Unit 2a
Urban Issues & Challenges

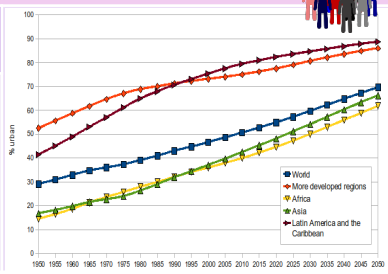
AQA

What is urbanisation?

Urbanisation is the increase in the amount of people living in urban areas such as towns or cities. In 2007 the UN announced that, for the first time, more than 50 % of the world's population live in urban areas.

Where is Urbanisation happening?

Urbanisation is happening all over the word but in LICs and NEEs rates are much faster than HICs. This is mostly because of the rapid economic growth, which is leading to increasing life expectancies, that they are experiencing.



Causes of Urbanisation

Rural - urban migration — The movement of people from rural to urban areas.

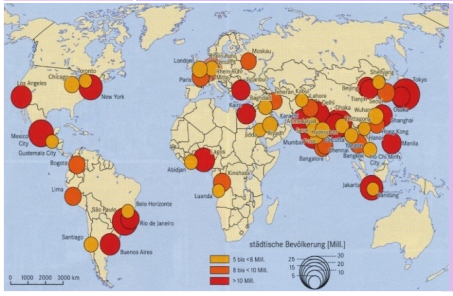
Push factors	Pull factors
Factors that encourage people to move **away** from a place.	Factors that encourage to move people **to** a place.
• Natural disasters e.g. drought. • War and Conflict. • Mechanisation. • Lack of opportunities. • Lack of employment.	Factors are sometimes perceived. • More Jobs . • Better education & healthcare. • Increased quality of life. • Following family members.

Natural Increase — When the birth rate is greater than the death rate.

Increase in birth rate (BR)	Lower death rate (DR)
• Migration often involves young adults. When there is a high percentage of population of child-bearing age this leads to higher birth rate. • In the UK migrant groups have higher fertility rates. • Lack of contraception or education about family planning.	• A higher life expectancy is due to supplies of clean water, better living conditions and diet. • Improved medical facilities help lower infant mortality rates and raise life expectancies.

Types of Cities

Megacity — An urban area with over **10 million people** living there.



More than two thirds of current megacities are located in either NEEs or LICs. The majority of megacities are located in Asia.
The number of megacities are predicted to increase from 28 to 41 by 2030.

Sustainable urban living

Sustainable urban living means being able to live in cities in ways that do not pollute the environment and using resources in ways that ensure future generations can also use them. Sustainable living should ensure that all facilities necessary for people are available, and that areas are economically viable.

Water Conservation

This is about reducing the amount of water used.

- Rainwater harvesting provides water for gardens and for flushing toilets.
- Installing water meters discourages water use. Dual flushes on toilets flush less water.
- Educating people on using less water.

Energy Conservation

Using less fossil fuels can reduce the rate of climate change.

- Promoting renewable energy sources e.g. solar panels, insulation.
- Making homes and appliances more energy efficient.
- Encouraging people to use less energy.
- Using wood in buildings instead of bricks.

Creating Green Space

Creating green spaces in urban areas can improve places for people who want to live there.

- Provide natural cooler areas for people to relax in.
- Encourages people to exercise.
- Reduces the risk of flooding from surface runoff.
- Reduces airborne particulates.

Waste Recycling

More recycling means fewer resources are used. Less waste reduces the amount that eventually goes to landfill. This reduces waste gases (methane) and contamination of water sources.

- Collection of household waste.
- More local recycling facilities.
- Greater awareness of the benefits in recycling.

Distribution of population & cities in the UK

The location of most UK cities is linked to the availability of natural resources (particularly coal), or near to the coast for imports, and the subsequent location of industry during the industrial revolution. This is because coal was the original source of power for the factories e.g. Glasgow, Newcastle, Nottingham and Cardiff.

