




Today you have been asked to report on how earthquakes, volcanoes and other natural hazards are caused and what impact they have on people living near them.

Teacher information

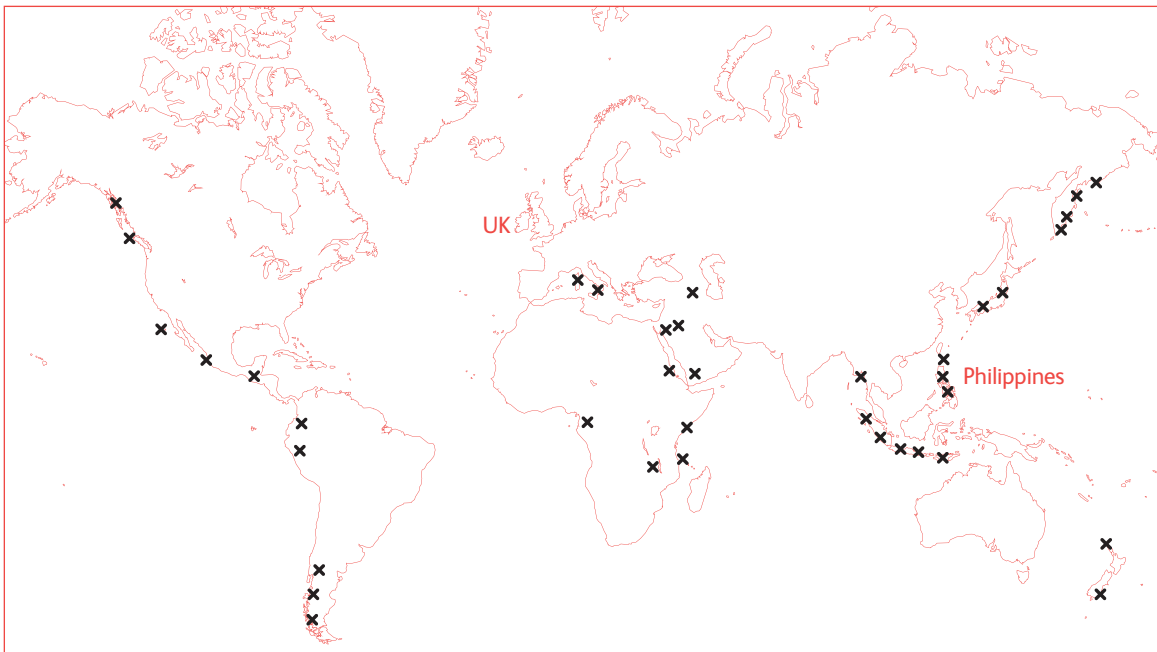
Gallery visited	 The Power Within  Restless Surface
Suitable for	 Key Stage 3 (ages 11 to 14)
Curriculum links	Science: evaluating scientific evidence, geological activity, human activity and natural processes leading to changes in the environment Geography: physical processes and natural landscapes
Example page	www.nhm.ac.uk/natural-hazards-ks3
Pre-visit preparation	Vocabulary: Volcano, earthquake, landslide, flood, eruption, monitoring, hazard, impact, sediment, emergency Concepts: The location and frequency of earthquakes in different parts of the world, the impact of the eruption of Mount Pinatubo on the local population and weather, the hazards and benefits of living near volcanoes, how the Kobe earthquake affected the area and how people minimise the risks, how landslides are caused, river sediments and flooding, how natural hazards affect people and what we can do to monitor them and minimise the risks from them
Post-visit work	Pupils can think about things that would be hazards in their homes during an earthquake. They can follow the news for reports about how volcanoes, earthquakes, landslides and floods have affected humans.

Explore and Discover... Natural hazards

1 Volcanoes and earthquakes



Find the volcano and earthquake activity map 



Press the left button to show recent volcanic eruptions (red lights).
Mark the areas of recent eruptions on the map above.

Have there been any volcanic eruptions near the UK recently? Yes No

Have there been any volcanic eruptions near the Philippines recently? Yes No

Press the button on the right to show large earthquakes (yellow lights).

