HAZARDS: PERCEPTION AND RESPONSE

WHAT IS A HAZARD?

"Loss of property from natural hazards is rising worldwide, and loss of life is increasing in many poorer nations" (Burton, Kates & White, 1978). Population growth and the widespread effects of earthquakes, volcanic eruptions, storms, floods, wildfires, and droughts contribute to this trend.

Hazard: Threat of significant loss of life, severe impact on life, or property damage caused by an event – must put people at risk to be a hazard.

Disaster: When a hazard leads to widespread destruction.

HAZARD CATEGORIES

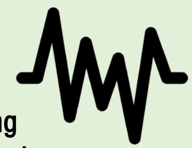
Geophysical: Driven by Earth's internal forces, e.g. earthquakes, volcanoes, tsunamis.

Atmospheric: Resulting from weather processes, e.g. tropical storms, wildfires.

Hydrological: Linked to water bodies, e.g. floods, droughts.

IMPACTS OF NATURAL HAZARDS

The severity of impacts depends on location, population, and the hazard's magnitude.



Primary impacts: Happen immediately – caused by ground shaking or extreme winds, e.g. homes collapse, damage to infrastructure, etc.

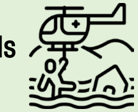
Secondary impacts: The after-effects that are a result of the primary impacts, e.g. disease outbreaks, water/power supplies cut off, economic downturns, etc.

PERCEPTION OF HAZARDS

- Population growth forces settlement in high-risk areas
- Some accept risks, such as farming on fertile volcanic soil
- Natural disasters also have major economic effects, with wealthier nations recovering faster than poorer ones
- Many underestimate risk; Kates (1971) found storm survivors often did not expect repeat damage
- Factors like age, status, and beliefs influence evacuation decisions

HUMAN RESPONSES

The primary response to hazards is risk reduction. This includes securing property locally and coordinating rescue efforts globally. International aid response speed depends on event intensity and infrastructure.



ADAM (Automatic Disaster Analysis and Mapping): System that enhances response efficiency.

Key approaches to hazard response:

- Fatalism – accepting hazards as uncontrollable
- Prediction – improved technology aids early warnings
- Adaptation – adjusting behaviour to minimize losses, often cost-effective

THE HAZARD-MANAGEMENT CYCLE

Preparedness: Education and planning reduce damage and speed recovery.

Response: Speed depends on emergency plans.

Recovery: Restoring normal life.

Mitigation: Reducing hazard severity and impact.

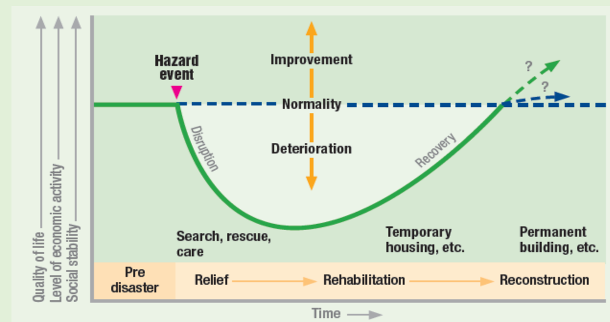
THE PARK MODEL OF DISASTER RESPONSE

A hazard disrupts life, with responses in three phases:

1) Relief: Immediate aid and rescue efforts.

2) Rehabilitation: Restoring temporary infrastructure.

3) Reconstruction: Returning to pre-event conditions or improving resilience.

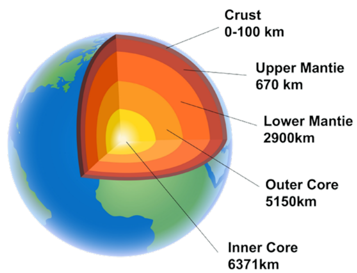


This model helps communities and governments plan for and manage disaster recovery effectively.

HAZARDS: STRUCTURE OF THE EARTH AND THEORIES OF PLATE TECTONICS

STRUCTURE OF THE EARTH

Though Earth appears spherical from space, it is actually a geoid, bulging at the equator and flattening at the poles due to centrifugal forces from rotation.



