

1. Natural Hazards

Natural Hazard → A natural event that threatens people or has the potential to cause damage, destruction and death.

Tectonic	Atmospheric	Geomorphological
Earthquake Volcanic eruption Tsunami	Tropical Storm Drought Tornado	Landslide Flooding Mudflow

Hazard Risk → The probability or chance that a natural hazard may take place.

Affected by → urbanisation | development | land use | climate change | geographical location

6. Contrasting Wealth

Italy is a HIC with a GNI per capita of \$37,920 (2023). Nepal is an LIC with a GNI per capita of \$1,430 (2023).

Contrasting wealth means:

- Building design and construction is better in Italy.
- Lack of resources and emergency services hindered response in Nepal. Greater reliance on outside support.
- Limited preparedness and education in Nepal.
- Poor infrastructure in Nepal slowed relief.

However: The magnitude of the Nepal earthquake was significantly greater than L'Aquila.

7. Reducing Risk

Monitoring - Observations e.g. seismometers (foreshocks), radon gas detection, animal behaviour.

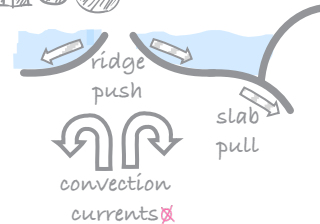
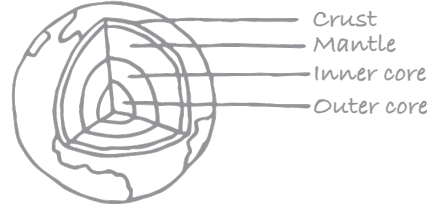
Prediction - Hazard mapping - looking for historical patterns and making predictions.

Protection - Designing and constructing hazard proof/resistant buildings e.g. seismic isolators.

Planning - Plans for what to do during and after an event. Education, aid supplies, drills, and plans.

Natural Hazards

2. Plate Tectonics



Oceanic	Continental
Thin (5-10km) Young (<200 million years) Dense (mainly basalt)	Old (<3.8 billion years) Thick (20-200km) Less dense (mainly granite)



Linear bands
Pacific Ring of Fire
Hot spots
Mid-Atlantic Ridge

3. Plate Margins



Destructive - Oceanic crust subducts continental. Water in sinking oceanic crust reduces mantle melting point. Magma rises and collects in magma chambers. Example: Eurasian / Pacific Plate Margin.

Constructive - oceanic crust separates, lithosphere thins, leading to upwelling. Reduced pressure leads to mantle melting, leading to diapirs that feed magma chambers. Example: Mid Atlantic Ridge.

Conservative - Two plates attempt to slide past each other. Friction causes them to get stuck. Released pressure when they slip causes earthquakes. Example: Pacific / North American plates.

4. Nepal 2015



Date: Saturday 25 April Magnitude: 7.9
Time: 11.26 am Development: LIC
Cause: Continental collision between Indian and Eurasian plates

Primary effects: 9K died | 19K injured | 8 mill affected | 1.4 mill without water, food, & shelter | 7k schools destroyed | 50% shops destroyed in Kathmandu | Est. cost US\$ 5 bill

Secondary effects: Avalanches & landslides in Himalayas | 19 died due to avalanches | Land slide blocked Kali Gandaki River | Tourism income declined | crops ruined

Immediate responses: India and China donated \$1 billion aid | UK provided 100 search and rescue responders | GIS crisis mapping | Tent city in Kathmandu - 1/2 million tents donated | Field hospitals set up

Long term responses: \$200 million for rehabilitation from Asian Development Bank | Lakes behind blocked rivers drained | Stricter building codes introduced | 7k schools rebuilt

5. L'Aquila 2009



Date: Monday 6 April Magnitude: 6.3 Cause: Fault - Paganica Fault
Time: 3.32 am Development: HIC

Primary effects: 309 died | 1.5K injured | 40k homeless | Historic buildings collapsed | 3000 - 11000 buildings damaged | Est. cost US\$ 1.1 bill

Secondary effects: Aftershocks caused land slides and rockfalls | mudflow caused by burst water pipes | rents increased | CBD closed due to unsafe buildings

Immediate responses: Hotel shelter for 10k | 40k tents donated | Mortgage and bills suspended | EU Solidarity Fund = US\$ 552.9 Long-term - ~~Free uni~~ | Free uni | Rebuild

8. Why live at risk?



Geothermal energy - Iceland harnesses geothermal energy from its tectonic location on the Mid-Atlantic Ridge, providing renewable power and employment.

Tourism - Italy's Mount Vesuvius attracts millions of tourists annually to explore Pompeii and its volcanic history.

Mining - Indonesia's Ijen volcano supports sulphur mining, offering livelihoods despite the risks.

Agriculture - Fertile soils on Mount Etna's slopes in Sicily enable productive farming of vineyards and citrus fruits.