London is a major anomaly to this trend. Instead its location on the River Thames enabled resources to be imported along the River Thames. Imports from across the British Empire were then used in industry.

Integrated transport system

This is the linking of different forms of public and private transport within a city and the surrounding area e.g. bus timetables coincide with train arrivals and departures. Trams lines associated with peak flow from park and ride locations.

Brownfield sites

A brownfield site is an area of land or that has been developed before and, because it has become derelict, can be re-used e.g old factories in Leicester rebuilt as apartments. Brownfield sites are more expensive to develop than greenfield sites as derelict buildings must be removed first.

Traffic management

Urban areas are busy places with many people travelling by different modes of transport. This has caused urban areas to experience traffic congestion that can lead to various problems.

Environmental problems

- Traffic increases air pollution which releases greenhouse gases that is leading to climate change.
- More roads have to be built.

Economic problems

- Congestion can make people late for work.
- Business deliveries take longer. This costs companies more money as drivers take longer to make the delivery.

Social Problems

- There is a greater risk of accidents. This is a particular problem in built up areas.
- Congestion causes frustration.
- Traffic creates particulates that can affect health e.g. asthma.

Congestion solutions

- Widen roads to allow more traffic to flow more easily and avoid congestion.
- Build ring roads and bypasses to keep traffic out of city centres.
- Introduce park and ride schemes to reduce car use.
- Encourage car-sharing schemes in work places and by allowing shared cars in special lanes.
- Have public transport, cycle lanes & bike hire schemes.
- Having congestion charges discourages drivers from entering the busy city centres.

Traffic Management Example: London – Congestion charges

Introduced in 2003 and extended in 2007 and 2011 the London congestion charge covers an area of central London. Motorists are discouraged from driving in the zone by an £11.50 daily charge. Buses, taxis, emergency vehicles and low emission vehicles are exempt. The number of vehicles driving in the congestion zone is 10% lower than before its introduction. Evidence that the congestion charge has caused local business problems is limited.

Greenbelt Area

This is a zone of land surrounding a city where new building is strictly controlled to try to prevent cities growing too much and too fast. Some developments are now being allowed on green belt. This is controversial.

Urban Regeneration

The investment in the revival of old, urban areas by either improving what is there or clearing it away and rebuilding e.g. development of Highcross Shopping Centre on old industrial land, or the conversion of old factories into accommodation.

Urban Change in a Major UK City: Bristol Case Study

Location and Background

- Bristol is the largest city in south-west England.
- It has a population of 440, 500.
- The population is expected to reach half a million by 2029
- Bristol developed in the 18th century as part of the triangular trade linking West Africa and the West Indies.
- Today it has two major docks, Avonmouth and Royal Portbury, and the UK's most centrally located deep-sea container port.

City's Importance

- Bristol is the UK's 8th most popular city for foreign visitors. Attractions include Brunel's ship SS Great Britain and Bristol Zoo
- Bristol has the largest concentration of silicon chip manufacture outside California
- The city has two large universities
- Bristol has several theatres and music venues and is home to the Aardman, the animators who created Wallace & Gromit
- Bristol holds a strategic position on the M4 corridor, with good road and rail links
- Bristol airports links to Europe and the USA

Migration to Bristol

- Between 1851 and 1891 Bristol's population doubled as people arrived looking for work.
- Recently, migration from abroad has accounted for about half of Bristol's population growth – including large numbers from EU countries e.g. Poland and Spain
- Migrant workers are employed in a range of sectors e.g. hospitality, retail, manufacturing, health, construction and transport
- Compared to elsewhere in the UK, a higher proportion of migrants coming to Bristol intend to stay permanently.
- Inward migration has had a significant impact on Bristol

+ Enriching the city's cultural life
+ Young migrants help balance the ageing population
+ Contributing to the local and national economy
- Pressures on housing and employment
- Challenge of integration into the wider community

City's Opportunities

Social: There are nightclubs, bars and a vibrant underground music scene. The Colston Hall is a venue for concerts. Theatres include the Bristol Old Vic. Bristol has two professional football teams and a Rugby Union team. Bristol has seen major changes in retail – Cribbs Causeway affected the outdated Broadmead which was developed into Cabot Circus as a result.