THE CORE

The core is the hottest part of Earth, composed of iron and nickel, four times denser than the crust. It has:

Inner core: Solid iron-nickel alloy (4 times denser than the crust).

Outer core: Semi-liquid iron and nickel, generating Earth's magnetic field.

THE MANTLE

The mantle is the largest layer (2,900 km thick) with semi-molten silicate rocks – makes up the bulk of the planet and is solid, increasing with density with depth.

Lithosphere: Includes the crust and upper mantle, forming tectonic plates.

Asthenosphere: Softer layer (almost plastic-like) – can move very slowly due to the high temperatures.

CRUST

Thinnest layer – varies in thickness from 5–10 km under oceans to 70 km under continents. It has two types:

Oceanic crust (sima): Basaltic rock, rich in silica and magnesium. Constantly renewed when subducting – so newer.

Continental crust (sial): Granitic rock, rich in silica and aluminium. Sial is thicker but less dense than sima – so is older

CONTINENTAL DRIFT

Developed in 1912 by Alfred Wegener – noticed that the South American east coast and African west coast fitted together like a jigsaw. Suggested that all continents were part of a supercontinent (Pangaea) – and had been drifting apart for millions of years.

But a lack of evidence meant his ideas were dismissed until after his death. Eventually confirmed in the 1950s by research into…

Sea-floor spreading: At divergent plate boundaries and mid-ocean ridges magma rises to the surface creating new crust – spreading the sea-floor.

Palaeomagnetism: Later confirmed symmetrical magnetic field reversals, confirming sea-floor spreading.

TECTONIC PLATES & MOVEMENT

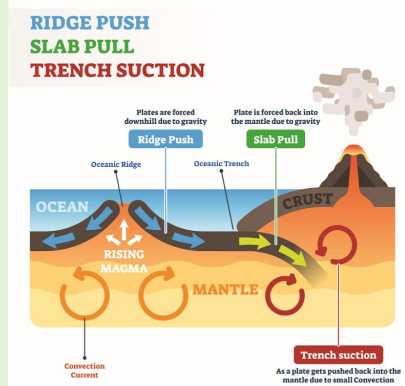
Earth's surface consists of seven major and several minor plates, moving 2–16 cm per year. Continental plates are ancient and buoyant, while denser oceanic plates form at ridges and subduct at trenches. Plate interactions create earthquakes, volcanoes, and landforms.

3 key ideas are at thought to be the main drivers for this movement…

Mantle convection: Heat from the earth's core rises within the mantle to drive convection currents. For many years this was accepted as what caused plate movement, but most scientists now reject this theory, in favour of ridge push and slab pull…

Ridge push: Cool oceanic lithosphere is denser and gradually subsides into the mantle below it; resulting in a slight incline with distance from the ridge. Gravity makes the rigid lithospheric plates slide down the hot, raised asthenosphere below mid-ocean ridges. Also called 'gravitational sliding'.

Slab pull: Coolest and densest section of a tectonic plate (furthest from the ridge) produces a downward force along the rest of the plate, subducts into the mantle at destructive plate margins. Thought to be the most important mechanism for plate movement.



HAZARDS: PLATE MARGINS AND HOT SPOTS

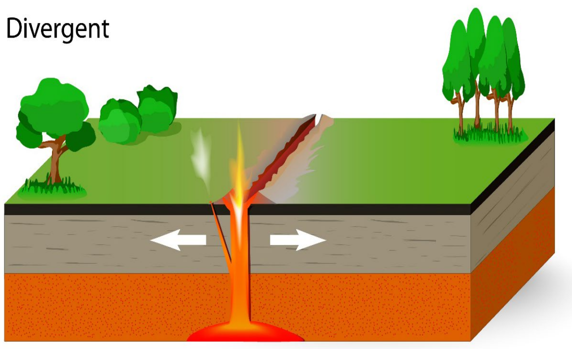
CONSTRUCTIVE (DIVERGENT) MARGINS

When plates separate, they form constructive margins – new crust is formed when magma (caused by the upper mantle melting) rises to the surface and fills the gap created by the plates moving apart. Creates…

- Mid-ocean ridges– through sea-floor spreading (e.g. Mid-Atlantic Ridge)
- Rift valleys – from continental stretching and collapse – new basaltic rock forms as magma rises and cools. (e.g. Great African Rift Valley

Mid-ocean ridges: These submarine mountain chains, cut by transform faults, extend for thousands of kilometres. Rising magma solidifies into new crust, sometimes forming volcanic islands (e.g., Surtsey, Tristan da Cunha).