Does the UK have large earthquakes? Yes No

Do the Philippines have large earthquakes? Yes No

How does this make the Philippines a dangerous place to live?

Answers will vary, but students may record that the Philippines is a dangerous place to live because:

- It is more likely to have earthquakes and volcanoes
- It is on a tectonic plate boundary
- Buildings may fall down
- People may be killed
- Water supplies may be affected

Explore and Discover...

Natural hazards

2 Mount Pinatubo

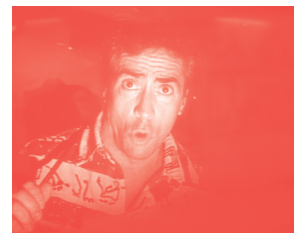
Go to the TV shop 



Watch the videos. Look for these people and listen to what they say. Look for the pictures of the people affected by the eruption.

What were the main risks from the volcano?

hot ash lava flows 'flying' rock hot mud flows

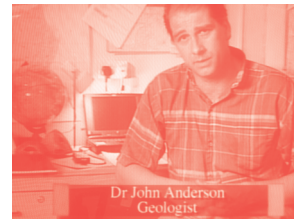


How did the scientific monitoring and emergency preparations help?

The scientific monitoring and emergency preparations helped scientists create a hazard map and helped 20000 people to escape, minimising loss of life.

What kind of volcano is Mount Pinatubo?

Mount Pinatubo is an explosive volcano (not effusive). It was previously thought to be extinct as it was dormant for 500 years.



How did scientists know the volcano was active?

steam escaping it was raining
small earthquakes it was June 1991

How did the large ash cloud affect the weather?

there was lightning it snowed it grew lighter
it grew darker it got warmer it got colder



What was it like for local people?

Answers may vary, but for the 500,000 local people living in the area there was darkness from the ash cloud with falling ash and rocks all around them. They would have had to evacuate their homes which may have been destroyed and lost their possessions.

3 Volcanic rocks



Find the volcanic rocks in the next section →

Different volcanoes produce different hazards.

Which of these rocks was a danger to people during the Mount Pinatubo eruption?

The volcanic bomb was a danger to people during the Mount Pinatubo eruption.

Draw and name one other volcanic rock.

Students may draw and name one of the following: obsidian, ignimbrite, pumice, volcanic bomb, pillow lava, andesite, spatter lava, Pele's hair, lava stalagmite, pahoehoe (pronounced 'pa-hoe-hoe) or Aa (pronounced 'ah-ah')



Find the casts from near Mount Vesuvius in Italy in AD 79 →

Volcanic eruptions have been a danger to people for thousands of years. This person and the dog were killed by hot ash.

How would you feel living near an active volcano?

Answers may vary as to how students would feel living near an active volcano. They may be concerned about the risk of landslides, mudflows, lava flows, tsunamis, volcanic ash falls, gas clouds, ash clouds, pyroclastic flows or volcanic dust and gas. However, they may mention the benefits, for example the soil around volcanoes tends to be very fertile.

Explore and Discover... Natural hazards

4 Kobe earthquake



Go to the Kobe supermarket

Watch the video and experience the earthquake.

Describe what it was like in the shop during the earthquake.

During the earthquake it was noisy, the shop moved and things were dislodged from the shelves. There were three stages to the earthquake:

- i. Shuddering from compression waves
- ii. Violent up, down and shaking movements from shear and surface waves
- iii. Shaking dying down as the ground absorbed energy from the earthquake

How would you feel if this happened in your local supermarket?

Answers may vary but students may respond that they felt nervous, frightened, concerned etc.



Find and watch the **Tragic consequences** video

What were the effects of the earthquake on Kobe?

fires started roads destroyed buildings collapsed people trapped

What other things do you think happened?

Answers may vary but students may respond that electricity and phone lines went down, there was a communications breakdown which meant there was trouble organising emergency services. Students may also say that people were injured or killed by falling objects and buildings or in fires.



Find the **Prevention** and **Prepared** panels on the left

Describe how each of the following can help minimise the risk to life.

