

Structure of the earth

The earth is made up of several layers:

- Core
- Mantle
- Crust.

The theory of plate tectonics suggests that the Earth is divided into 7 large and 12 smaller crustal plates, which 'float' on the mantle.

There are two types of crustal plate:

- Oceanic (heavy)
- Continental (lighter).

The places where plates meet are called plate margins/boundaries. The majority of earthquakes and volcanoes occur along these plate boundaries.

Why do people live in hazardous areas?

- Volcanic soil good for farming
- Increases jobs in tourism
- Heat used for geothermal power
- Volcanic rock is a useful resource
- Reluctance to move
- Can't afford to move (LEDCs)
- In MEDCs - money spent on hazard prediction and preparation, making it safe to live in hazardous areas.

How do countries respond to the threat of hazards?

- USA - advice in phone book
- Japan - disaster day on 1st September
- Give early warnings
- Plans in place
- Buildings and transport structures can be built to withstand earthquakes by reinforcing them with steel or building them with rubber shock absorbers.
- Services such as gas, water and electricity can be laid in more flexible pipes to stop them breaking.

Why do earthquakes affect areas in different ways?

- Distance - from the epicentre
- Type of land - the Mexico City earthquake was made worse because the city was built on a dry clay lake bed.
- When the earthquake happens - in an urban area like Kobe, if an earthquake happens at night, fewer people will be on the streets. If an earthquake happens in winter, the secondary impacts on homeless people are greater, especially in LEDCs.
- How well prepared an area is - if buildings have been constructed to withstand earthquakes and the population is prepared, the effects will be reduced.
- Better instruments to detect earthquakes

MEDCs are able to afford the prediction and preparation techniques that reduce the number of deaths and injuries. In LEDCs, few buildings are constructed to withstand earthquakes, and services are poor. Consequently the number of deaths and injuries is often greater.

Plate boundaries

There are 4 types of plate boundary. You should look up in your notes how to draw each type. All four case studies have occurred at DESTRUCTIVE plate boundaries.

- **Collision margin:** where 2 continental plates collide and push together to form fold mountains. The Himalayas are being created in this way.
- **Destructive margin:** where an oceanic plate is moving towards a continental plate. The heavier oceanic plate sinks below the lighter continental plate. As this happens the heat from the mantle and friction from contact between the plates melts the edge of the oceanic plate. The melting plate creates magma that rises to the surface to form volcanoes. At the same time friction between the two plates can trigger earthquakes.
- **Constructive:** where 2 plates move away from each other, magma rises into the gap and cools, creating new rock e.g. the Mid-Atlantic Ridge.
- **Conservative:** plates move alongside each other. In some areas the plates "stick" together. Pressure builds up until a sudden movement sends shockwaves through the Earth e.g. the San Andreas Fault in California, USA.

This module looks at why earthquakes and volcanoes occur and the problems they cause. You will also need to know how MEDCs can deal with earthquakes and volcanoes better than LEDCs

Unstable Plate Margins

Earthquakes

MEDC example - Kobe, Japan 1995

- Measured 7.2 on the Richter Scale
- Occurred at 5.46 am (people in bed)
- Deaths and injuries
- Buildings destroyed
- Supplies of gas, water and electricity disrupted

LEDC example - Mexico City 1985

- Built on unstable dry lakebeds
- When earthquake occurred air pockets from the dry lake bed came to the surface causing subsidence.
- Buildings destroyed/fires
- People killed

Volcanoes

MEDC example - Mount Etna, Sicily, Italy, 1991

- Most active volcano in the world
- Over 1 million people live on the slopes of Mt Etna
- Area has rich soil and good weather
- Area attracts large number of tourists

LEDC example - Nevada del Ruiz, Columbia 1985

- Volcano showed signs of activity emitting gas and steam
- Started to melt glacier at top causing mud flow (Lahar)
- Death toll was 21,000 mainly due to lahar sweeping through villages like Armero.

Primary and secondary effects

Primary effects: the immediate effects caused by the earthquake. This includes death, injury, and damage to buildings.

Secondary effects: indirect effects e.g. fires from broken gas mains. Area losing money because businesses are demolished

Keywords

- Richter scale - scale used to measure the strength of earthquakes.
- Seismograph - instrument used to measure the strength of earthquakes.
- Infrastructure - communications and services in an area, such as roads, railways, gas, electricity, water, drains, sewerage, and telephones.
- Epicentre - point in the earth's surface directly above the focus.
- Focus - point in the earth's crust where an earthquake starts.