Rift valleys: Continental divergence fractures the lithosphere, causing land to collapse between faults while horsts remain elevated. The Great African Rift Valley may eventually split East Africa from the continent.



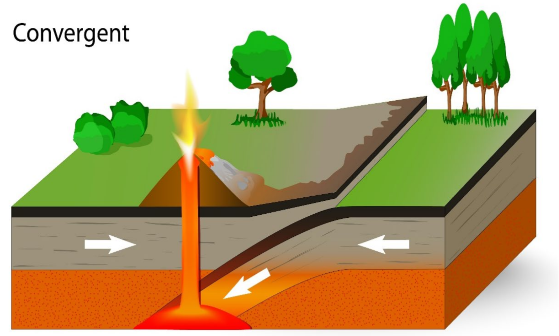
DESTRUCTIVE (CONVERGENT) MARGINS

When plates collide, they form destructive margins, with three types of convergence:

Oceanic-continental: The denser oceanic plate subducts, forming deep trenches, e.g. Peru–Chile Trench) and fold mountains, e.g. Andes. Melting in the Benioff Zone creates magma – friction may trigger earthquakes and magma rises to form steep-sided composite volcanoes – can have very explosive eruptions.

Oceanic-oceanic: Subduction creates trenches, e.g. Mariana Trench, and volcanic island arcs (e.g. Mariana Islands) that run parallel to plates margins.

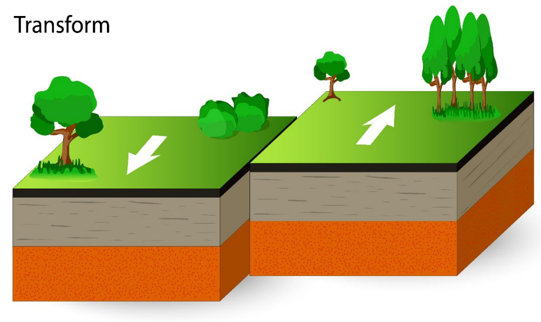
Continental-continental: Similar-density plates uplift and crumple, forming high fold mountains, e.g. Himalayas. Volcanic activity is absent (as there is no magma), but shallow violent focus earthquakes can occur. Fold mountains continue to grow – Himalayas (~5mm/year).



CONSERVATIVE (TRANSFORM) MARGINS

When plates slide past each other - can be in the opposite direction or in the same direction, but at different speeds. No subduction – so no crust is created or destroyed so no volcanic eruptions, but stress build-up (from plates getting stuck) causes shallow-focus earthquakes which are very destructive.

San Andreas Fault: Found along the margin between the North American and Pacific plates – stretches over 1000km along the west coast of the USA, through California.



MAGMA PLUMES AND HOT SPOTS

Volcanic activity mostly occurs at plate margins, but hot spots form from magma plumes rising through the lithosphere – where the crust is thin or weak. These stationary plumes create volcanic chains as plates move over them, e.g. the Hawaiian islands near the centre of the Pacific Plate.

HAZARDS: VOLCANIC ACTIVITY

SPATIAL DISTRIBUTION OF VOLCANOES:

Volcanic activity is closely linked to tectonic plate margins.
Ring of Fire: Around the Pacific Ocean there is high volcanic density.
Plate margins: Volcanoes are common at constructive (divergent) and destructive (convergent) margins but absent at conservative (transform) margins. Some volcanoes also occur at plate centres, like the Hawaiian hot spot, or along rift valleys like the Great African Rift.
Type and intensity of volcanic eruptions: Varies by location, influencing the type of lava erupted, such as basaltic lava at constructive boundaries and andesitic or rhyolitic lava at destructive boundaries

MUDFLOWS AND LAHARS

Lahars (volcanic mudflows) are among the deadliest volcanic hazards. They can be hot or cold, triggered by eruptions, melting glaciers, or heavy rain mixing with ash.
Example: The 1985 Armero tragedy in Colombia killed 21,000 people due to a 30m-high lahar traveling at 80 km/h.