Economic: High-tech industries have developed in Bristol (e.g. 50 micro-electronic and silicon design). Bristol is well-known for Aardman Animations and has 14 of the 15 main global aircraft companies.

Environmental: In 2015, Bristol became the first UK city to be awarded the status of European Green Capital. Bristol has an Integrated Transport System (ITS) encouraging use of public transport. More than a third or Bristol is open space.

City Challenges

Socio-economic:
Lack of investment in Bristol has lead to inequalities between some areas such as Filwood, which has high levels of social deprivation and Stoke Bishop, which is a more affluent area.

Filwood – life expectancy is 78 years, one third of people aged 16-24 are unemployed, in 2013, only 36% of students got top grades at GCSE

Stoke Bishop – life expectancy is 83 years, only 3% are unemployed, 94% of students got the highest grades in five or more GCSEs

Environmental:
As a result of the movement of the port downstream from the city and Bristol's population rapidly growing many challenges have arisen. Firstly, many industrial buildings are now derelict. Secondly, the demand for new homes has led to urban sprawl on the rural-urban fringe and building on brownfield and greenfield sites

The Temple Quarter Regeneration

The Temple Quarter was regenerated because the area was very run down and it gave a bad impression to visitors driving in from the south or south-east, or arriving at Temple Meads railway station.

The target is to create 17,000 new jobs by 2037, focusing on several key projects:

1. Glass Wharf – new office development
2. Electrification of London to Bristol rail line
3. 'Arena Island' – with bridge to new Bristol Arena
4. Paintworks – new mixed use development
5. Temple Meads Station – major redevelopment to turn station into a modern transport hub for the city
6. Temple Studios – new technical and digital enterprises
7. Engine Shed – a renovated historic building will be home to high-tech, creative and low-carbon sector companies

Urban Change in a Major NEE City: Rio de Janeiro Case Study

Location and Background

- Rio de Janeiro is situated on Brazil's Atlantic coast (south-east).
- It has grown up and around a large natural bay called Guanabara Bay.
- Until, 1960, Rio was the capital of Brazil - it is now Brasilia.

City's Importance

- The cultural capital of Brazil with over 50 museums and its famous annual carnival
- A UNESCO World Heritage Site
- Host for 2016 Olympics and matches during the 2014 World Cup
- Manufacturing industries e.g. chemical and furniture
- 'Christ the Redeemer' – one of the 'New' Seven Wonders of the World
- A major port – main exports are coffee, sugar and iron ore
- Brazil's second most important industrial centre – 5% of GDP

Migration to Rio de Janeiro

Rio is the second largest city in Brazil. In 2014, Rio had a population of 6.5 million people in the city itself and 12.5 million in the surrounding area.

Rio has grown rapidly in the last 50 years to become a major industrial, administrative, commercial and tourist centre which has attracted many migrants from Brazil and other countries.

Migrants have come from many different places:

- Other parts of Brazil such as the Amazon Basin
- Other countries in South America e.g. Argentina and Bolivia
- South Korea and China (new business opportunities)
- Portugal (common language)
- USA and UK (skilled workers)

City's Opportunities

Social: Authorities have tried to improve access to education by encouraging local people to volunteer in school and giving grants to poor families. Authorities are trying to improve healthcare by having medical staff taking health kits into people's homes which can detect 20 different diseases

Economic: Unemployment rates in favelas are over 20%, with most working in the informal sector. The Schools of Tomorrow programme aims to improve education for young people in the poor and violent areas of the city.

