CHANGING ECONOMIC WORLD: DEVELOPMENT GAP

KEY TERMS

HICs: High-income countries – GNI per capita of above $14,005.
NEEs: Newly emerging economies – have seen rapid growth in manufacturing industries.
LICs: Low-income countries – GNI per capita of less than $1,145.

DEVELOPMENT INDICATORS

GNI per capita: The income of the whole country divided by the number of people – shows strength of economy.

Birth and death rates: The number of births/deaths per thousand people per year – both decrease as countries develop.

Infant mortality: The number of children who die under 1 year old per 1000 live births per year – shows quality of healthcare for mothers, access to vaccinations, food and clean water.

Life expectancy: The average number of years a person is expected to live – shows access to healthcare, clean water and nutritious food.

People per doctor: The number of people in a place divided by the number of doctors – shows investment into healthcare and level of education (so people can become qualified doctors).

Literacy rates: The percentage of adults who can read and write – shows how a government values education and whether they can fund it. Sometimes given in male/female to gender inequality.

Access to safe water: The percentage of people who have access to water which is safe to drink – linked to life expectancy and death rate.

HUMAN DEVELOPMENT INDEX (HDI)

Composite measure of development – indicators combined to generate a figure of 0-1 (1 = highest development). Includes:

- **Wealth:** Using Gross National Income (GNI) per capita
- **Health:** Using life expectancy at birth
- **Education:** Using expected years of schooling for children of school entering age, and mean years of schooling for adults aged 25 and over

DEMOGRAPHIC TRANSITION MODEL (DTM)

Show how the population of a place changes over time – includes birth rate, death rate and total population.

Stage 1 – High fluctuating: High birth and death rates, stable population; youthful population – people have a low life expectancy e.g. tribal communities.

Stage 2 – Early expanding: High birth rate, decreasing death rate, rapid natural increase; youthful population – high demand for schools and healthcare for children, e.g. Afghanistan.

Stage 3 – Late expanding: Decreasing birth rate, low death rate, rapid natural increase; youthful population – high demand for schools and healthcare for children, e.g. Kenya.

Stage 4 – Low fluctuating: Low birth rate, low death rate, stable population; ageing population – high demand for adult health and social care, e.g. France

Stage 5 – Natural decrease: Very low birth rate, low death rate, natural decrease; ageing population – shortage of workers, very high demand for care for the elderly e.g. Japan

CHANGING ECONOMIC WORLD: DEVELOPMENT GAP

PHYSICAL REASONS FOR DEVELOPMENT GAP

Landlocked: Countries struggle to trade without access to ports.

Lack of water: Droughts can lead to crop failure, famine and starvation. Also affects trade and productivity (workers are weaker).

Pests and diseases These can destroy crops – affects food supplies and exports. Also affects ability to work and tourism (therefore income).

Extreme weather: Too hot or too cold affects what can be grown, and floods can destroy crops/property.

Terrain: Mountainous areas are remote and inaccessible so hard to develop – limits economic activity.

Natural disasters: Cause huge amounts of damage to houses, businesses and infrastructure – affects the economy and takes a long time to recover from.

HISTORICAL REASONS FOR DEVELOPMENT GAP

Colonialism: Countries were part of empires, which took raw materials and sent them back to Europe. These countries struggled after independence.

ECONOMIC REASONS FOR DEVELOPMENT GAP

Trade: Some countries have a lack of resources to trade, and haven't got enough money to set up industries – end up exporting low value goods.

Fluctuating prices: If prices go up and down all the time countries are not guaranteed a decent income.

Debt: LICs took out loans to fund development projects – have to pay back interest too, so less money to spend on important services, e.g. schools and healthcare

POLITICAL REASONS FOR DEVELOPMENT GAP

Conflict: Money is spent on warfare than important services. Other countries don't want to trade, and tourists do not visit as it's too unsafe.

Corrupt governments: Governments mismanage the economy – often leaders live lavish lifestyles whilst their population lives in poverty.

STRATEGIES TO REDUCE THE DEVELOPMENT GAP

Fair trade: Farmers are guaranteed a minimum price for their produce, and a fair trade premium goes to the community to spend on projects, e.g. clinics and schools.

Aid: Money that comes from other countries or NGOs to spend on developmental projects to improve quality of life, e.g. improving water supply or healthcare.

Debt relief: Countries have their debts written off so they can spend the money on poverty reduction.

Microfinance loans: Small loans given to people to improve their lives, e.g. to start businesses or make home improvements.

Appropriate technology: Projects that use cheap and simple technology that is easy to set and maintain by the local community (also called **intermediate technology**).

TNC investment: Creates jobs and leads to a multiplier effect in the local area – increased spending and profits, further job creation, more future investment.

Tourism: Creates jobs directly and indirectly, e.g. hotel staff, tour guides, airport staff, etc – also leads to multiplier effect.

CHANGING ECONOMIC WORLD: NEE COUNTRY STUDY (NIGERIA)

INTRODUCTION:

Location: In West Africa – bordered by Niger, Chad, Cameroon and Benin. It has an Atlantic coastline in the south. The capital city is Abuja.
Population: 218.5 million (est. 411m by 2050).
Life expectancy: 56 years.
GNI per capita: $2,160 ($5,700 PPP).
Culture: Nollywood is the 2nd biggest film industry in the world.

CONTEXT:

1960: Gained independence from Britain, resulting in a period of conflict and civil war. Lack of stability led to corruption and affected development.
1999: Stable government (democracy) – but lots of problems, including a weak economy, lack of services and poor infrastructure.
Now: Many countries are starting to invest in Nigeria, e.g. China – huge construction projects.

ETHNICITY & FAITH

Ethnic groups: Yoruba (21% of the population), Hausa and the Fulani (29%), and Igbo (18%).
Religion: Christianity, Islam, and traditional African religions are practised widely.
Tensions between Muslim and Christian groups. (in the north) and the Yoruba and Hausa.

NORTH-SOUTH DIVIDE:

The north is the Sahel, which is drier. The south is better for farming, and has good port links for transport.
Boko Harem (extremist group) operate in the north – puts of trade and tourists.

CHANGING INDUSTRY

Farming has declined, manufacturing and services, e.g. finance and retail, have increased (TNC investment).
Discovery of oil has fuelled economic growth and huge investment into industry.
MINT country (with Mexico, Indonesia and Turkey – rapid economic growth.

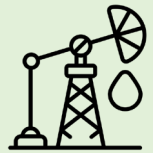
ENVIRONMENTAL IMPACTS OF INDUSTRY

fast/unregulated economic growth has caused environmental issues...
Deforestation: 70-80% of forests lost for farming (cash crops), logging and development of infrastructure and Industry.

Desertification (in the north):
From HEP dams – reduces water flow downstream.

Contamination of water/soil/air:
From oil spills and burning gas (e.g. Niger Delta).

TNCS IN NIGERIA



E.g. Shell Oil (Anglo-Dutch TNC) – huge investment in extracting oil in the Niger Delta.

Benefits of Shell Oil in the Niger Delta:

- Pay taxes and increase export revenue
- Employ 65,000 Nigerians directly and another 250,000 indirectly
- Create a multiplier effect by giving contracts to Nigerian companies

Disadvantages of Shell Oil in the Niger Delta:

- Oil spills cause pollution of water and soil, causing problems for farming and fishing
- Gas flares pollute the air
- Security issues related to oil theft and disruption of supplies by military groups

AID IN NIGERIA

Nigeria receives 4% of aid sent to Africa, but corruption means aid isn't always effective.

WaterAid: Working to improve access to sanitation and reduce disease risk (only 30% have access to a 'decent' toilet).

Nets for Life: Mosquito nets to reduce malaria deaths.

CHANGING ECONOMIC WORLD: UK ECONOMIC FUTURES

RURAL POPULATION INCREASE: SOUTH CAMBRIDGESHIRE (EAST OF ENGLAND)

Population: 162,000 (2021 census – up from 140,000 in 2011; estimated to increase to 182,00 in 2031.
Increase due to: Counter-urbanisation, good transport links (commuting to London), well-paid job opportunities.
Social impacts: More house building, noise, traffic, congestion; loss of 'village feel'; demand on services.
Economic impacts: House price increase – forces young people out, new customers for local businesses, BUT some places become dormitory villages (empty during the day – affects business).

RURAL DEPOPULATION: OUTER HEBRIDES (ISLAND GROUP OFF WEST SCOTLAND)

Population: 27,000 (was 46,000 in 1901) – most on Isle of Lewis.
Decrease due to: Limited opportunities so younger people move away to seek better-paid jobs.
Social impacts: Ageing population with few people to care for elderly – lack of adult social care; essential services close due to lack of support, e.g. bus services.
Economic impacts: Businesses close due to lack of customers; lack of investment due to poor infrastructure; decline in fishing and farming.