THE VOLCANO EXPLOSIVITY INDEX (VEI)

This measures eruptions from 0 to 8 on a logarithmic scale. Predicting eruptions is difficult as even dormant volcanoes, e.g. Mount St. Helens, may suddenly reactivate. Despite eruption patterns, volcanic activity remains unpredictable, requiring contingency planning, especially near active volcanoes like Vesuvius.

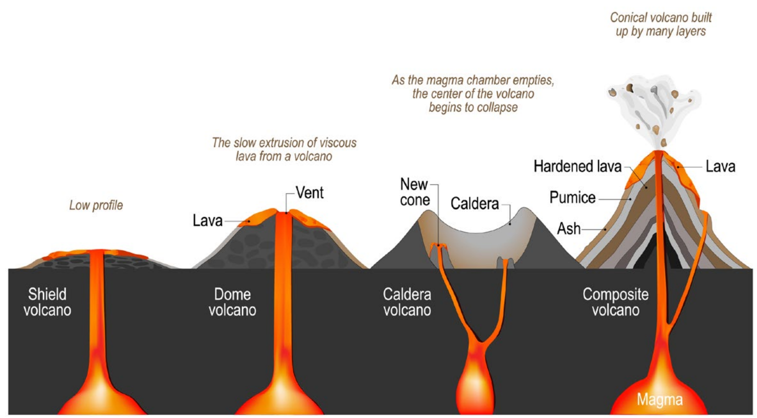
PREDICTING VOLCANIC ERUPTIONS

Unlike earthquakes, volcanic eruptions show warning signs…
- Increased seismic activity
- Ground swelling or deformation (magma build-up) – scientists can use surveying equipment, GPS and satellite imagery to monitor these bulges
- Increased emission of gases from the volcano's vents, e.g. sulfur dioxide
- Increased steaming or fumarolic activity

Hazard maps help prioritize evacuations by identifying high-risk areas.

IMPACTS OF VOLCANIC ACTIVITY:

Dependent on the type of volcano:
Fissure eruptions: Release basic lava, forming extensive lava plateaus like the Deccan Traps in India. These eruptions significantly alter landscapes and contribute to global climate change.
Shield volcanoes: Broad with shallow sides, formed from basaltic lava. Common at constructive plate margins and hot spots, they produce gentle eruptions, as seen in Hawaii and Iceland.
Acid dome volcanoes: Steep, convex cones formed from viscous, silica-rich lava. They erupt explosively, producing deadly pyroclastic flows, e.g. 1902 Mount Pelée disaster that killed 30,000.
Composite volcanoes (stratovolcanoes): Alternating layers of ash, tephra, and lava. They have a conical shape but often develop secondary cones and fissures, e.g. Mount Etna.
Calderas: Form when a violent eruption empties the magma chamber, causing the volcano to collapse into a massive crater. Santorini in the Mediterranean is a well-known example, with the sea filling its caldera.



HAZARDS: VOLCANIC ERUPTION CASE STUDIES

EYJAFJALLAJÖKULL, ICELAND (2010)

- Severe flooding as meltwater from glacial ice washed away roads No casualties occurred but 800 people were evacuated
- Ash deposits ruined farming and contaminated water sources
- Supply chains were disrupted, affecting industries like Kenyan agriculture, while travel, tourism, and schools faced major disruptions
- Winds carried the ash cloud across Europe and closed European air space for 6 days…
    - Grounded100,000 flights
    - Stranding 10million people
    - Cost airlines $1.7 billion

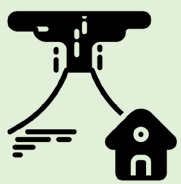
MOUNT MERAPI, JAVA, INDONESIA (2010)