Environmental: Expansion of the metro system (reducing car use), new toll roads and making coast roads one way during rush hour to reduce traffic and air pollution. 12 new sewage works have been built since 2004 to reduce water pollution

City Challenges

Social: 12% of Rio's population had no running water and 37% is lost through leaks and illegal access. There are frequent power cuts and blackouts and many poorer people get their electricity by illegally tapping into the main supply. Only half of all children continue their education beyond the age of 14 due to a shortage of teachers and schools and a lack of money and a need for teenagers to work and support their families.

Economic: A recession in 2015 increased unemployment in Rio. Unemployment rates in favelas are over 20% with most working in the informal economy. Murder, kidnapping and armed assault occur regularly and powerful gangs control drug trafficking in many of the favelas

Environmental: Air pollution causes around 5000 deaths per year in Rio. Traffic congestion increases stress and pollution and happens because the steep mountains limit where roads can be built, the number of cars has grown and high crime levels mean people prefer to drive as it is safer. Guanabara Bay is highly polluted and rivers are polluted by open sewers in the favelas because there are no sewage pipes. Many favelas are on steep slopes with few proper roads so waste collection is difficult. Most waste is dumped and pollutes the water system, causing diseases and encouraging rats.

Urban planning to improve QoL for urban poor

Favela Barrio Project – a site and service scheme, the local authority provides land and services for residents to build homes

Complexo de Alemao is a group of favelas in Rio's North Zone. The local authority has made many improvements such as:

- Paved roads
- Access to water supply & improved sanitation
- A cable car system (one free return ticket a day)
- A Pacifying Police Unit (UPP)

How have the Olympics affected the favelas?
Some favelas were demolished to make way for developments for the 2016 Olympic Games. The small town of Campo Grande saw 800 new houses being built.
+ for some, the houses are better than the favelas
- It lacks a sense of community, has no shops and is a 90 minute drive from the city centre

Has the Favela Barrio Project been a success or failure?
+ Quality of life, mobility and employment prospects of the residents have improved
- The newly built infrastructure is not being maintained
- Residents lack the skills and resources to make repairs
- More training is needed to improve literacy and employment

How are Resources Distributed?

Resources include food, water and energy. We need these for basic human development. Access to them affects our economic and social well-being.

Food depends on climate, soils and technology. Europe, Asia and N and S America tend to have a surplus. Africa has a deficit

Water depends on climate. The Middle East and Africa have shortages. Water is essential and many people spend large amounts of their days collecting water meaning they cannot work

Energy is affected by the distribution of fossil fuels. In theory more use of renewable energy should reduce uneven distribution but in practice knowledge and money to develop these limits use in LICs

Food in the UK

The UK imports 47% of its food	Trends
Often it is **cheaper** to produce food abroad. LICs benefit from the money, creating jobs and generating taxes to improve infrastructure, but this can affect their own livelihoods as land is used for export crops only and it places pressure on water supply Supermarkets mean that we demand **year round food** so we need to import food to make up the shortfall UK food travels 30 billion km each year. Food contributes 17% of the UK's carbon emissions. We call this the **carbon footprint**	• Organic food – does not use pesticides or fertilisers. Tends to be more expensive because yields are lower but people think it is healthier • Agribusiness is industrialised agriculture on a large scale. Farms are large, leading to loss of hedgerows to allow machinery to operate. Less people are employed in farming. • Eat local and Eat seasonal. These are movements to encourage a reduction in the carbon footprint.

Surplus = more than is needed
Deficit = less than is needed
Security = having a reliable supply of affordable resource

Water in the UK

The amount of water used by the average household in the IUK has increased by 70% since 1985.

Causes	Distribution
• Population growth • Wealth so have more water-intensive appliances (e.g. dishwashers) • Demand of out of season food needs irrigation • Leisure use (esp. golf courses) • Power showers	• It tends to rain in the North West (highland areas) where there is a surplus • Demand is highest in the South East due to population concentration. Here rainfall is lower. There is a deficit • This causes water stress • Water needs to be managed by transferring it to where demand is.