NORTH-SOUTH DIVIDE

North heavily affected by deindustrialisation - the south has a fast-growing service sector. South tends to have higher wages, house prices, life expectancy and government spending.
Strategies to reduce regional inequality:

- Northern Powerhouse
- Transport infrastructure projects
- Enterprise Zones/Local Enterprise Partnerships

UK IN THE WIDER WORLD

- Left EU in Jan 2020 (trading bloc)
- Part of Commonwealth
- Part of NATO, G8, and UN Security Council
- Linked by trade, culture, transport, electronic communication

INFRASTRUCTURE IMPROVEMENTS

Road: 2014 road investment strategy (£15 billion) to improve capacity and condition of roads, e.g. smart motorways and more traffic lanes.
Rail: Projects include High Speed 2* (HS2) and London's Crossrail**
Ports: Liverpool 2 deep container port (£400 million) to double container capacity, creating 5,000 jobs and reducing road freight.
Airports: Proposed third runway at Heathrow (£20 billion) – Europe's biggest and busiest airport – could boost UK economy by £200 billion!

HIGH SPEED S (HS2) *

Cost = £88 billion (originally costed at £56 billion)
Planned to connect London to Birmingham, Manchester and Leeds (but northern routes cancelled) – decrease journey time and increase capacity – leading to investment (to address regional inequality), BUT… huge impact on wildlife and environment, 1,740 homes will be demolished and costs are spiralling.

CROSSRAIL **

Cost = $16.5 billion – 32km of twin bore tunnels under central London linking west to east by new Elizabeth line. Will reduce journey times, ease congestion, extra 1.5 million people living within 45 minutes commute of central London. BUT opened 4 years late!

CHANGING ECONOMIC WORLD: UK ECONOMIC FUTURES

KEY TERMS

Employment structure: % of workforce in each of the following economic sectors…

Primary sector: Working with natural resources, e.g. farming, fishing, mining, forestry.

Secondary sector: Making, building or processing raw materials into finished products, usually in factories.

Tertiary sector: Providing a service, e.g. education, healthcare, retail, finance.

Quaternary sector: Hi-tech research and development.

UK CHANGING ECONOMY

Middle ages: Most worked in farming.

Industrial revolution: Growth of manufacturing

1970s onwards: Decline of manufacturing, growth of services.

Now: Post-industrial economy – tertiary/quaternary focus (80% of UK workers)

SHIFT FROM TRADITIONAL INDUSTRIAL BASE

Deindustrialisation: Closure of coal mines, steel works, etc, in northern England and South Wales – led to unemployment and poverty.

Globalisation: Competition from LICs/NEEs (low labour costs, fewer regulations); and new hi-tech machinery (fewer workers needed).

Government policy: Post WWII many industries became state-run, e.g. British Rail, National Coal Board (nationalisation); Privatisation happened in 1980s – industries that had been subsided to keep running closed, leading to job losses, e.g. closure of coal mines.

ENVIRONMENT IMPACTS OF INDUSTRY

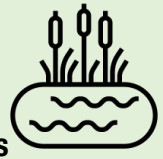
Primary sector: Dust/noise from mining and quarrying, piles of waste materials, heavy traffic on roads.

Secondary sector: Pollution released into air and water from factories – also visual impact.

Tertiary sector: Retail leads to lots of wastage, air travel through tourism and international business.

Management:

- Stricter targets for water quality and air pollution
- Fine companies harshly for environmental damage
- Restore old quarries into lakes and wildlife habitats
- Filters on industrial chimneys to remove key pollutants



SCIENCE AND BUSINESS PARKS

Situated on the edge of urban areas close to transport links.

Science park: A site for a group of research and IT based firms, usually linked to a university, so that they can share facilities and employ highly qualified graduates, e.g. Cambridge Science Park.

Business park: Area of land used by different businesses, usually in purpose-built buildings – these parks have plenty of space as land is cheap, so can have large buildings and car parks, e.g. Cobalt Park, Newcastle.

SUSTAINABLE MODERN INDUSTRY EXAMPLE: TORR QUARRY, SOMERSET

- 75% of material transported by rail (not heavy lorries)
- Noise levels, vibrations, dust and water quality – all monitored
- Extended by deepening rather than widening
- When operations finish it will be restored – wildlife lake, planting of native grasses, shrubs and trees, add characteristic limestone

THE CHALLENGE OF NATURAL HAZARDS: TECTONIC HAZARDS

WHAT AFFECTS HAZARD RISK?

Poverty: Land is cheaper in risky places.
Urbanisation: People may be forced to live on steep slopes or flood plains.
Farming: Farmers choose to live on floodplains or volcano slopes because of fertile land.
Climate change: More extreme weather events in the future.

PLATE TECTONIC THEORY

Continental drift: Crust broken into plates that move (Wegner) – used to be one 'super-continent' – Pangea.
Convection currents: Theory that plates moved due to movement of magma in the mantle (widely discredited now).
Ridge push: New crust formed at constructive margins rises to form ocean ridges – older seafloor on either side slides away.
Slab pull: At subduction zones older denser plates sink into the mantle – pulling newer/less dense bits of plate with it.

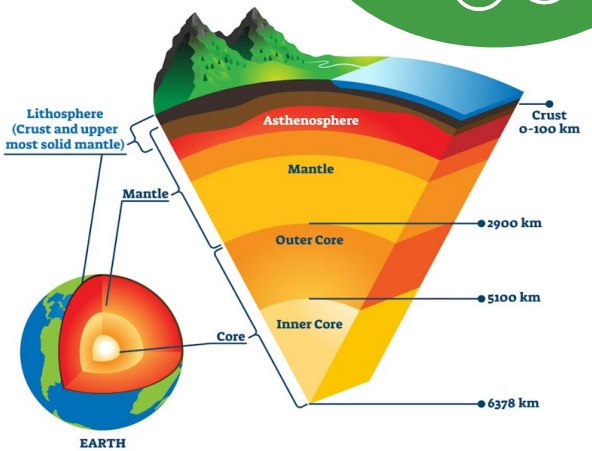
LAYERS OF THE EARTH

Crust: Thinnest outermost layer.
Mantle: Thickest layer (approx. 2,900km).
Core: Inner core is solid; outer core is liquid.
Lithosphere: ***The crust and upper (rigid) part of the mantle).***
Asthenosphere: ***Denser weaker layer of the mantle (100-400km below Earth's surface) – semi-molten.***

TYPES OF CRUST

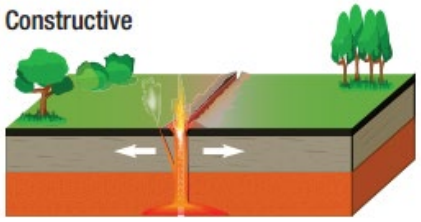
Continental:
- 20-200km thick
- Less dense
- Mainly granite
- Up to 3.8 billion years old

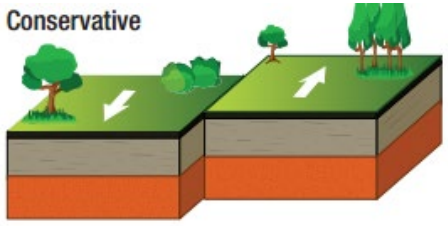
Oceanic:
- 5-10km thick
- Very dense
- Mainly basalt
- Less than 200 million years old



TYPES OF PLATE MARGIN (BOUNDARY)

Destructive: When continental and oceanic plates move towards each other. The denser oceanic plate is subducted under the continental plate forming an ocean trench, and the continental plate folds to form mountains – earthquake and volcanoes occur here.
Constructive: When plates move apart magma rises to the surface and cools to form new land, e.g. a mid-ocean ridge, which can cause volcanoes and earthquakes.
Conservative: When two plates slide past each other, either in opposite directions, or in the same direction but at different speeds. The plates can stick and jolt free causing earthquakes. There is no rising magma so no earthquakes.





THE CHALLENGE OF NATURAL HAZARDS: TECTONIC HAZARDS

PRIMARY IMPACTS

The direct impacts (caused either by the earth shaking or a volcano erupting) – they happen during or immediately after the event, e.g. loss of life and numbers injured, buildings destroyed, transport infrastructure damaged, water/gas pipes breaking, electricity cables falling down; volcanoes – ash clouds covering everything, lava/ash contaminating water supplies.

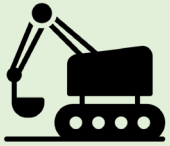
SECONDARY IMPACTS

The indirect impacts (caused by the primary impacts) – they happen in the coming hours, days and weeks, e.g. tsunamis and landslides, communities being cut off (from damaged roads), outbreaks of waterborne diseases (from contaminated water), fires and power cuts (from broken cables).
BUT, also increase in tourism after volcanic eruptions, e.g. Iceland.

IMMEDIATE RESPONSES

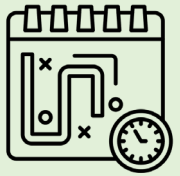
Emergency aid/ assistance given within the first few hours/days – vital to reduce death toll, e.g. search and rescue, medical care such as pain relief and emergency surgery, temporary shelter, providing food and clean water.

LONG-TERM RESPONSES



Take place in the weeks and months after – focus on rebuilding and helping people return to normal lives, e.g. restoring essential utilities, repairing/ rebuilding domestic and commercial buildings, repairing transport links. Also measures to reduce future damage.