Bendy buildings have enough freedom of movement to absorb the vibrations of an earthquake without breaking.

Computers to turn off electricity and gas linked to seismometers, they shut down power and gas supplies and direct emergency services in order to prevent fires.

Securing large objects to floors and walls reduces personal injury, a simple measure to stop large objects falling onto people.

Earthquake drills mean that everyone knows what to do in an earthquake. An earthquake drill is part of every school curriculum in Japan, and citizens keep a survival kit in the house, which includes a fire extinguisher, torch, food, medicines and a radio. This is to keep people as safe as possible.

5 Landslides



Find **Fall, slip, slump** halfway through *Restless Surface* →

Landslides and rockfalls can cause expensive damage to buildings and roads and they can be dangerous to people.

Turn the wheels to make a steep slope. Which slope is the most stable?

A  large particles B  medium particles C  small particles in water

Which slope collapses first? A B C

How might heavy rain cause a landslide?
 Heavy rain might cause a landslide because the water acts as a lubricant, reducing friction between grains and making a slope less stable.

Look at the case studies on the panel to the left.

List some of the dangers and damage people encounter from eroded material.
 Dangers and damage people encounter from eroded material: Students may include landslides, abandoned roads, land falling into the sea, buildings falling off cliffs and people being injured and killed as houses and schools are crushed.



Go to **Going with the flow** →

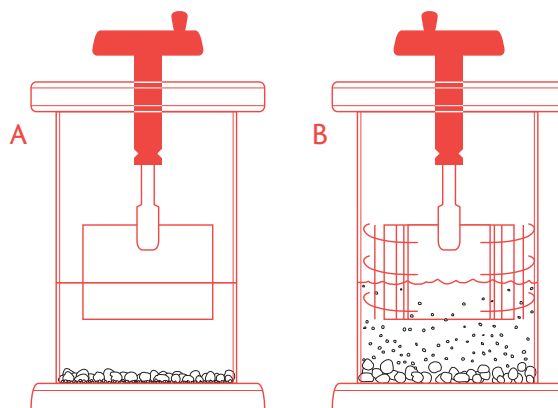
What happens when you turn the handle and move the water?
 When you turn the handle and move the water, the small grains are lifted and move with the current.

Moving river water carries solid material.

Mark where the level of solid material is...

- A before you turn the handle
- B when you were turning it

The solid material carried by rivers is deposited as sediment.



Explore and Discover... Natural hazards

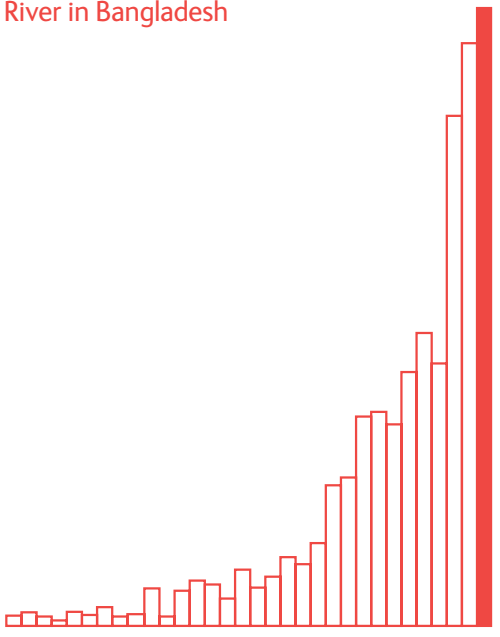
6 Flooding



Find this graph and these photographs 

The graph shows how much solid material different rivers carry.

Shade the column for the Brahmaputra River in Bangladesh



How does its figure compare to the sediment load carried by other rivers?

The Brahmaputra river carries 2000 tonnes per square kilometre per year of sediment load. The Huang He river carries 1500 tonnes and the River Ganges carries 1000 tonnes. These three rivers carry 20% of all land-derived sediment load in the world.

Sediment is deposited on the land during floods. Do you think a river that carries lots of solid material...

