

# Lesson 5: Volcanoes: a suitable home?

## Lesson Plan

Use the *Volcanoes* PowerPoint presentation in conjunction with the Lesson Plan. The PowerPoint presentation contains photograph and images and follows the sequence of the lesson. The *factsheet for teachers*, to accompany this lesson also explains some of the key points in more detail. This lesson assumes prior knowledge from Lesson 4: Volcanoes.

Remember to use atlases or Google Earth to locate the volcanoes mentioned in the lesson.

### Key questions and ideas

- Why do people live on or near volcanoes?
- To understand that volcanoes produce useful minerals and that these can be extracted.
- To understand that volcanic soils are fertile and good for agriculture.
- What is geothermal energy important?
- Why is the volcanic landscape and environment important for tourism?
- What are the dangers of living on or near volcanoes?

### Subject content area

- Locational knowledge: Using maps to focus on Europe, North and South America, concentrating on key physical and human characteristics, key topographical features and land-use patterns; and understand how some of these have changed over time.
- Place knowledge: Understand geographical similarities and differences through the study of a region of the United Kingdom, a region in a European Country and a region within North and South America.
- Physical geography: Describe and understand key aspects of physical geography, including volcanoes.
- Human geography: Describe and understand key aspects of human geography, including types of settlement and land use, economic activity and the distribution of natural resources including energy, food and minerals.
- Geographical skills and fieldwork: Use maps and digital/computer mapping to locate countries and describe features studied.

### Downloads

- Volcanoes: a suitable home? (PPT)
- Factsheet for teachers PDF | MSWORD

### Starter

Spot your teacher's mistakes!

Show pupils the mislabeled diagram of a cross section of a composite volcano. Note that not all of the labels are incorrect. Working in pairs, can pupils spot the mistakes?

For those finishing quickly, can they correctly label the diagram?

### Main Teaching

There are 500 active volcanoes in the world and on average 25 volcanoes erupt every year. Some active volcanoes are erupting lava, ash and noxious gases on a continual basis. However, 600 million people live on, or near to, active volcanoes: that is one in ten of the world's population.

The question remains: why?

People choose to live near volcanoes because they consider the advantages outweigh the disadvantages. Most volcanoes are safe for long periods of time in between eruptions and those that erupt frequently are usually considered, by the people who live nearby, as being predictable.

**The advantages:** Ask pupils what they consider to be the advantages of the volcanic landscape. Then clarify:

- Fertile soil that is good for agriculture.
- The presence of minerals.
- Geothermal energy to produce electricity.
- Tourism: volcanoes attract millions of visitors every year.

**Fertile soil:** Volcanic rocks are rich in minerals. However, when the lava is newly cooled these minerals are not available to plants. The rocks need thousands of years to become weathered and broken down before they form rich soils- some of the richest on Earth. In the foothills of Mount Etna, Sicily, the fertile volcanic soils support more than ninety vineyards. In Naples, Italy in an area that includes Mount Vesuvius, the soil is rich because of two large eruptions 35 000 and 12 000 years ago. The area is intensively cultivated and produces grapes, citrus trees, herbs and flowers. It is also a major tomato growing region.

#### **Minerals:**

**Sulphur:** Show pupils the photographs of sulphur mining in East Java. Explain that sulphur is used to make a wide range of products and can be extracted from the vents of active volcanoes. In East Java, the Ijen volcano supports a sulphur mine. It is a dangerous job for the mine workers. Poisonous gas can burn the eyes and the throat and rot teeth. Mine workers' lungs can also be permanently damaged. The water inside the crater's lake has a pH similar to battery acid and can easily burn through clothes and skin. Luckily most of the world's sulphur is no longer produced in this way.

Magma rising deep from inside the earth contains a large range of precious metals and minerals. Tin, lead, copper, gold, silver and **diamonds** can all be found in volcanic rocks. The world's largest diamond mine, the Jubilee diamond mine, also known as the Yubileyny diamond mine is located in northern Russia.

**Geothermal energy:** Show pupils the photographs of geothermal energy in Iceland. Explain that geo means 'of the earth' and 'thermal' means heat. Geothermal energy is therefore the heat that naturally occurs underground in volcanic areas. In many cases this geothermal energy is evident in the form of hot springs and geysers- fountains of hot water that shoot out intermittently from the spring. In other cases this hot water is stored deep underground and is used in power plants to make electricity. **Iceland** has five geothermal plants supplying about a fifth of the country's energy supply and 85% of all heating and hot water to buildings in the country.

The photograph shows Hellisheidi geothermal power plant. Located on Hengill volcano in the south of Iceland, Hellisheidi power plant is the largest in Iceland and the second largest geothermal power station in the world. It was built to provide electricity to the capital city, Reykjavik. The Hengill volcano, from which the power plant extracts its energy, is still active, although the volcano last erupted 2 000 years ago.

**Tourism:** Whether they are active, dormant or extinct volcanoes make for popular tourist attractions and attract millions of visitors every year.

**The Hawaiian Islands:** The island has 1.4 million permanent residents but attracts approximately 8 million visitors each year: and the numbers increase year on year. Most

visitors stay at least one week. Tourism is Hawaii's biggest employer and is a \$14 billion industry for the islands.

Hawaii is a string of shield volcanoes overlying a volcanic hot spot.

**The Yellowstone National Park** is located primarily in Wyoming, North America. It covers an area of over 9000km<sup>2</sup>. Three million tourists visit the National Park each year. There are 300 active geysers in Yellowstone (the largest concentration of geysers in the world). Of all the geysers in Yellowstone Old Faithful erupts the most regularly. Every 14-125 minutes water shoots 56 metres into the air for up to five minutes at a time. To see what Old Faithful is doing live, visit the National Park Service website:

<http://www.nps.gov/features/yell/webcam/oldFaithfulStreaming.html>

Yellowstone is a supervolcano.

**Edinburgh Castle** is Scotland's most popular tourist attraction and 1.4 million visitors were recorded in 2013. The photograph shows the castle busy with tourists, as the photographers said, "It feels a bit like Disneyland."

Edinburgh Castle is built on a volcanic plug (See Lesson 4 for details).

**The Disadvantages:** Ask pupils what they consider to be the disadvantages of the volcanic landscape. Then clarify: volcanoes are dangerous and destructive.

- Volcanoes produce lava
- Volcanoes produce ash clouds and poisonous gas
- Volcanoes produce lahars (mud flows)

The Factsheet to accompany this lesson looks at each of these disadvantages in detail.

## Main Activity

Pupils can write a postcard home having visited a volcanic locality. They can draw on their prior knowledge from 'Lesson 4: Volcanoes' to demonstrate an understanding of how volcanoes are formed and include case study material.

Pupils can then draw the picture on the front of the postcard. The picture should be relevant to the lesson content.

Higher ability pupils should be expected to include more of the geographical detail specific to the chosen volcano in their writing. Their design for the front of the postcard will be more complex. It might include a picture of the volcano and the surrounding landscape, a map showing the volcano's location, and/or the benefits of volcanic activity for the region.

## Plenary

**Volcano Tennis.** In pairs pupils take it in turns to say, "Did you know that..." and then give one piece of information or one fact about volcanoes from the lesson. The Tennis Champion is the pupil who runs out of information last.