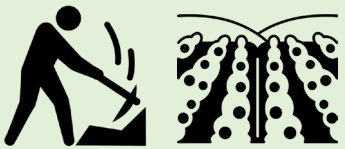
MITIGATING TECTONIC HAZARDS – MP3



Monitoring: Using scientific equipment to detect warning signs, e.g. measuring changes in temperature and bulges in the volcano dome as magma rises, monitoring seismic Activity.
Prediction: Using historical evidence/live data to estimate when a tectonic hazard might happen, e.g. historical records show where earthquakes might occur, particularly if pressure is building up after no recent activity.
Protection: Designing buildings/structures to withstand tectonic hazards, e.g. shock absorbers at the base of tall buildings to make them sway, cross-bracing and automatic window shutters.
Planning: Identifying and avoiding places most at risk and preparing for a disaster, e.g. drawing up hazard maps, setting up 'no-go' areas, practising earthquake drills, stocking up on food, water and fuel, and knowing where to evacuate to.

WHY LIVE IN TECTONIC AREAS?

Geothermal energy: Hot magma in rocks heats up steam – used to drive turbines at power stations.
Mining: Volcanic are rich in minerals – valuable resources and creates jobs.
Farming: weathered lava releases minerals – nutrient-rich soil.
Tourism: Tourists visit to see eruptions, geysers and relax in hot springs.



THE CHALLENGE OF NATURAL HAZARDS: WEATHER HAZARDS

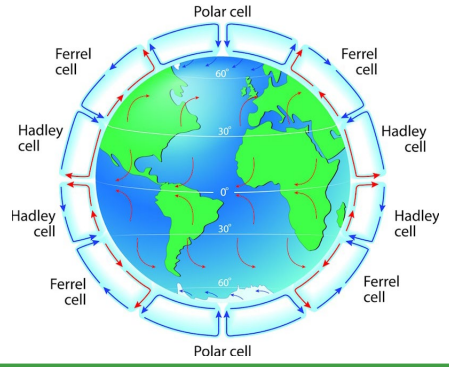
GLOBAL ATMOSPHERIC CIRCULATION

3 cells operate circulating air through the troposphere – whole system is driven by the equator.

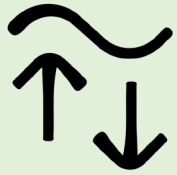
Hadley cell: Air rises at the equator (creates low pressure and rainfall) – when it reaches the atmosphere it can't go any further to travels north or south, then cools and falls creating low pressure and dry conditions at 30°.

Ferrel cell: Air descends at the tropics as it is pulled down by the adjacent air in the Hadley cell. Here the air is driven by the Hadley and Polar cells.

Polar cell: At around 60° this warm air rises, leading to clouds and rain. The air will then flow back to the poles.



PRESSURE BELTS

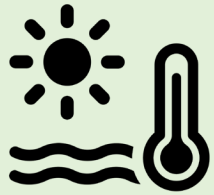


Descending air = high pressure = no clouds and rain.
Rising air = low pressure = clouds and rain.
Poles – high pressure = dry.
60° – low pressure = wet, e.g. the UK.
Tropics – high pressure = dry (home to hot deserts).
Equator – low pressure = very wet (home to tropical rainforests)

TROPICAL STORMS

Form within the tropics between 5 and 30 degrees north and south (not actually along the equator).
Hurricanes: Atlantic and Eastern Pacific Oceans.
Typhoons: West of the North Pacific Ocean.
Cyclones: Indian and South Pacific Oceans.

STAGES OF A TROPICAL STORM



1) Ocean needs to be at least 27°C (to a depth of 60-70m).
2) Air is heated and warm air rises rapidly, drawing in moisture, causing strong winds.
3) Rising air cools and condenses to form tall cumulonimbus clouds – this releases latent heat.
4) The winds start to spin upwards due to the Coriolis effect (the effect of the earths axis).
5) Centre of the storm = eye – calm drier conditions.
6) Trade winds steer storm towards the land.
7) Once it makes landfall the storm loses its source of power – this is why most storm damage happens by the coast.

EXTREME WEATHER IN THE UK

- Prolonged rainfall
- Strong winds (named storms)
- Droughts and heatwaves
- Extreme cold

MANAGING EXTREME WEATHER IN THE UK

Flooding: Environment Agency monitors river levels and gives warnings, flood barriers installed.
Names storms: Met Office issues warnings, travel companies cancel services, high bridges closed, etc.
Droughts and heatwaves: Water companies can place restrictions on use if needed.
Extreme cold: Local councils grit roads.

CLIMATE CHANGE IN THE UK

- The top 10 warmest years on record have occurred since 2002
- Six of the 10 wettest years on record have occurred since 1998
- Fewer very cold days

THE CHALLENGE OF NATURAL HAZARDS: WEATHER HAZARDS

PRIMARY IMPACTS

The direct impacts (caused either by the strong wind, heavy rain or storm surges) – they happen during or immediately after the event, e.g. damage to and destruction of buildings, loss of life through drowning (90% of deaths in tropical storms), power lines blown down, crops washed away, and huge storm surges.

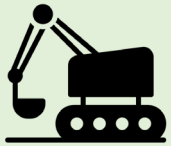
SECONDARY IMPACTS

The indirect impacts (caused by the primary impacts) – they happen in the coming hours, days and weeks, e.g. thousands of people losing their homes and becoming homeless, outbreaks of waterborne disease, loss of crops or fishing boats could lead to a loss of income and affect food supplies, shops could be shut due to a loss of power, education may be disrupted by schools closing.

IMMEDIATE RESPONSES

Emergency aid/ assistance given within the first few hours/days – vital to reduce death toll, e.g. search and rescue, medical care such as pain relief and emergency surgery, temporary shelter, providing food and clean water.

LONG-TERM RESPONSES



Take place in the weeks and months after – focus on rebuilding and helping people return to normal lives, e.g. restoring essential utilities, repairing/ rebuilding domestic and commercial buildings, repairing transport links. Also measures to reduce future damage.

MITIGATING TECTONIC HAZARDS – MP3

Monitoring: Using satellites and aircraft to track the size, temperature and moisture levels of storms, as well as and air pressure.

Prediction: Using super-computers to predict where the storm will hit using a track cone. Computers are also used to give out advanced warnings, e.g. Hurricane Watch (48hr warning) and Hurricane Warning (36hr warning).

Protection: Reinforcing homes, e.g. window shutters, securing roofs and doors with metal straps, building homes on stilts to protect from flooding, building cyclone shelters, constructing storm drains to remove excess rainfall, building sea walls to protect against storm surges, and planting mangrove forests to absorb excess water.

Planning: Raising awareness about what to do in a tropical storm, e.g. Hurricane Preparedness Week (USA), assembling a disaster supply kit, stocking up on food, water and fuel, and knowing where to evacuate to.

HOW WILL CLIMATE CHANGE AFFECT TROPICAL STORMS?

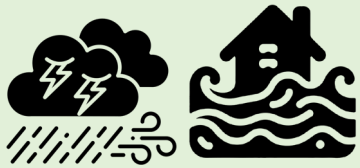
More frequent and intense tropical storms (category 4/5 storms)…

Global warming → ocean thermal expansion of the oceans → sea level rise.

Higher storm surges → low-lying coastal areas flooded.

Storm surges are the most deadly hazard related to tropical storms!

Warmer air in the atmosphere can hold more moisture → heavier rainfall → more destructive flooding during tropical storms.



THE CHALLENGE OF NATURAL HAZARDS: CLIMATE CHANGE

QUATERNARY PERIOD

2.6 million years ago to the present day.
Overall period of cooling!

Glacials:
Cooler periods – UK covered in ice last 100,000 years).

Interglacials:
Warmer periods (last 10,000 years).

EVIDENCE OF CLIMATE CHANGE

Recent:
- Melting sea ice
- Sea level rise
- Seasonal patterns (e.g. birds migrating, plants flowering

Historic:
- Tree rings
- Fossil pollen
- Ice cores
- Observing ocean sediment

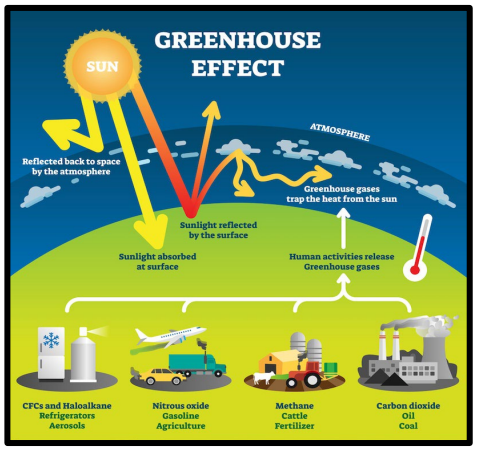
GREENHOUSE EFFECT

The Sun's infrared heat rays enter the Earth's atmosphere…

Short-wave radiation: Most solar radiation is able to past through it to warm up the earth's surface.

Long-wave radiation: The heat given off by the earth's surface.

Greenhouse gases form a blanket within the atmosphere that traps long-wave radiation heat.



NATURAL CAUSES

Orbital changes:
- Eccentricity
- Axial tilt
- Precession

Solar output: Sunspots – dark patched on surface…
- Maximum sunspots = give off more heat
- Few sunspots = colder climate

Volcanic activity: Eruptions can block out sun (temporary effect)

HUMAN CAUSES

Greenhouse gases are released into the atmosphere by human activity – have increased since industrialisation…

Carbon dioxide: From burning fossil fuels and deforestation.