- deposits lots of sediment during floods
or
 deposits little sediment during floods

The Brahmaputra River floods regularly, but people still live there because the huge amount of sediment deposited is good for growing crops.

Look at the picture of the Brahmaputra River flooding, the photograph on the right.

List the hazards of flooding that you can think of.

Answers may vary, but students may respond that the hazards of flooding include: destroying land, damaging/destroying houses, cutting people off from each other, affecting fresh water supplies etc.

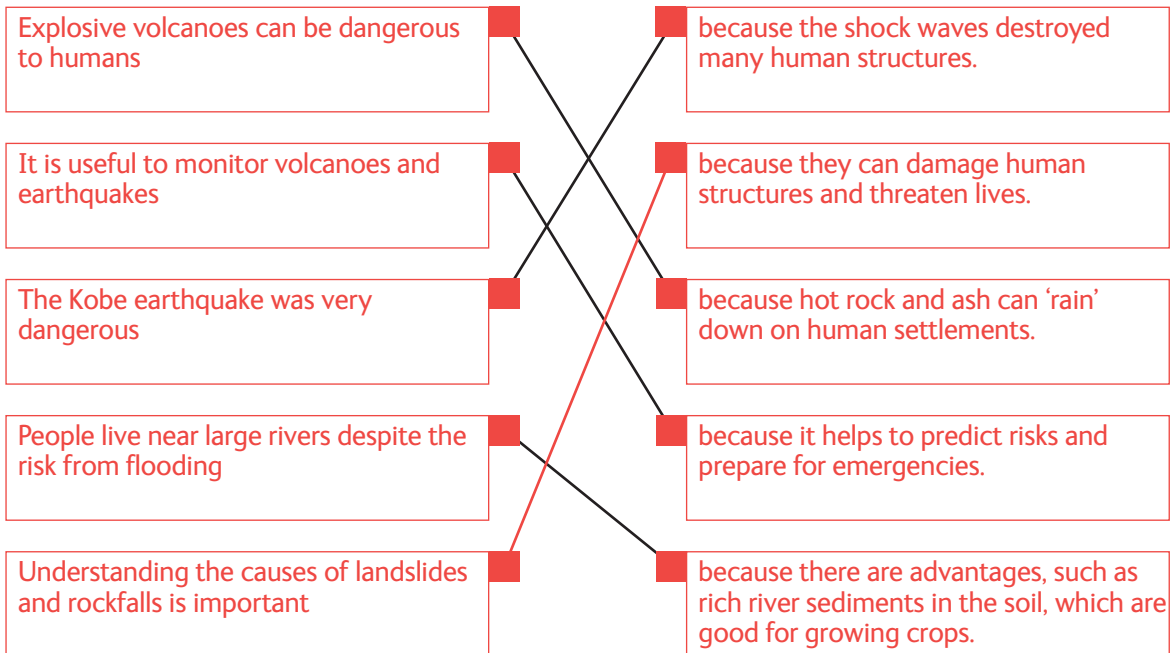
How would you feel living near the Brahmaputra River?

Answers may vary, but students may respond that they would feel concerned or worried if they lived near the Brahmaputra river. They may also recognise the benefits of the sediment for growing crops.

Explore and Discover...

Natural hazards

Check what you have learnt on this sheet.
Match the statements. One has been done for you.



Now you have found out how natural hazards affect people, you might like to explore the causes of volcanoes and earthquakes. Visit the middle sections of *The Power Within*.

When you get home...

Think about things that would be a hazard in your home during an earthquake.

Follow the news for reports about how volcanoes, earthquakes, landslides and floods have affected humans.

Check national news websites and search engines for information on recent volcanoes, earthquakes, landslides and floods. These may include:

- December 2004 – Indian Ocean earthquake and Asian/Boxing Day Tsunami
- Summer 2007 – flooding in England and Wales
- February 2008 – earthquake in Lincolnshire
- May 2008 – Cyclone Nargis in Burma
- May 2008 – earthquake in China
- May 2008 – landslide in Lyme Regis, Dorset