Unit 2

AQA

Resource Management - Food

Water quality

Causes of pollution	Effects of pollution
• **Fertilisers from farming** • **Hot water from industrial cooling** • **Oil from ships** • **Untreated waste** • **Oil from roads**	• **Kills wildlife** • **Fertilisers cause eutrophication which kills fish** • **Toxic chemicals can enter food chain eg through shellfish** • **Contaminated water**

Managing pollution

- Legislation – strict UK laws on discharge from farms and industry
- Education campaigns not to dispose waste in water
- Waste treatment plants
- Investing in sewers
- Green roofs filter out pollutants

Energy in the UK

The UK consumes less energy than it did in 1970 even though there are 6.5 million more people. The average energy consumption has declined 12%. Heavy industry has declined and energy efficient products have reduced household demand.

UK Energy Mix

Coal 35% Gas 25% Nuclear 19% Renewables 21% (wind, solar, tidal, biofuel, HEP)	UK supplies of oil and gas are declining meaning we rely on imported fossil fuels. There are restrictions on carbon emissions so the focus is on renewables.

Non-Renewables

Economic issues	Environmental issues
Fossil fuels • Non-renewable so will run out (not sustainable) • Miners get sick so costs to healthcare	• Carbon dioxide released leads to acid rain and climate change • Fracking can cause ground water pollution
Nuclear • Expensive to build but raw materials are cheap • Cost to transport and store waste v high	• Waste is radioactive for 100 years • Nuclear accidents, while rare, have long term impacts on wildlife and people

Renewables

• High set up costs • Biomass means land not used for food production so may increase costs of food • Tourism declines as visual appeal is damaged • Low profitability	• Considered ugly and ruins views • Wind turbines can affect bird migration • HEP dams flood land upstream and affects ecology of water • Biomass reduces biodiversity as only one crop is grown (eg. sugar cane) • Geothermal energy is limited to tectonically active countries like Iceland

Global Food Supply & Demand

The world produces enough food for everyone but it is not distributed evenly. Countries with highest food insecurity are in Africa, the Middle East and parts of Asia. HICs in the western world enjoy food security.

Food security – people have enough nutritious food to teat to stay healthy and active.
Food insecurity is when people can't get enough food to stay healthy or lead an active lifestyle. They cannot grow enough or afford to import the food they need.
Global food consumption is increasing because:

- Global population is growing (expected to reach 9 billion in 2040.
- Economic development means people are getting wealthier. Wealthier people tend to spend more on food and change diets to more meat-based diets
- Industrialisation of food production means some foods are cheaper so more affordable.

Factors Affecting Food Supply

Climate

- Drought and climate change affect food production
- Sub-Saharan Africa farmers rely on seasonal rains
- Flooding affects crops in Haiti
- Patterns of rainfall are changing leading to more frequent and intense floods

Technology

- LICs lack farm machinery, irrigation, storage facilities, transport infrastructure and processing facilities
- The Green Revolution allowed India to grow drought and pest resistant crops but Africa could not afford the seeds.

Pests & Disease

- Tropical regions in particular suffer from pests and diseases and lack money to protect corps and animals
- Locusts can eat crops before picked
- Cattle suffer from bacteria

Water Stress

- Lack of water means plants don't grow
- LICs cannot afford expensive water transfer schemes to irrigate crops
- Climate change may make this more of a risk

Conflict

- War leads to food shortages
- Farmland may be mined
- People forced to leave
- Water supplies may become polluted
- Food aid may be restricted by military
- Army can take males to fight rather than farm.

Poverty

- Farmers in LICs cannot afford high quality seeds or fertiliser or mechanisation.
- They also suffer from malnourishment or undernutrition of a balanced diet so this reduces their ability to work.