Methane: From rotting organic matter, burning biomass, agriculture (cattle farming).

Nitrous oxides: From fertilisers, sewage treatment plants and vehicle exhausts.

MITIGATION STRATEGIES

Reducing or preventing greenhouse gas emissions…
- Alternative energy sources that don't emit CO2
- Afforestation to create carbon stores
- Transport strategies, e.g. investing in public transport, cycle path networks, park and ride and car share schemes, and EV charging networks

ADAPTATION STRATEGIES

Responding to the impacts of climate change by adjusting how people live or work
- Farming techniques
- Water management
- Flood defences for low-lying areas, e.g. sea walls, tidal barriers, homes on stilts

INTERNATIONAL AGREEMENTS

Paris Accord: Agreement to limit warming to 1.5°C above pre-industrial levels – signed by 195 countries.

THE LIVING WORLD: ECOSYSTEMS

WHAT IS AN ECOSYSTEM?

The interaction of living (biotic) and non-living (abiotic) components.

Biotic:

- Animals, e.g. mammals, insects, birds and fish.
- Plants, e.g. trees and shrubs (provide food and shelter)
- Bacteria/fungi – decomposers – important in nutrient cycle

Abiotic:

- Air – oxygen for respiration; carbon dioxide for photosynthesis
- Sunlight for photosynthesis and plant growth
- Water and minerals (soil and rock)

NUTRIENT CYCLING

Plants/animals die – decomposers help to recycle the nutrients ready for plant/animal growth. Decayed material adds nutrients to the soil – which are taken up by plant roots.

ENERGY TRANSFER

Food chains: Show transfer of energy in the form of food from organism to organism (arrows show energy transfer).

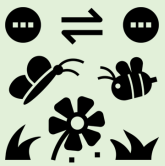
Food webs: Show food chains in an ecosystem – if you remove part it affects the whole web(interdependent).

GOODS AND SERVICES

Goods: Biomass, water, goods to sell, e.g. timber, ingredients, e.g. for medicines and toiletries.

Services:

- Plants filter water and air to remove pollutants
- Leaf litter for nutrient cycling
- Carbon storage
- Pollination



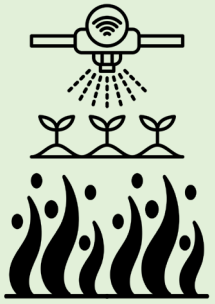
- Water storage
- Cooling effect
- Roots bind soil together – stops soil being eroded or washed away

- Planting trees reduce noise/visual impact
- Reduces flood risk

HUMAN IMPACT ON ECOSYSTEMS

Deforestation: To make way for housing developments, road construction, mining, and use as timber products.

Farming:

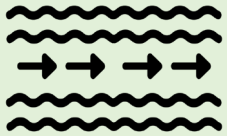


- Irrigation – water taken from ponds/rivers – water depletion harms marine life
- Fertilisers – washed into waterways causing eutrophication – algae grows and starves water of oxygen, killing fish
- Profit - hedgerow removal to make fields bigger, destroying habitats and food webs

GLOBAL BIOMES

Large-scale ecosystem known for its dominant vegetation type. Vegetation varies because of…

Altitude: Temperature falls with height above sea level (air is thinner so can't retain heat) so trees are replaced by tough grasses on steep mountains.



Ocean currents: E.g. cold currents create dry conditions (lack of evaporation), whereas the warm Gulf Stream makes western Europe warmer despite the latitude.

Mountain ranges: Forces air to rise upwards – relief rainfall over mountainous areas, but moisture is quickly lost so the other side of the mountain is dry (rain shadow effect).

THE LIVING WORLD: TROPICAL RAINFORESTS

RAINFOREST STRUCTURE

Emergents: Tallest trees (up to 50m) – grown tall to reach the sun.

Canopy: Densest layer (up to 30m) – most sunlight, most species.

Under canopy: Trees grow up to 15m – damp layer than only gets 10% of sunlight.

Forest floor: Very dark, lots of leaf litter – large predators, e.g. jaguars.

RAINFOREST FEATURES

- Found along the equator
- Warm and wet year round
- Average temp = 27°C
- Annual rainfall = 2500m+
- Dense/lush vegetation
- Hot and humid – ideal for nutrient cycling
- Poor soils – thin/not very fertile, nutrients washed away by heavy rain (leaching)

PLANTS AND ANIMALS

Home to half of global species.

Animals adapt to conditions…

Monkeys: Prehensile tails for balance/swinging.

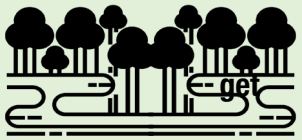
Poison arrow frogs: Brightly coloured to warn predators of danger.

Plants adapt to survive humidity…

Leaves: large surface areas, and leaf angling to maximise photosynthesis, waxy surfaces/drip tips, so they don't rot.

Buttress roots: Massive ridges above the ground to support tree base.

Lianas: Vines that twist around tree trunks to reach sunlight, or also hang down from branches.



Epiphytes: Sit on branches in the canopy – nutrients from water and air instead of soil.

RATE OF DEFORESTATION

- Half of all rainforest has been cleared
- Increase in rate in South America, Asia and Africa, especially in Peru/Indonesia
- Decreased in Amazon (but 20% already lost)
- 60 hectares per minute lost around the world

CAUSES OF DEFORESTATION

Logging: For timber for building materials or furniture.

Mining: To explore/exploit minerals below ground.

Energy: Large rivers = high HEP potential – land cleared to build dams.

Farming: Huge areas cleared for cattle ranches and cash crop plantations

Road building: opens up the rainforest – makes it commercially accessible

IMPACTS OF DEFORESTATION

Global:

- Climate change
- Loss of biodiversity

Local:

- Less evapotranspiration – drier
- Soil erosion/loss of fertility
- River pollution
- Harms indigenous tribes

RAINFOREST MANAGEMENT

International agreements: Restrictions on trade in tropical rainforest hardwoods, making it harder to sell them/make money from them; 'Debt for nature' – HICs cancel debt in LICs so they can invest in conservation projects.

National strategies: Can bring in laws to protect environment and can stop exploitation, can set up national parks – but reluctant to limit exploitation due to impact on the economy.

Local strategies: e.g. selective logging only fells fully grown trees (less valuable ecologically); ecotourism which educates visitors, is small-scale and local, and money invested into conservation.

THE LIVING WORLD: COLD ENVIRONMENTS (OPTION)

KEY FEATURES – POLAR BIOME

- Average temp below freezing – can be -50°C
- Very little precipitation – officially desert
- Soils permanently covered in ice – so permanently frozen
- Some mosses and lichens
- Few permanent settlements

KEY FEATURES – TUNDRA BIOME

- Average temperature can be -20°C
- Warmer and wetter than polar biome
- Permafrost – most ground is permanently frozen but melts closer to surface – causes waterlogging
- Soils have low fertility
- Tundra means 'treeless place' in Finnish

CHALLENGES

Extreme cold: Dangerous to work outside (down to -50°C) – serious risk of frostbite.
Building: Construction projects have to ensure permafrost doesn't melt – complex and expensive
Inaccessibility: Roads covered in snow or thick ice, waterlogging from melted permafrost – dangerous to drive off-road.

POLAR/TUNDRA ANIMALS

Polar bears: Thick fur and insulating fat, black nose and foot pads to retain heat.
Penguins: 2 layers of feathers – traps body heat, streamlined bodies – swim quickly.
Seasonal behaviour: Hibernating in winter to conserve energy, migrating to warmer regions.

ECONOMIC ACTIVITIES

Mineral extraction: Abundance of minerals – important source of income, e.g. lead and gold.
Energy development: Fossil fuels, e.g. coal, oil and gas, some potential for geothermal.
Fishing: Cold water = abundant fish stocks, e.g. Barents sea – over 150 species of fish.
Tourism: Spectacular scenery and activities, e.g. snow mobiles, dog sleds, also cruise passengers.

INTERNATIONAL AGREEMENTS

International agreements are important in protecting cold environments.
Antarctic Treaty: Signed in 1959 has stopped economic development, despite all the valuable resources, and has protected this fragile environment.
Arctic Council: Aiming for sustainable development across region, e.g. setting fishing and hunting quotas.

POLAR/TUNDRA PLANTS

Permafrost: Frozen ground so plants need shallow root systems, e.g. mosses/lichens.
Water logging and poor drainage: Soils are dry in winter and very wet in summer (after permafrost melts) – hardy - e.g. mosses.
Strong winds: Plants grow low and close together, hairy stems (both trap air), leaves thin and waxy to reduce transpiration.

NATIONAL MANAGEMENT STRATEGIES

Balance interests of different groups…
Arctic National Wildlife Refuge: Protects 12 million acres in Alaska from exploitation.
Western Arctic Reserve: Bans oil exploration and drilling – protects habitats.

LOCAL MANAGEMENT STRATEGIES

NGOs, e.g. Greenpeace and the WWF work to conserve the environment and traditional ways of life in wilderness areas – they often work with scientific organisations and oil companies,

THE CHALLENGE OF RESOURCE MANAGEMENT: UK OVERVIEW

UK FOOD IMPORTS

The UK imports 40% of its food because:

- Imported food may be cheaper
- People want a choice of exotic food
- People want seasonal food all year round, e.g. strawberries

Food miles: How far food travels from field to plate (e.g. green beans from Kenya travel over 7,000 km to reach the UK).