Series of deadly eruptions starting late October – went through to the start of December…

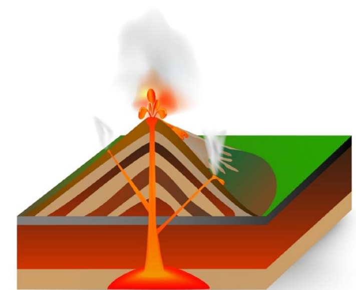
- 353 deaths
- Displaced 350,000 people
- Lahars and pyroclastic flows devastated homes, farmland and infrastructure
- Ash plumes led to major aviation disruption – grounded flights
- Financial losses were estimated at US$781 million.
- Despite evacuation orders for 20,000 villagers, some returned and perished

MONTSERRAT, CARIBBEAN 1995-PRESENT

Location: The Caribbean island of Montserrat is a British Overseas Territory in the Lesser Antilles.
Plate margin: It lies on a subduction zone where the South American plate sinks beneath the Caribbean plate.
Tectonic history: The island's composite volcanoes, including Chances Peak in the Soufrière Hills, have a history of dome collapses, leading to pyroclastic flows.
July 1995: Eruptions from Chances Peak led to monitoring efforts, revealing the volcano was dormant, not extinct.
April 1996: By this point many have been evacuated, and the capital city of Plymouth (in the danger zone) was entirely abandoned)
June 1997: Catastrophic eruption sent pyroclastic flows across the island, killing 19 people, destroying the airport, and burying two-thirds of homes. Over half of the 11,000 residents were evacuated abroad.
Further eruptions: In 2006, 2008, and 2010 continued to cause evacuations, with the 2010 vulcanian eruption producing a 15km ash column and widespread pyroclastic flows.



MOUNT ETNA, SICILY, ITALY:



Stratovolcano

Mount Etna, Europe's most active volcano, stands at 3,350m and spans 1.250 km^2.
Tectonic history: Stratovolcano with complex geology, it has a long history of eruptions, threatening over 900,000 residents on its fertile slopes.
Plate margin: Formed by the collision of the African and Eurasian plates, its activity may also be linked to rifting, pulling eastern Sicily away from Italy.
Eruptions: Etna's eruptions are mostly effusive (with low-viscosity lava flows) but mild strombolian eruptions also occur, especially at the summit.
Craters: The volcano features multiple summit craters, including the Northeast and Southeast Craters, and erupts from both summit vents and fissures on its flanks.
Characteristics and layers:

- Mount Etna's slopes feature secondary volcanic cones and fissures, creating a diverse landscape
- A past collapse of its eastern slopes formed the 7 km-long Valle del Bove, a natural funnel layered with ancient and recent lava flows
- Scientists study these layers to understand past eruptions
- In contrast, ridges like the active Northeast Rift are marked by eruptive cones and deep fissures

HAZARDS: EARTHQUAKES

DISTRIBUTION OF EARTHQUAKES

Earthquake activity is evident at constructive, destructive and conservative plate margins. The number, intensity, depth and wider extent of earthquakes vary according to the type of margin.

MAGNITUDE AND IMPACT

Impacts of an earthquake depend not only on its magnitude (size), depth and surface geology, but also on population density, the design of buildings, and the time of day.

Moment Magnitude Scale (Mw): Measures earthquake magnitude. based on the earthquake's seismic moment – which is calculated from physical properties of the earthquake, including the area of the fault that slipped, the amount of slip, and the rigidity of the rocks. Uses a logarithmic scale used to measure the size of earthquakes – each number is 10 times the magnitude of the one before.

It is considered more accurate than the older Richter scale, especially for large earthquakes.

Modified Mercalli Intensity Scale: Measures earthquake damage using observations of the earthquake's impact. The scale ranges from I (imperceptible) to XII (catastrophic).

SEISMIC WAVES

Anthropogenic earthquakes: Those caused by human activities, e.g. fracking or constructing a new reservoir (increased pressured on the land).

Natural earthquakes: 95% of the world's earthquakes occur along or near tectonic plate margins. Friction and sticking between plates cause enormous pressures and stresses.

