What are Natural Hazards?

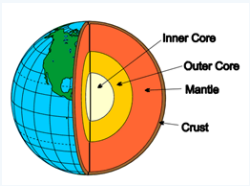
Natural hazards are physical events such as earthquakes and volcanoes that have the potential to do damage humans and property.
Hazards include tectonic hazards, tropical storms and forest fires.

What affects hazard risk?

- Population growth/Urbanisation– closely built buildings can lead to the domino effect
- Global climate change– storms can become more frequent and more intense, flooding and drought also more likely
- Farming-People chose to live near rivers that are at risk of flooding
- Wealth - LICs are particularly at risk as they do not have the money to protect themselves

Structure of the Earth

There are 4 layers of the Earth:

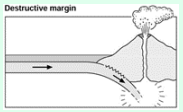


The crust is split into major fragments called **tectonic plates**. There are 2 types: **Oceanic** (thin and younger but dense) and **Continental** (old and thicker but less dense)

Convection currents cause tectonic plates to move. The heat from the core causes the magma in the mantle to be heated. This magma expands as it does so and rises as it becomes less dense. As it moves further away from the core, it begins to cool, contracting and becoming denser. Eventually, it will reach the crust and is forced to sink back towards the core as it does not have the energy to forces its way through. As it does so, friction causes the plate to be dragged in the direction of the magma. This cycle repeats itself continuously.

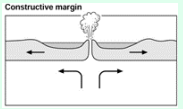
Plate Boundaries/Margins

Destructive



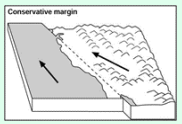
Here, two plates move towards each other. The oceanic plate (Nazca) subducts under the continental plate (North American) as it Is denser. As it does this, friction is created as the plates do not move easily, creating earthquakes. Volcanoes also occur here due to the heat from the friction and the mantle below.

Constructive



Here, two plates move apart. The North American plate and Eurasian plate move further apart each year creating the mid-Atlantic ridge, where magma rises through the crust at its weak points creating less violent eruptions. Earthquakes also occur here as this process does not move smoothly.

Conservative



Here, two plates slide past each other, either in opposite directions or in the same direction yet at different speeds. The Pacific and North American plate move in the same direction, but one moves slightly quicker. Earthquakes occur here due to the friction that is created.

Effects of Tectonic Hazards

Primary effects happen immediately due to the hazard directly.
Secondary effects happen as a result of the primary effects and therefore often occur later on (although some can occur almost immediately)

Primary - Earthquakes	Secondary - Earthquakes
• Property and buildings destroyed • People injured or killed • Ports, roads, railways damaged • Pipes (water and gas) and electricity cables broken	• Business reduced as money spent repairing property • Blocked transport hinders emergency services • Broken gas pipes cause fire • Broken water pipes lead to a lack of fresh water
Primary - Volcanoes	**Secondary - Volcanoes**
• Property and farm land destroyed • People and animals killed or injured • Air travel halted due to volcanic ash • Water supplies contaminated • Roofs collapse from the weight of the ash	• Economy slows down. • Emergency services struggle to arrive • Possible flooding if ice melts • Tourism can increase as people come to watch • Ash breaks down leading to fertile farm land • Starvation as no crops

Unit 1: Living with the Physical Environment

Section A: The Challenge of Natural Hazards

Responses to Tectonic Hazards

Immediate (short term)	Long-term
•Issue warnings if possible •Rescue teams search for survivors •Treat injured •Provide food and shelter, food and drink •Recover bodies •Extinguish fires	•Repair and re-build properties and infrastructure •Improve building regulations •Restore utilities •Resettle locals elsewhere •Develop opportunities for recovery of economy •Install monitoring technology

Monitoring	Prediction
Instruments are used to monitor the area. Seismometers measure earth movement. Volcanoes give off gases	By observing monitoring data, this can allow evacuation before event as you know when are where is likely to be hit.
Protection	**Planning**
Reinforced buildings and making building foundations that absorb movement Automatic shut offs for gas and electricity	Avoid building in at risk areas Training for emergency services and planned evacuation routes and drills.

Formation of Earthquakes and Volcanoes

Volcanoes	Earthquakes
At a destructive plate boundary, friction causes heat between the plates. Heat from the magma in the mantle below adds to this, melting the subducting plate. This causes magma in a new area of high pressure, which rises through weaknesses in the continental plate causing violent eruptions. At a constructive margin, magma can rise easily through the thinned plates causing non-violent eruptions.	Plates do not move past each other easily, therefore friction occurs. Friction leads to a build up of pressure causing the plates to become locked, and eventually the pressure builds causing it to be released with a sudden jolt at the focus. Seismic waves are felt

Comparing Earthquakes – Nepal and Chile

	Nepal. 25th April 2015. Magnitude 7.8.	**Chile** 2th February 2010, Magnitude 8.8
Primary Effects	9000 deaths 23000 injured Over 500,000 homes destroyed Historic buildings including Dharahara Tower fell 26 hospitals and 50% of schools destroyed	500 people killed and 12,000 injured. 800,000 people affected in total. 220,000 homes, 4500 schools, 53 ports, 56 hospitals and Santiago airport damaged. Power cuts, water supplies and communication disrupted. US $30 billion cost of damage
Secondary Effects	Avalanche on Mount Everest killing 19 people. Loss of income from tourism (which was 8.9% of Nepal's GDP). Rice seed stored in homes was ruined as homes collapsed. This caused food shortages.	1500km of roads damaged by landslides- remote communities cut off for days. Several coastal towns destroyed by tsunamis. A fire at a chemical plant near Santiago leading to evacuations.
Immediate Responses	Nepal requested international help. UK's DEC raised $126 million. Red Cross- tents for 225,000 people. UN and WHO distributed medical supplies to the worst districts. Facebook launched a safety feature so people could indicate they were safe.	Emergency services acted swiftly. Temporary repairs made to important Route 5 north-south highway within 24 hours to allow aid to be transported. 90% of homes had power and water within 10 days. US $60 million raised to build 30,000 small emergency shelters
Long term responses	Rebuilding. World Heritage Sites reopen June 2015. Longer climbing season.	The President announced it would take 4 years to fully recover. Chile's economy, based on copper industry was rebuilt with little aid. Housing reconstruction plan made to rebuild 200,000 homes a month later.

Why do effects vary?

Location	Other
Depth of focus– shallow focus= stronger vibrations **Coastal areas** are more prone to Tsunamis, whereabout **mountainous areas** could have landslides or avalanches.	**Time of day-** During the day, people can be warned to evacuate more easily **Population density**– more people in an area mean more buildings to collapse and more people to evacuate

Wealth

Earthquake proof buildings are expensive to buy, therefore many buildings collapse in LICs
Monitoring needs to be continuous– this is expensive. Warnings can be given in HICs to evacuate
HICs can afford to train **emergency services** better and have stores of **emergency supplies**, therefore search and rescue can occur immediately and few people starve.
Road construction tends to be better in HICs, meaning evacuation and rescue can occur easily
Resources– HICs can recover more rapidly than LICs meaning fewer long-term secondary impacts occur,

Why people Live near Hazards

Geothermal energy– the high temperatures from the rising magma create a reliable, renewable energy source.
Mineral rich soils from the ash and lava, meaning farmers can produce higher yields of crops as well as high value produce.
People **feel safer** due to better building design and monitoring leading to evacuations

Mineral extraction– deposits of high value minerals such as gold
Tourism– most areas have beautiful landscapes that tourists visit, creating many jobs
Water supplies can reach the surface at fault lines, which is important in dry regions
Many occur in **favourable locations** for settlements, eg coastal areas