Carbon footprint: How much carbon dioxide is produced during food production and transportation.

Impacts: Creates jobs for LIC farmers, UK farmers can't compete with low prices, reliance on overseas produce.

SMALL-SCALE VS LARGE-SCALE FARMING

Organic farming: Food produced without using chemicals such as fertilisers and pesticides – small-scale and expensive.

Agri-business: Food produced intensively using chemicals and technology, e.g. heat and light – farms run as large-scale businesses.

DEMAND FOR WATER

50% of UK water is domestic use, e.g. baths/ showers, flushing toilets, water-intensive appliances, etc. On average we each use 150 litres of water a day. 1/5 of all UK water is wasted through leakage. Water also used for agriculture, industry and leisure.

WATER CONSERVATION

Water use is being managed by encouraging people to:

- Have water meters in their homes so they can see just how much they are using
- Use water efficient appliances
- Use grey water to water plants (water recycling)

Hosepipe ban: During times of drought water companies can temporarily stop unnecessary water use, e.g. watering gardens, washing cars.

WATER QUALITY MANAGEMENT

Environment Agency manages UK water quality:

- monitor river water
- regulate use of water and restrict recreational use
- prosecute those who are polluting water sources, e.g. Southern Water fined £90 million in 2021 for illegal sewage dumping

WATER TRANSFER SCHEMES

Water is transferred through network of canals/ rivers/pipes from areas of surplus, e.g. north-west, to areas of deficit, e.g. south-east – expensive!

UK ENERGY MIX

Shift from **fossil fuels** to **nuclear** and **renewable energy** – reduced fossil fuel supplies and climate change targets to meet (government target to phase out coal-fired energy by 2025).

Fracking: Could be used to extract shale gas from underground, although is controversial!

IMPACTS OF FOSSIL FUELS

Economic: Often inaccessible so costly to extract (cheaper to import); NHS cost of treating respiratory illnesses of workers.

Environmental: CO2, dust, noise, landscape scars.

IMPACTS OF NUCLEAR ENERGY

Economic: Huge cost of construction, transportation/storing, and decommissioning.

Environmental: Risk of radiation leaks, e.g. Chernobyl (Ukraine, 1986).

IMPACTS OF RENEWABLE

Economic: Initial cost is high, solar farms take up farmland, turbines can deter tourists.

Environmental: Visual/noise pollution, solar panels and turbines can endanger wildlife.

THE CHALLENGE OF RESOURCE MANAGEMENT: WATER (OPTION)

KEY TERMS

Water security: When all people have access to a reliable source of water, of appropriate quality and quantity.

Water deficit: Where the demand for water exceeds the supply of water in an area.

Water stress: When the demand for water is greater than the supply, over a certain period, or when poor quality restricts its use (e.g. pollution of drinking water).

Waterborne diseases: Diseases such as cholera and typhoid which are caused by bacteria in contaminated water.

Water conflict: Conflict between countries, states, or groups over the rights to access water resources, e.g. if a river runs through several countries.

Over-abstraction: When too much water is taken from a river, lake, or other store, for the purpose of irrigation or industrial use.

GLOBAL DEMAND FOR WATER

Population growth: 8 billion people (est. 9 billion in 2037). Countries with the highest growth already lack water security.

Economic development: Increased wealth leads to growth of commercial farming and 'thirsty' industries. Rising living standards, e.g. washing machines.

SOURCES OF WATER

Naturally occurring rivers/lakes: Water can be transported by pipeline to where it is needed.

Aquifers: Natural underground stores where water collects in porous rocks – is extracted by drilling wells or boreholes down.

Reservoirs: Artificial lakes usually created by building a dam across a valley and allowing it to flood.

CAUSES OF WATER INSECURITY

When people are without reliable access to a safe water supply…

Climate: Main cause of water insecurity! In semi-arid and arid areas people often rely on the land – drought is common.

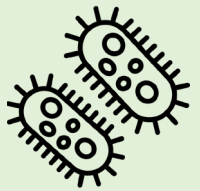
Geology: Aquifers need porous rocks – non-porous rocks can't store water.

Pollution: E.g. raw sewage, agricultural chemical run-off, toxic chemicals from industry – make water unsafe to drink, risk of waterborne diseases.

Over-abstraction: Taking too much water from rivers/lakes/aquifers so they can't replenish.

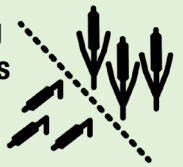
Limited infrastructure: Many LICs can't afford to provide/maintain good water supply – dams/reservoirs are too expensive so rely on small-scale projects.

IMPACTS OF WATER INSECURITY



Waterborne diseases: Many people in LIC have to drink contaminated water – the bacteria leads to cholera, typhoid, etc – and many deaths.

Lower industrial output: Less water for 'thirsty industries, e.g. steel and textiles; also affects energy production.



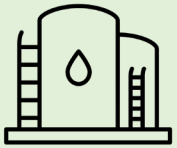
Lower food production: 2/3s of global water is used for farming – less water for irrigation means lower crop yields.

Conflict: Water is a valuable commodity – water stress means that disagreements often happen over shared water resources, e.g. dams upstream affect villages downstream. Potential for future 'water wars'.

THE CHALLENGE OF RESOURCE MANAGEMENT: WATER (OPTION)

INCREASING WATER SUPPLY

Dams and reservoirs: Dams control the flow of water so a store can build up in the reservoir behind. Dams can be huge and displace communities upstream/ limit water downstream, water lost through evaporation.



Diversion/storage: Water supply is moved and stored for use at a later time. Storage is often underground – less water loss through evaporation. Small-scale.

Water transfer schemes: Take water from areas of surplus to areas of deficit through network of canals and pipelines – large-scale and expensive. Selling water to other countries can be an important income source.

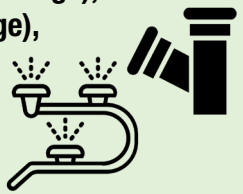
Desalinisation: Process of removing salt from sea water to turn it into fresh water – very expensive and uses a lot of energy. Common in the Middle East.

SUSTAINABLE WATER MANAGEMENT

Trying to reach a balance between water consumption and water supply.

Groundwater management: Reducing pollution and over-abstraction of groundwater sources, e.g. the Environment Agency monitors UK water quality and fines those who pollute groundwater sources.

Reducing domestic use: E.g. water-efficient appliances, showers not baths, low-flow toilets, not leaving taps running, recycling rainwater.



Investment in infrastructure: New reservoirs (increased water storage), wastewater treatment works (increased capacity to treat sewage), repairing/replacing 2000km of pipes (reduced water leaks).

Efficient irrigation: Over 1/3 of global water use – use more low pressure pipes (to reduce evaporation) and drip irrigation (that spray directly onto roots where it is needed most.

Reducing water pollution: Removing pollutants through filtration, having strict regulations/restrictions on water use, fining companies who pollute.

Reusing water:

- **Reclaimed water** – treating domestic/industrial wastewater to be reused for irrigation and industrial processes, to top up rivers/ groundwater, and for drinking – all impurities removed so it safe
- **Grey water** – water from bath/shower/washing up/dishwasher, etc – can be used for flushing toilets or watering the garden (but contains bacteria)

EXAMPLE: LARGE-SCALE WATER TRANSFER – LESOTHO HIGHLANDS WATER PROJECT (LHWP)

- Lesotho – mountainous country (surrounded by South Africa) – water surplus
- Largest water transfer scheme in Africa – 6 major dams and 200km of tunnels transfer water from Lesotho to South Africa (takes 40% of Senqu river water)
- Lesotho receives around $1.5 million a month from South Africa for its water (about 75% of income)
- Generates HEP, creates jobs, but has displaced many and led to debt

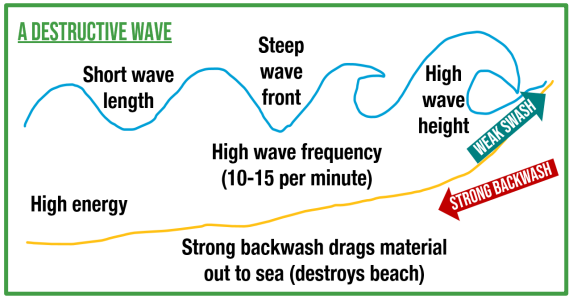
EXAMPLE: SMALL-SCALE WATER PROJECT – HITOSA GRAVITY-FED WATER:

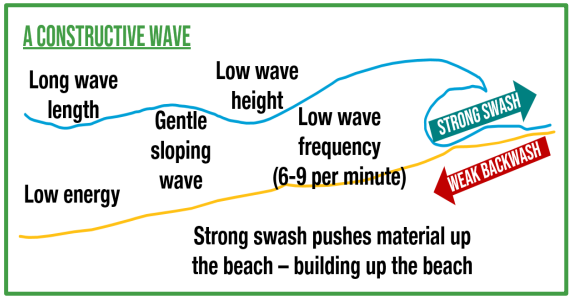
- In rural Ethiopia (LIC)
- Semi-arid – seaonal rivers have dried out (desertification)
- Uses only gravity to transfer water from upland sources to local tap stands (by pipes)
- Needs upland water source (e.g. spring), a main pipeline, storage tanks, distribution pipelines and tap stands
- Cheap to run and maintain
- Provides 75,000 in 40 villages access to 25 litres of safe water a day – within 250m of all households

UK PHYSICAL LANDSCAPES: COASTAL LANDSCAPES (OPTION)

WAVE KEY TERMS

Crest: Point at the top of a wave.
Trough: Base of a wave.
Wave height: Distance between the trough and the crest.
Wave length: Distance between two wave crests.
Wave frequency: How often the waves break in a minute.
Swash: Waves running up the beach.
Backwash: Waves returning to the sea due to gravity.



