
| | Speed | | Coastal |
| | | 11 | Slope |

# *Self Check Answers (contd)*

### The Tropical Cyclone Hazard (contd)

**Page 66** *Crossword: Tropical Cyclones*

| Across | Down |
|---|---|
| 6 Typhoon | 1 Gale |
| 8 Anemometer | 2 Darwin |
| 9 Low | 3 Isobars |
| 10 Anticyclone | 4 Beaufort |
| 13 Storm Surge | 5 Knots |
| 17 Queensland | 7 Hurricane |
| 18 Bengal | 11 Cumulonimbus |
| 21 Florida | 12 Eye |
| 22 Floods | 14 Tracy |
| 23 Iron | 15 Radar |
| 24 Hedland | 16 Meteorology |
| 25 Fiji | 19 Tornadoes |
| 26 Tropics | 20 Satellite |

**Page 82** *Crossword: Drought*

| Across | Down |
|---|---|
| 1 Food | 1 Famine |
| 3 Sudan | 2 Dams |
| 4 Aid | 3 Snow |
| 5 Pollution | 6 Income |
| 7 Prices | 8 High |
| 9 Desertification | 9 Duststorms |
| 11 Sheep | 10 Fertility |
| 12 Farmers | 13 Australia |
| 16 Dry | 14 Ash |
| 17 Diseases | 15 Watertable |
| 21 Pasture | 18 Crops |
| 24 Industry | 19 Rains |
| 26 Water | 22 Topsoil |
| 27 Bushfires | 23 Adapted |
| 28 Queensland | 25 Arid |

## Section 6

## The Drought Hazard

**Page 81** *Drought and Farm Management (Activity 4)*

| | | | |
|---|---|---|---|
| 1 | Fencing | 7 | Degraded |
| 2 | Pest control | 8 | Windbreaks |
| 3 | Retention | 9 | Native |
| 4 | Agistment | 10 | Lucerne |
| 5 | Ground | 11 | Stocking |
| 6 | Pollution | 12 | Erosion |

The words down the centre of the puzzle are therefore:

*Contour Banks*

## Section 7

## The Earthquake Hazard

**Page 96** *Crossword: Earthquakes*

| Across | Down |
|---|---|
| 5 San Andreas | 1 Water |
| 6 Epicentre | 2 Mantle |
| 7 Seismograph | 3 Sea |
| 10 Eurasian | 4 Japan |
| 11 Richter | 8 Plates |
| 14 Magnitude | 9 Prediction |
| 17 Newcastle | 12 Crust |
| 19 Collapse | 13 Tsunami |
| 21 Focus | 14 Meckering |
| 22 Fire | 15 Tremors |
| 23 Cities | 16 Subsidence |
| 24 Shock | 18 Faulting |
| | 20 Mexico |


# *Self Check Answers (contd)*

## Section 8

## The Volcano Hazard

### Page 100 *What is a Volcano? (Activity 3)*

**Clues**

1 Magma
2 Crater
3 Eruption
4 Secondary
5 Vent
6 Chamber
7 Composite
8 Cinders
9 Shield
10 Lapilli
11 Bombs
12 Common
13 Ash
14 Convex
15 Layers
16 Cone
17 Lava
18 Dome

The remaining letters form the word:

*Tephra*

### Page 102 *The Destructive Effects of Volcanoes*

1 Tsunamis
2 Forests
Roads
Crops
3 Landslides
Mudflows
4 Slope
Floods
5 Lava
Ash
6 Evacuation
7 Active
8 Earthquakes
9 Death
Low
10 Whole
11 Wind
12 Population
Close
13 Food
Shelter
14 Resettled
15 Rivers
16 Coast
17 Time

The remaining letters form the word:

*Eruption*