Impacts of food Insecurity

Famine and Under-nutrition

- Famine leads to malnourishment and wakened immune systems.
- UN estimates 800 million people suffer from chronic malnourishment – almost all in LICs

Soil Erosion

- Overcultivation and overgrazing together with a lack of rainfall leads to soil erosion. This reduces the fertility of the soil and limits food production

Rising Prices

- When food supply falls, prices rise. Poor grain harvest in Russia, Australia and Pakistan in 2010 led to shortage of supply and prices around the world increased. Poorer people are most

Social Unrest

- Food shortages can lead to rioting and social unrest. This has been seen in North Africa and the Middle East in recent years.

Increasing Food Supply

Irrigation

- Watering crops
- Can be wasteful – drip irrigation is more effective
- Usually involves taking ground water which can run dry. If overused salts are found in the water.

Aeroponics and Hydroponics

- Modern techniques using no soil involving artificially lit and heated greenhouses. Plants grow quickly and diseases are eliminated.
- However these are expensive and require expert knowledge.

Biotechnology

- The "new green revolution" promotes sustainable and environmental techniques using nutrient recycling, crop rotation and mixed farming.
- Genetically Modified crops (GM) can increase crop production. However their use is controversial in some places as long term effects are not known.

Appropriate Technology

- A low tech solution using local, cheap or recycled materials. Widely used in LICs e.g. using bicycle power to de-husk coffee beans.
- Agroforestry is another example using the shade of trees to grow crops (e.g. in Mali). This helps prevent desertification.

Sustainable Food Supplies

Organic farming + does not use chemicals – expensive
Urban Farming + uses rooftop gardens and back yards
Sustainable fish + only allows fishing in areas where there it is sustainable
Seasonal food + reduces carbon footprint – limits food availability
Reduced waste 33% of all food produced is wasted. Over 60% of food waste is fruit and vegetables. Better storage would help.

Increasing sustainable food supplies in Makueni, Kenya

Makueni County in eastern Kenya is 200km south east of Nairobi. It has a population of 885,000 with most living is small isolated rural communities. The average annual rainfall is just 500mm

The main crops grown are maize, beans, millet, sorghum, cassava and sweet potatoes.

The area has rich, dark, volcanic soils which are high in nutrients. Low and unreliable rainfall affects agricultural output with frequent crop failures.

In April 2014, the charity 'Just a Drop' together with the African Sand Dam Foundation provided direct help in two small villages

Programme included:

- Improving access to a clean & safe water supply
- Rainwater harvesting tank on school roof
- Growing trees to reduce soil erosion
- Use of sand dams to provide a water supply

+ Crop yields and food security have increased
+ Water-borne diseases have been reduced
+ Less time is wasted fetching water → more time for work & education
+ The school now has a safe

The Indus Basin Irrigation System (IBIS)

IBIS is a large scale agricultural development **to increase food supply.** It is the largest continuous **irrigation system** scheme in the world. It consists of 3 large dams and over a hundred smaller dams that regulate water flow. 12 link canals enable water to be transferred between rivers
The source of the Indus River is high in the Tibetan Plateau. From there it flows roughly north to south through the length of Pakistan to reach the Arabian Sea. The Indus Basin covers about one million km² and includes parts of India, China and Afghanistan.

Advantages

- Improves food security for Pakistan, making 40% more land available for cultivation
- Irrigation has increased crop yields – wheat (36%), rice (39%) & fruit (150%)
- Diets have improved as a greater range of food products are available
- HEP is generated by main dams

Disadvantages

- Some farmers take an unfair share of water, depriving others downstream
- Population growth will increase the demand for water in the future
- High costs to maintain reservoir capacity, barrages and canals
- High summer temperatures result in high water loss through evaporation

Unit 1c
Physical Landscapes in the UK

AQA

Relief of the UK

Relief of the UK can be divided into uplands and lowlands. Each have their own characteristics.