Notes

Quizzes

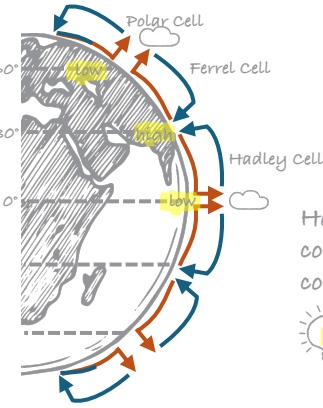
Natural Hazards

9. GAC



Global Atmospheric Circulation

GAC A system of air circulation that moves heat around the planet due to uneven insolation (solar heating).



High Pressure	Low Pressure
Cool, dry air sinks, creating dry conditions.	Warm, moist air rises, leading to precipitation.

Hot, and moist at the Equator due to concentrated insolation. Air rises, cools, condenses causing heavy rainfall.

This is why the tropical rainforest is located here – link to The Living World unit!

14. Beast from The East



Location: UK **When:** February 2018

Polar vortex (large mass of cold air) pushed cold Siberian air to the UK. It combined with Storm Emma, causing heavy snow.

Social impacts: 10 people died; Schools closed; travel disrupted; power cuts; food shortage in some supermarkets.

Economic impacts: £1 billion/day cost to economy.

Environmental impacts: Wildlife struggled (50 cm snow in some places); Tree damage impacting ecosystems.

Management: Gritting roads, army support for stranded vehicles, public warnings.

15. Climate Change



Evidence: – Average surface temp increased 1°C over last 100 years; sea level rise of 19cm from 1900; glacial retreat.

Natural causes:

- Orbital changes (Milankovitch cycles).
- Volcanic eruptions (ash cooling the Earth).
- Solar output variations.

Human causes:

- Burning fossil fuels (CO₂).
- Agriculture (methane).
- Deforestation (reduced carbon sinks).

11. TS and CC

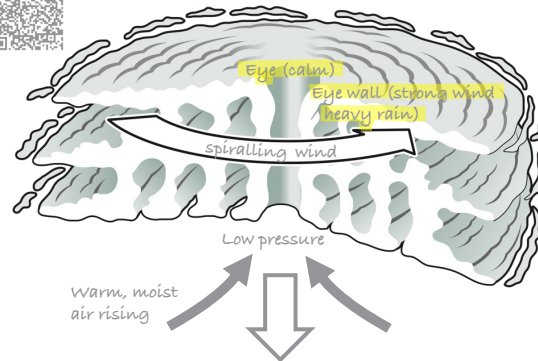


Distribution: Warmer oceans may expand storm zones to higher latitudes.

Frequency: Uncertain, but intense storms (Category 4/5) likely to increase.

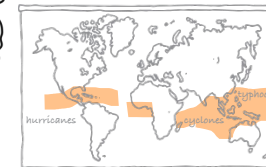
Intensity: Higher sea surface temperatures provide more energy for storms.

10. Tropical Storms



Formation

1. Warm ocean water (27°C+) heats the air above.
2. Rising air creates low pressure; water vapour condenses, releasing energy.
3. Earth's rotation (Coriolis effect) spins the storm.



Where?

Between 5°-30° latitude; warm water and Coriolis effect needed.

13. Tropical Storm Management



Monitoring and Prediction: Satellite monitoring and computer models.

Protection: Storm-proof buildings, sea walls, evacuation plans.

Preparation: Education, emergency kits, early warning systems.

16. Managing CC



Reducing the causes of climate change by reducing emissions:

- Renewable Energy: Wind, solar, hydro reduce emissions.
- Reforestation: Absorbs CO₂.
- International Agreements: Paris Agreement (limit warming to 1.5°C).
- Carbon capture: Remove CO₂ from waste gases and store.

Respond to climate change by reducing its negative effects:

- Flood Defences: Thames Barrier protects London.
- Agriculture: Change crop types; Drought-resistant crops.
- Water Supply: Desalination plants in arid regions; water transfer schemes.

12. Typhoon Haiyan



Location: Philippines **Category:** 5 (195mph)

When: November 2013 **Storm surge:** 5m

Social impacts: 6,300 deaths; 29,000 injured; 4.1 million homeless.

Economic impacts: \$5.8 billion damage; Overall cost \$12 billion; 90% Tacloban destroyed; 1.1 million homes destroyed; 1.1 tonnes of crops destroyed; 12% increase in rice prices.

Environmental impacts: Mangroves damaged; oil spills (800,000 litres from oil tanker); landslides.

Immediate responses: International aid (food, water, shelter - \$1.5 billion foreign aid pledged); 1,200 evacuation centres; 800,000 evacuated.

Long-term responses: Build Back Better; Rebuilding homes; mangrove replanting; storm shelters constructed; storm surge warning system.



Notes



Quizzes