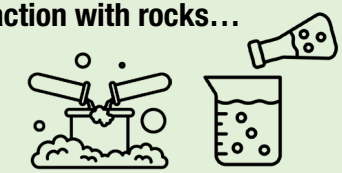


WHAT AFFECTS THE STRENGTH AND HEIGHT OF WAVES?

- The speed of the wind
- The time the wind blows for
- The fetch (the distance of water the wind blows over)

WEATHERING (THE BREAKING DOWN OF ROCK IN SITU)

Biological: Animals burrowing and plant roots.
Chemical: Rainfall creating a chemical reaction with rocks…



- Carbonation – carbonic acid reacts with calcium carbonate in limestone
- Hydrolysis – acid breaks down rock
- Oxidation – oxygen and water react

Mechanical (physical): Changes in temperature or moisture

- Freeze-thaw – water in cracks freezes and expands and then thaws – process repeats causing rock to break away
- Onion skin (exfoliation) – rocks are heated so expand, then contract when cool – process repeats causing layers to flake off
- Salt weathering – salt from sea spray enters cracks – evaporates and crystalises making rock weaker

EROSION WEARING AWAY OF ROCK)

Hydraulic action: Water is forced into cracks and weakens from within.

Abrasion: Sand/shingle scratches and scrapes cliff base.
Attrition: Pebbles collide with each other which wears sharp edges down.
Solution/corrosion: Chemicals in the water dissolve rock.

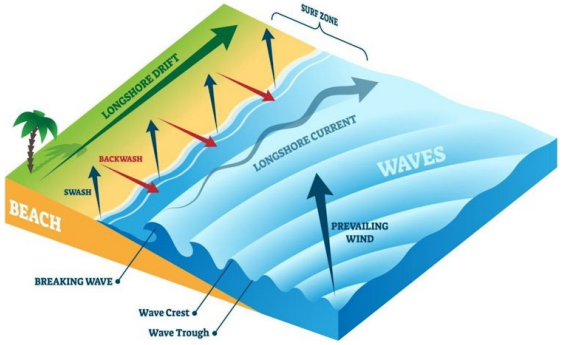
LONGSHORE DRIFT

Swash moves up the beach at the angle of the prevailing wind. Backwash moves down the beach at 90° to the coastline (due to gravity). The repeated zigzag movement transports material along the coastline.

MASS MOVEMENT (ROCK, SOIL OR MUD MOVING DOWN A SLOP DUE TO GRAVITY)

Landslides: Downhill movement of large volumes of rock, soil and mud – often after heavy rain.
Rockfalls: Fragments of rock break away from cliff face, due to freeze-thaw weathering.

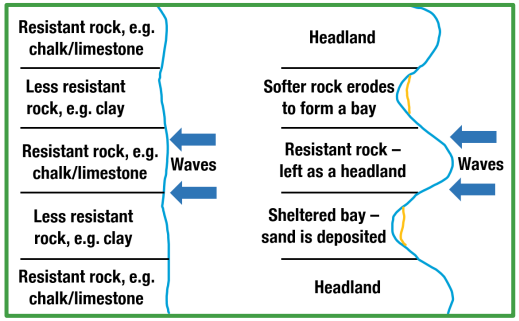
Slumping: Material moves down a concave cliff face – making the material rotate backwards into the cliff face as it slips down.

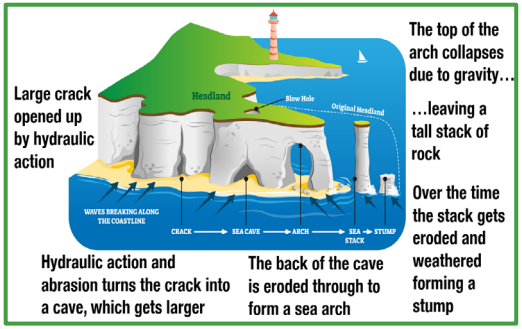


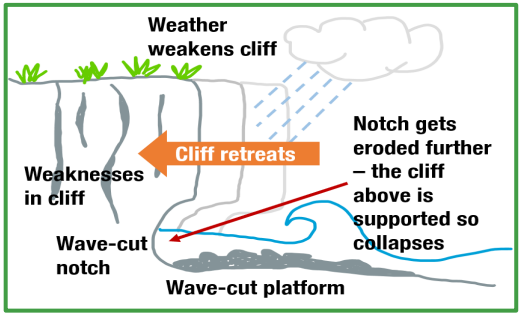
UK PHYSICAL LANDSCAPES: COASTAL LANDSCAPES (OPTION)

EROSIONAL LANDFORMS

- Bays and headlands
- Caves, arches, stacks and stumps
- Wave-cut platforms



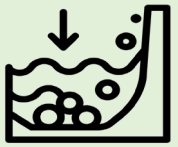




DEPOSITION

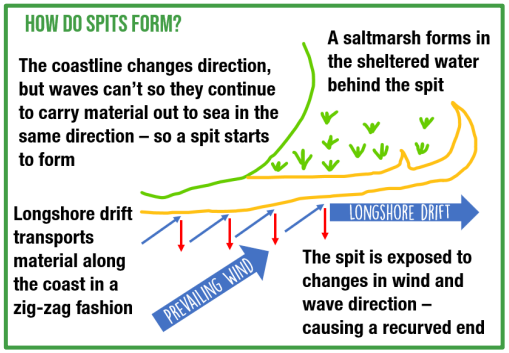
Where waves lose their energy so drop the sediment load they were carrying. Adds sediment to the beach so builds it up. Occurs where…

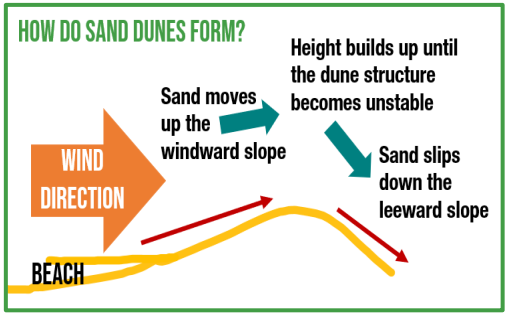
- the sea is shallow and sheltered
- there is lots of sediment,
- there is a large flat beach causing friction
- structures (e.g. groynes) trap sediment



DEPOSITIONAL LANDFORMS

- Spits and bars
- Beaches
- Sand dunes





HARD ENGINEERING STRATEGIES

Structures built to either stop flooding, reduce erosion, or both.

Sea walls: Stops sea water flooding the land behind – reflects wave power (curved); BUT very expensive, ugly, access issues, reflected waves can damage the beach.

Groynes: Prevents longshore drift from moving material and builds up beach – helps reduce erosion, and good for tourism; BUT Can starve areas further along the coast of material (leading to more erosion). Expensive to maintain. Access issues along beach.

Rock armour: Placed at the cliff base – gaps between the rocks slow down the wave's energy; BUT ugly, can cause damage when installed. Gaps in between can attract litter and vermin.

SOFT ENGINEERING STRATEGIES

Strategies that work with nature.

Beach nourishment/replenishment: Adding more sand to the beach – bigger beach = less erosion and more tourism; BUT needs annual maintenance as it is often just transported elsewhere.

Sand dune regeneration: Restoring existing dunes or artificially creating new ones to provide a barrier between land and sea; BUT fences off large part of the beach, subject to storm damage – unstable.

UK PHYSICAL LANDSCAPES: RIVER LANDSCAPES (OPTION)

EROSION WEARING AWAY OF ROCK)

Hydraulic action: Water is forced into cracks and weakens from within.

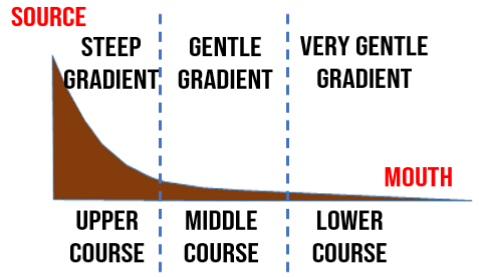
Abrasion: Sand/shingle scratches and scrapes river bed/banks.

Attrition: Pebbles collide with each other which wears sharp edges down.

Solution/corrosion: Chemicals in the water dissolve rock.