Key

Lowlands

Uplands

Areas +600m: Peaks and ridges cold, misty and snow common. i.e. Scotland

Areas - 200m: Flat or rolling hills. Warmer weather. i.e. Fens

Types of Erosion

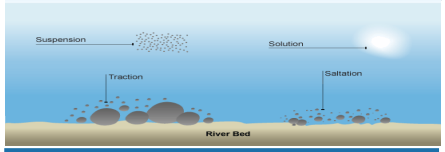
The break down and transport of rocks – smooth, round and sorted.

Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart or scraped against the banks and bed of a river.
Hydraulic Action	Water enters cracks in the cliff, or river bank, air compresses, causing the crack to expand.

Types of Transportation

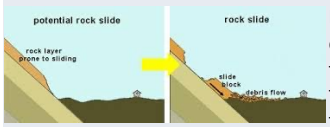
A natural process by which eroded material is carried/transported.

Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

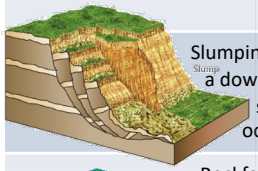


Mass Movement

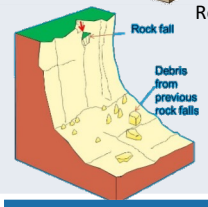
A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.



Rock slides occur when there is a failure along the bedding plane.



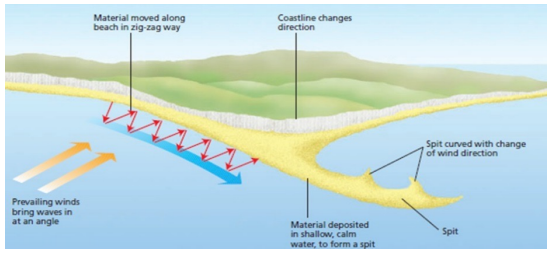
Slumping occurs when there is a downward rotation of sections of cliff. Often occur after heavy rain.



Rockfall is the rapid free fall of rock from a steep cliff face because of gravity.

Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.



1) Swash moves up the beach at the angle of the prevailing wind.
2) Backwash moves down the beach at 90° to coastline, due to gravity.
3) Zigzag movement (Longshore Drift) transports material along beach.
4) Deposition causes beach to extend, until reaching a river estuary.
5) Change in prevailing wind direction forms a hook.
6) Sheltered area behind spit encourages deposition, salt marsh forms.

Types of Weathering

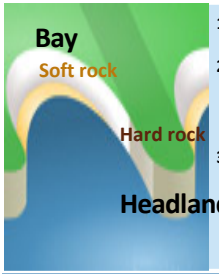
Weathering is the breakdown of rocks where they are.

Biological	Breakdown of rock by plants and animals e.g. roots pushing rocks apart.
Mechanical	Breakdown of rock without changing its chemical composition e.g. freeze thaw

What is Deposition?

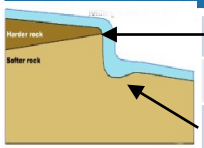
When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition. Heaviest material is deposited first.

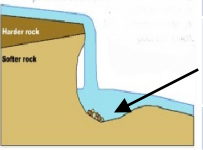
Formation of Bays and Headlands



1) Waves attack the coastline.
2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Formation of a Waterfall





1) River flows over alternative types of rocks.
2) River erodes soft rock faster creating a step.
3) Further hydraulic action and abrasion form a plunge pool beneath.
4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
5) Waterfall retreats leaving steep sided gorge.

Mechanical Weathering Example: Freeze-thaw weathering

Stage One

Water seeps into cracks and fractures in the rock.

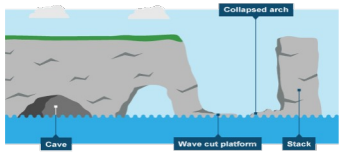
Stage Two

When the water freezes, it expands about 9%. This wedges apart the rock.