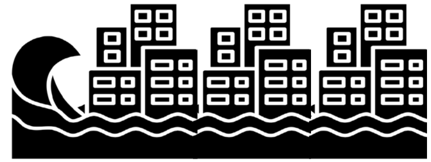
Focus: The point where the rocks fracture – sends a series of seismic shockwaves to the surface.

Epicentre: The point directly above the focus – experiences the most intense ground shaking, with deterioration beyond.

Tremors usually last for less than a minute followed by several weeks of aftershocks as the crust settles.

There are several types of seismic wave:

- **Primary or pressure (P) waves –** like high frequency sound waves – they reach the surface fastest.
- **Secondary or shear (S) waves –** shake like a skipping rope – they reach the surface next.
- **Surface Love (L) and Rayleigh (R) waves –** cause the most damage – they are the slowest



TSUNAMIS

Giant waves caused by the sudden displacement of a large volume of water, triggered by large earthquakes occurring on or near the ocean floor, particularly at convergent tectonic plate boundaries. When the ocean floor rises or falls suddenly it displaces the water above, creating a series of waves.

These destructive series of waves are characterised by:

- Very low wave height, but very long wavelength
- Very high speed – between 640–960km per hour
- A long time between each wave – between 10 and 60 minutes
- On approaching the coast, the waves slow and pile up as a massive wall of water.

Effective warning systems: Give many hours warning – without this, the first sign which is the apparent draining away of the sea in front of the tsunami (known as a drawdown) will be too late.

MITIGATION TECHNIQUES:

Earthquakes cannot be accurately predicted, although clues can occur before they strike, e.g. microquakes and ground bulging. Risk assessment, contingency planning and earthquake engineering is required. Including:

- **Earthquake-resistant construction –** cross-bracing, shock absorber, rolling weights, automatic shutters, etc.
- **Geographic Information Systems (GIS) –** used to prepare hazard maps and to inform the planning of urban development
- **Public education –** such as earthquake preparation checklists and practising evacuation drills

HAZARDS: EARTHQUAKE CASE STUDIES

PORT-AU-PRINCE EARTHQUAKE, HAITI, 2010

Haiti is a multi-hazard LDE vulnerable to tropical storms, flooding, landslides, periodic droughts and earthquakes.

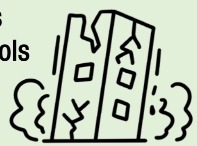
It is also the poorest country in the western hemisphere – political instability, corruption, poor infrastructure, social inequality, exclusion and unrest.

A complex strike-slip fault, following the conservative plate margin running through Haiti and the Dominican Republic, had been jammed since the last earthquake of 1751.

January 2010: Build-up of stress in the rocks released = catastrophic, shallow-focus, magnitude 7 earthquake.

Primary impacts:

- Over 230000 died
- 50% of Port-au-Prince buildings collapsed (including key government buildings).
- Over 180000 homes were damaged – 1.5 million people made homeless
- Infrastructure and nearly 5000 schools were damaged or destroyed
- Strong aftershocks were recorded



Secondary impacts:

- Haitians faced challenges in accessing food, water, sanitation, and healthcare, as well as ongoing issues with rebuilding infrastructure and providing adequate shelter
- Government was severely weakened – development in the country was set back by decades
- There was general lawlessness.
- Cholera outbreak killed over 1500
- 1.5 million people were still homeless one year later – living in makeshift camps or informal settlements

INDIAN OCEAN TSUNAMI, 2004

Caused by a magnitude 9.0–9.3 earthquake – ruptured 1000km of seabed off the coast of Sumatra.

Several countries affected – one of the world's worst natural disasters.