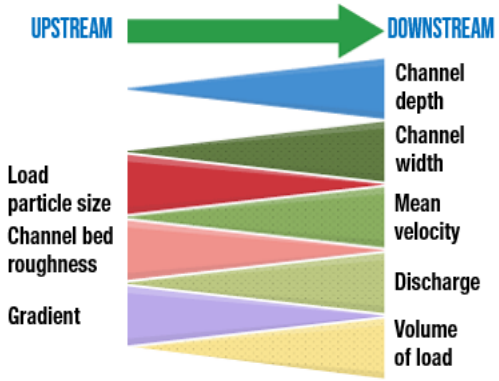
LONG PROFILE

Shows how the gradient changes as the river flows from source to mouth.



BRADSHAW MODEL

Theoretical model that describes the changes that occur as the river flows downstream – shown as a series of triangles – if the triangle widens downstream the variable increases.



TRANSPORTATION PROCESSES

Traction: Large boulders are rolled along the river bed.

Saltation: Small pebbles and stones are bounced along the river bed.

Suspension: Fine materials are carried within the river's flow.

Solution: small pebbles and stones are bounced along the river bed.

UPPER COURSE

- Interlocking spurs
- Waterfalls
- Gorges

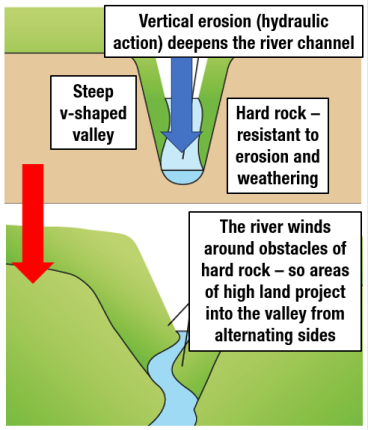
MIDDLE COURSE

- Meanders
- Oxbow lakes

LOWER COURSE

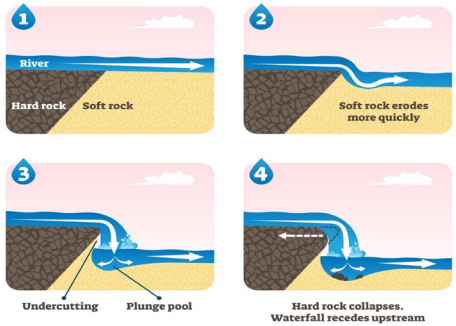
- Levees
- Floodplains
- Deltas

HOW DO INTERLOCKING SPURS FORM?



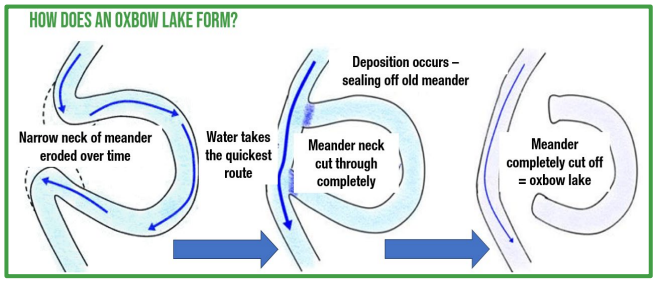
WATERFALL FORMATION

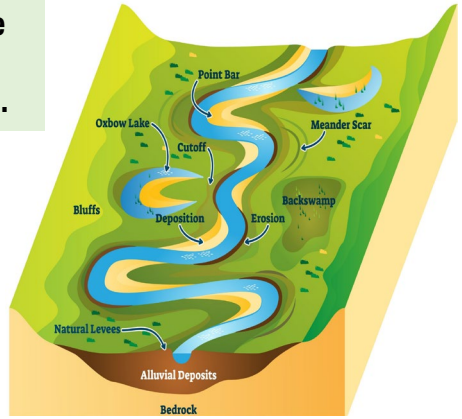
Form where water falls down a vertical drop in the river channel.



MEANDER FORMATION

Inner bends have a slower flow (shallower so have more friction) = deposition; Outer bends have a faster flow (deeper so have less friction) = erosion.

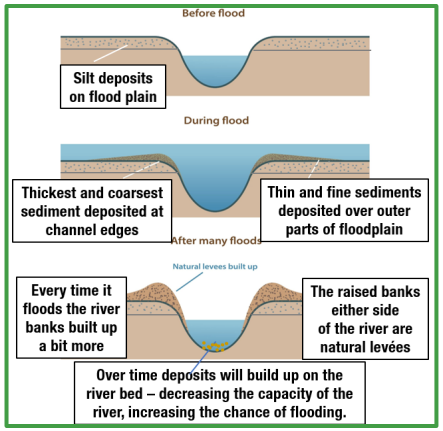




UK PHYSICAL LANDSCAPES: RIVER LANDSCAPES (OPTION)

LEVÉE FORMATION

Naturally raised river banks at the sides of a river channel, formed after a flood deposits sediment on the flood plain close to the river.



FACTORS THAT INCREASE THE RISK OF FLOODING

Physical factors…

Prolonged heavy rainfall: Drainage systems overwhelmed, and land saturated.

Steep slopes: Hard for rain to infiltrate the soil – easier to flow down the slope instead.

Low-lying land: Flood water can spread out further.

Geology: Impermeable rocks don't allow water to infiltrate.

Confluence: Where 2 rivers meet (more water).

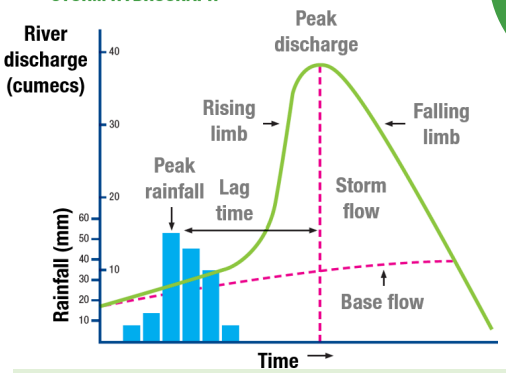
Snowmelt: Increase of water in area.

Human factors…

Deforestation: Fewer roots to absorb water and fewer leaves to intercept rain.

Urbanisation: Covers land in impermeable tarmac or concrete – increased surface-run-off.

STORM HYDROGRAPH



HYDROGRAPH KEY TERMS

Peak rainfall: Highest amount of rainfall

Peak discharge: Highest river level after a storm

Lag time: Hours between peak rainfall and peak discharge

Rising limb: Discharge rising after a storm

Falling limb: Discharge decreasing after run-off has passed

Base flow: Normal river flow

HYDROLOGICAL CYCLE KEY TERMS

Infiltration: Water seeping down into soil.

Percolation: Water seeping down into rock.

Water table: Level of saturated rock/soil (no more water can be absorbed).

Groundwater: Water stored in rock.

Surface run-off: Water flowing over the ground (overland flow).

Throughflow: Water flowing through soil.

Groundwater flow: Water flowing through rock.

HARD ENGINEERING STRATEGIES

Dams: Concrete barrier built across river to control the flow of water; BUT expensive, the land behind is flooded – people displaced, less water downstream, impact on river ecosystem.

Embankments: Artificially raised river bank to increase capacity of river; BUT prone to erosion and disrupts river habitats.

Channel straightening: Water travels along the river quicker – so water is removed from areas quicker, BUT can make flooding downstream worse.

SOFT ENGINEERING STRATEGIES

Flood plain zoning: Land with the lowest economic value has the highest flood risk so is not used for homes or businesses, BUT too late in many areas!

Flood warnings: Environment Agency warns of flood risk – time to evacuate; BUT many ignore warnings, can increase insurance premiums.

Afforestation: More trees to absorb water and intercept rain, BUT changes natural landscape and affects wildlife.

URBAN ISSUES AND CHALLENGES: URBANISATION

KEY TERMS

Urban: Built-up areas such as towns and cities

Rural: Areas of lower population in villages – the countryside

Urbanisation: The increasing proportion of people living in urban areas (towns and cities).

Counter-urbanisation: The movement of people from towns and cities to surrounding rural areas

Suburbanisation: The outward growth of towns and cities, which may swallow up villages on the outskirts of the urban area. Characterised by large housing developments.

MEGACITIES

These are cities with over 10 million inhabitants.

Top 5 largest by population (2024):

- Tokyo, Japan – 37.1 million
- New Delhi, India – 33.9 million
- Shanghai, China – 29.2 million
- Dhaka, Bangladesh – 23.2 million
- Sao Paulo – 22.6 million

URBANISATION TRENDS

Urbanisation is linked to industrialisation – people move to urban areas to find work (which is more reliable than farming).

57% of the global population live in urban areas (predicted to reach 67% by 2050).

HICs: High proportion of people living in urban areas (more than 60%) – but urban population is slowing in these countries.

NEEs: Rapid urbanisation since the 1980s (e.g. Nigeria, Brazil, India, China) – most of the world's megacities are in NEEs.

LICs: Typically less than 25% of population living in urban areas, however many LIC cities are now growing rapidly.

REASONS FOR URBANISATION

- Migration
- Natural increase

MIGRATION (PUSH-PULL THEORY)

Cities may grow because people move to them from other places.

international migration: When people move into cities from other countries.

Internal migration: When people move from other places within the same country.

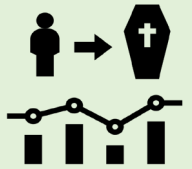
Rural-urban migration: When people move to cities (urban areas) from the countryside (rural areas).