Primary impacts:

- Up to 300,000 fatalities
- Infrastructure destroyed
- Coastal settlements devastated
- Vegetation/topsoil stripped up to 800m inland

Secondary impacts:

- Widespread homelessness; 500,000 forced into refugee camps in the worst hit region
- Economies devastated (fishing, agriculture, tourism)
- Water supplies and soils contaminated by salt water
- Negative multiplier effects weaken economies

Immediate responses:

- Massive international relief efforts involved more than 160 aid organisations and UN agencies
- Foreign military troops provided assistance

Long-term responses:

- Programmes of reconstruction implemented
- Political barriers delayed aid distribution, e.g. in Sri Lankan areas held by rebel Tamil Tigers
- Existing government prejudices highlighted, e.g. the Indian Dalits 'underclass' were ignored
- Tourist resorts quickly rebuilt, e.g. Phuket in Thailand
- Tsunami warning system, including specific contingency planning

TOHOKO EARTHQUAKE, JAPAN, 2011

Magnitude 9.0 – under the Pacific Ocean...

- 400–500 km segment of the North American Plate, snagged by the subducting Pacific Plate, suddenly released upwards by between 5 and 10m
- Tsunami warning system kicked in, but people along a 3000 km stretch of coastline had just 30 mins to escape
- Ten waves (about 1km apart) slowed and piled up as they reached the shallower coastal water – surged up to 10km inland

Biggest ever recorded in Japan with global significance:

Moved the island of Honshu 2.4m closer to North America

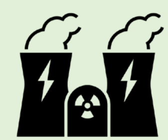
- Shifted the Earth's axis by at least 10 cm
- Made Earth days shorter by 1.8 microseconds
- Calved 125 km2 of icebergs from the Antarctic coast
- Caused visible waves in Norwegian fjords

Primary effects:

- Ground shaking caused buildings to collapse, fractured gas pipes and started fires
- Tsunami swept inland, devastating nearly 500 km^2
- In Tokyo, skyscrapers 'shook like trees', but their earthquake-resistant design meant damage was limited
- Over 18,000 were dead or missing – but Japan's tsunami warning system saved many lives

Secondary effects

- Half a million people were homeless. For weeks, 150000 people lived in temporary shelters.
- 1 million homes without running water and almost 6 million homes without electricity
- Explosions and radiation leaks at the Fukushima nuclear power plant



HAZARDS: TROPICAL STORMS

WHAT IS A TROPICAL STORM?

Hurricanes (Atlantic and Eastern Pacific Oceans), typhoons (west of the North Pacific Ocean) and cyclones (Indian and South Pacific Oceans). Sustained wind speeds in excess of 120km/h (75mph) – can be 500km in diameter.

DISTRIBUTION OF TROPICAL STORMS:

Several factors affect the distribution of tropical storms:
Oceans: Tropical storms derive their moisture from the oceans and peter out on reaching land.
High temperatures: Sea-surface temperature in excess of 26°C.
Atmospheric instability: Most likely to form in regions where warm air is being forced to rise, such as the ITCZ.
Rotation of the Earth: 'Spin' is needed to initiate the rotation of a tropical storm. Storms do not usually form between 5°N and 5°S.
Uniform wind direction at all levels: Winds from different directions at altitude 'shear off' the vertical development of a tropical storm, restricting height and intensity.

FORMATION AND DEVELOPMENT OF A TROPICAL STORM

Once a tropical storm has started to form, it will soon develop its distinct and clearly defined rotation:

- Warm, moist air rises rapidly in its centre, creating a central vortex, to be replaced by air drawn in at the surface
- The eye is often characterised by a column of dry, sinking air – the eye wall is the most damaging part of a storm
- Rising air cools, condenses and towering cumulonimbus clouds form
- When condensation occurs, latent heat is released, which powers the storm
- Cloud and rain extend in a series of waves
- A storm starts to lose energy as it reaches land, as the supply of energy and moisture is cut off

FREQUENCY, MAGNITUDE AND PREDICTABILITY

Frequency and magnitude: There is no clear evidence that the numbers nor intensity (magnitude) of storms are increasing as global temperatures increase.
Predictability: To some extent, tropical storms can be predicted – they are mostly restricted to the tropics and do not usually occur close to the Equator. They also mostly occur from late summer into autumn with a peak from August through to October.

EFFECTS

Strong winds:

- Speeds in excess of 75mph – damage to buildings and infrastructure, e.g. road network
- Damaged powerlines – blackouts and possible fires

Storm surges:

- Biggest cause of loss of life in a storm
- Cover farmland with saltwater and pollutes freshwater supplies
- Destroys housing and infrastructure

Coastal and river flooding:

- Brings torrential rain
- Triggers flash flooding – particularly in urban areas where drainage systems can't cope

Landslides:

- Intense rainfall waterlogs soil and– weakens slopes and triggers soil movement
- E.g. Hurricane Mitch in 1998 triggered multiple landslides across Central America – killing 11,000 people

MITIGATION

Preparedness:

- Through education/public awareness
- Prediction – using information to reinforce buildings, e.g. boarding up windows
- Emergency supplies/evacuation routes

Prevention:

- Cloud seeding to try to dissipate tropical storms (so far unsuccessful!)
- Focus on forecasting, along with mitigation and adaptation, to reduce impacts

Adaptation:

- Land-use zoning to reduce vulnerability
- Low-value land-uses by the coast
- Properties raised on stilts

Structural responses:

- Soft engineering – e.g. planting trees and building up beaches
- Hard engineering – e.g. constructing sea walls and storm drains

Disaster aid:

- Immediate – e.g. search and rescue, food
- Long-term – e.g. rebuilding programmes

HAZARDS: WILDFIRES

WHAT IS A WILDFIRE?

Generic name used for an uncontrolled rural fire (*bushfires* in Australia, *brushfires* in North America) – they affect different layers of vegetation.

- Every continent experiences conditions favourable for the ignition of wildfires – except Antarctica
- Population growth in rural areas increases the risk
- Wildfires release carbon stored in trees, plants and peat, enhancing the greenhouse effect and increasing the likelihood of wildfires (positive feedback loop)

CAUSES OF WILDFIRES

Most fires that threaten life and residential areas, particularly in woodland close to large urban areas such as Sydney and Los Angeles, are the result of human actions (e.g. discarded cigarettes and campfires). Heat transfer processes (radiation, conduction, convection) preheat trees, forest litter and also vegetation ahead of the flames, enabling rapid spread of the fire through spot fires.

VEGETATION TYPE – FUEL CHARACTERISTICS

The type and amount of fuel (vegetation) influences the intensity (the output of heat energy) and rate of spread (degree of threat). E.g. Grassland fires rarely produce the same intensity as forest fires, and the eucalyptus is fire-promoting – oils within the leaves can explode!

Climate and weather conditions:

- Most wildfires occur during or after prolonged dry periods
- Strong, dry winds blowing from continental interiors or deserts help the drying process and are ideal conditions for lightning storms – a common form of ignition
- Wind strength determines the rate of spread

IMPACTS

Social:

- Loss of life and injury
- Displacement of people
- Damage to power lines/ communications
- Behavioural adaptations
- New jobs required

Economic:

- Damage to structures, businesses, crops and livestock
- Financial losses (loss of earnings, damage costs)
- Cost of rebuilding and relocation
- Cost of future preparedness and mitigation

Environmental:

- Destruction of habitats and ecosystems
- Effects on ecosystem succession
- Pollution from smoke and toxic ask
- Short term surge in carbon dioxide due to the burning of carbon stores.

Political:

- Strategies for preparedness and mitigation
- Decisions about replanting forests, compensation, future regulations, etc
- Responses of governments, local authoritiess and emergency services in the immediate aftermath

RESPONSE

Preparedness:

Early detection and suppression of wildfires can take the form of:..

- Voluntary rural firefighting teams
- Warnings issued as fire risk increases
- Firebreaks around properties

Prevention:

- Public awareness can prevent fires starting
- Many countries operate 'fire bans' during times of high risk
- Controlled burning reduces the fuel store, but it may get out of control

Mitigation:

Reducing the impact before, during and after the event…

- Early detection by cameras and drones, satellites and infrared sensors
- Back burning ahead of the fire to remove the fuel
- Rivers may also control the spread
- Disaster aid and fire insurance

Adaptation:

- Burning old/diseased wood stimulates fresh growth
- Regulations can restrict access to areas at risk of wildfire
- Buildings made of natural products which will not cause pollution if burnt