Push factors: Reasons to leave a place, e.g. poverty, lack of access to education and healthcare.

Pull factors: Reasons to move to a place, e.g. job opportunities, better access to services.

NATURAL INCREASE

When the **birth rate** is higher than the **death rate** = population increase.



In NEEs/LICs this happens because the death rate is decreasing rapidly – to better access to a varied diet, medical care and sanitation – fewer people dying of diseases linked to poverty or malnutrition.

URBAN ISSUES AND CHALLENGES: NEE CITY STUDY (RIO)

LOCATION

Rio de Janeiro is on Brazil's Atlantic coast in a large natural bay (Guanabara Bay). Previously the capital of Brazil, but replaced by Brasilia in 1960. It is the 2nd largest city in Brazil after Sao Paulo.

GROWTH OF RIO

2024 population = 6.2 million (predicted to reach 13 million by 2030) – growth rate of 0.5% annually.
Natural increase: 35% of Rio's urban growth (but has slowed down recently due to ageing population.
Migration: 65% of urban growth – mainly rural-urban, but also from other countries, such as Bolivia and Peru, as well as other continents.

PUSH FACTORS FROM RURAL BRAZIL

- Lack of healthcare and education
- Commercial farming and use of machines has reduced jobs
- Farming pays low wages – few other job opportunities
- Dense rainforest

PULL FACTORS TO LAGOS

- Education opportunities – schools and universities – future earning potential
- Better access to healthcare – many clinics and hospitals (so life expectancy is higher in cities)
- Job opportunities – in manufacturing and service industries (higher wages/ more reliable than farming
- Access to essential services such as water and electricity supply (although can be temperamental)

IMPORTANCE OF RIO

Regional

- Brazil's largest university
- Several large hospitals serving
- surrounding population
- Source of jobs for people locally

National:

- Major port for exporting coffee, sugar, etc
- National attractions, e.g. National Museum of Fine Arts
- Contributes 7% of Brazil's GDP

International:

- Best know Brazilian city – home to famous attractions, e.g. Statue of Christ the Redeemer, Sugar Loaf mountain, the Rio carnival (known as 'the greatest show on Earth')
- Rio hosted the 2016 Olympic Games and the 2014 football World Cup
- Part of the city is a UNESCO World Heritage Site
- The city is a world-famous global tourist destination, with well-known songs written about the beaches at Copacabana and Ipanema
- Home to the HQs of major TNCs of Petrobras (energy company) and Vale (mining company)
- Rio is very ethnically diverse and has the largest Portuguese population outside Portugal (Portugal was the former colonial power)

URBAN ISSUES AND CHALLENGES: NEE CITY STUDY (RIO)

HEALTHCARE IN RIO

Disease spread rapidly in overcrowded favelas and access to family clinics is poor in some parts of the city – care for the elderly and pregnant women is lacking.
NGO Bliss has set up programmes to improve health, e.g. leprosy awareness, and training to be health workers.
Health kits have also been taken into homes that can detect 20 different diseases – this has reduced infant morality.

FAVELAS

These are informal settlements – there are over 1000 in Rio, home to 24% of the population. The city has expanded right up into the mountains and hills which surround it – here the favelas are very crowded, and vulnerable to landslides.
Some favelas are very poor, whilst others are vibrant and well-established.

EDUCATION IN RIO

Literacy rate for children 10 and over is 95% – good access to schools and 99 higher education institutes in the city. BUT, many leave school by 14 to start work (especially in favelas).
Government grants to encourage children to stay in school and funds football and other extra activities.

SERVICES IN FAVELAS

Waste: Refuse lorries can't get through narrow streets
Electricity: 70% of people have access, but those without often try to hook up illegally to existing power lines – leads to risk of fires and blackouts.
Water: 90% of people have running water – those who don't often buy water from street vendors (expensive). Lots of leakage through old pipes.
Sanitation: Untreated sewage flows into waterways.
Regeneration linked to 2016 Olympics included new water treatment plants and pipelines, a biogas plant (from rotting waste), a new nuclear power station and HEP plant.

ENVIRONMENTAL ISSUES

Water pollution: Especially in Guanabara Bay - 200 tonnes of raw sewage and 50 tonnes of industrial waste poured into the bay daily, also oil spills. Huge impact on fish and other marine wildlife.
Congestion: Most congested city in South America – steep mountains limit road building and tunnels are expensive to build. Crime means that most people prefer to drive around the city.
Air pollution: Build up of exhaust fumes and factory emissions – leads to thick smog (gets trapped by mountains) – leads to 5,000 deaths a year.

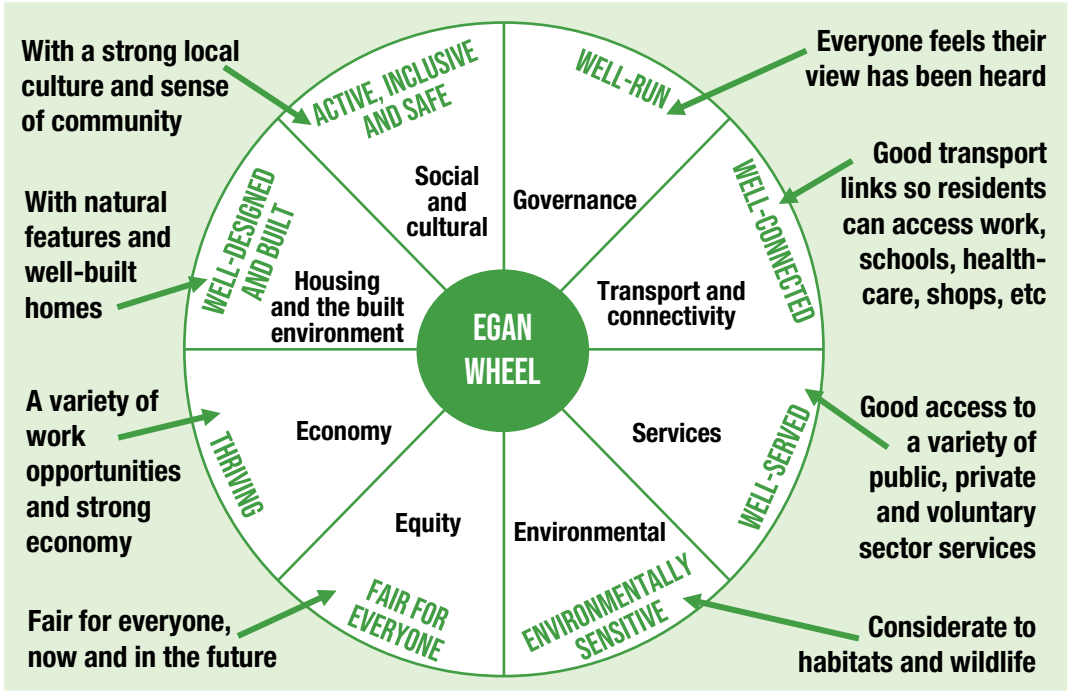
FAVELA BAIRRO PROJECT

Site and service scheme: Local authority provides land and services for people to build homes. Cost = US$ 1 billion.
Improvements: Paved formally named roads; access to water supply and sanitation; secured hillsides (to stop landslides); new health/education/leisure facilities; cable car system; access to credit and 100% mortgages; Pacifying Police Unit (UPP) to reduce crime.
Success? Improved quality of life, BUT some issues with maintenance (people lack skills/resources), increased rents mean that the poorest residents are worse off.

URBAN ISSUES AND CHALLENGES: URBAN SUSTAINABILITY

3 STRANDS OF SUSTAINABILITY

Sustainable urban environments need to be social, economically and environmentally sustainable.



EXAMPLE – FREIBURG, GERMANY

Social planning: Affordable housing, local people involved in decision-making and can invest in renewable schemes (e.g. £5 million in 9 wind turbines, 8 solar farms and an HEP plant) – financial rewards given.

Economic planning: Centre for solar technology – created 1000 jobs, also 10,000 jobs in 1,500 environmental business in the city.

Environmental planning: Organic waste collected and put through a biogas digester, waste is burned to provide energy for 28,000 homes, 350 community recycling collection points, 88% of packaging recycled. 40% of city is forested – 44,000 trees planted.

Water conservation: Rainwater harvesting increased infiltration through green roofs, unpaved tramways, pervious paths.

Sustainable transport: Tram network – 70% of people live within 500m of a tram stop – frequent and cheap; 400km of cycle paths and 9,000 'bike and ride' parking spaces; car parking restrictions.

WATER CONSERVATION

Minimises use of water and maximises supplies…

- Collection of water i.e. from rainwater harvesting
- Recycling water
- Protecting groundwater from pollution

ENERGY CONSERVATION

Minimises use of energy and reduces pollution…

- Saving energy
- Use of technology to make efficient use of energy
- Renewable energy

WASTE MANAGEMENT

Minimises waste sent for disposal and recycling as possible – reduces the need for the production of new raw materials and the amount of waste going to landfill.

SUSTAINABLE TRANSPORT

Integrated transport systems (ITS) in cities link parking and public transport hubs to make transport more efficient. Congestion is reduced, which reduces air pollution from vehicle exhausts.