Stage Three

With repeated freeze-thaw cycles, the rock breaks off.

Formation of Coastal Stack

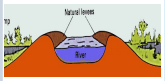


Example: Old Harry Rocks, Dorset

1) Hydraulic action widens cracks in the cliff face over time.
2) Abrasion forms a wave cut notch between high tide and low tide.
3) Further abrasion widens the wave cut notch to from a cave.
4) Caves from both sides of the headland break through to form an arch.
5) Weather above/erosion below –arch collapses leaving stack.
6) Further weathering and erosion eaves a stump.

Formation of Floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.



✓ Nutrient rich soil makes it ideal for farming.
✓ Flat land for building houses.

Size of waves

Affected by:

- **Fetch how far the wave has travelled**
- **Strength of the wind.**
- **How long the wind has been blowing for.**

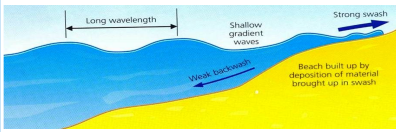
Types of Waves

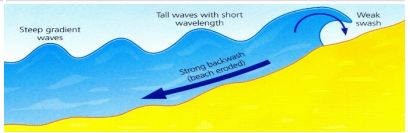
Constructive Waves

This wave has a **swash that is stronger** than the backwash. This therefore builds up the coast.

Destructive Waves

This wave has a **backwash that is stronger** than the swash. This therefore erodes the coast.





Coastal Defences

Hard Engineering Defences

Groynes	**Wood barriers prevent longshore drift, so the beach can build up.**	✓ **Beach still accessible.** ✗ **No deposition further down coast = erodes faster.**
Sea Walls	**Concrete walls break up the energy of the wave . Has a lip to stop waves going over.**	✓ **Long life span** ✓ **Protects from flooding** ✗ **Curved shape encourages erosion of beach deposits.**
Gabions or Rip Rap	**Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.**	✓ **Cheap** ✓ **Local material can be used to look less strange.** ✗ **Will need replacing.**

Soft Engineering Defences

Beach Nourishment	**Beaches built up with sand, so waves have to travel further before eroding cliffs.**	✓ **Cheap** ✓ **Beach for tourists.** ✗ **Storms = need replacing.** ✗ **Offshore dredging damages seabed.**
Managed Retreat	**Low value areas of the coast are left to flood & erode.**	✓ **Reduce flood risk** ✓ **Creates wildlife habitats.** ✗ **Compensation for land.**

Coastal Management Example: Lyme Regis

Location and Background
Lyme Regis is a small coastal town in Dorset, on England's south coast and is popular with tourists.

What are the issues?
Unstable cliffs
Powerful waves from the south west cause rapid erosion
Foreshore erosion has destroyed or damaged many properties
Sea walls have been breached many times

How has the coastline been managed?
Phases 1 & 2 – new sea walls and promenades, cliffs stabilised, creation of wide sand and shingle beach to absorb wave energy, extension of rock amour to retain beach and absorb wave energy
Phase 4 – New sea wall for extra protection, cliffs stabilised to protect homes. Total cost = £43 million

How successful has it been?
+ New beaches have increased tourists and seafront businesses are doing well
+ New defences have withstood stormy winters
+ Harbour is better protected
- Increased tourists caused conflict due to traffic congestion & litter
- Some think the new defences spoil the landscape
- New sea wall might interfere with natural processes

Water Cycle Key Terms

Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevents water reaching the ground.
Surface Runoff	Water flowing over the surface of the land into rivers
Infiltration	Water absorbed into the soil from the ground.
Transpiration	Water lost through leaves of plants.

Physical and Human Causes of Flooding.

***Physical:* Prolong & heavy rainfall**
Long periods of rain causes soil to become saturated leading runoff.

***Physical:* Geology**
Impermeable rocks causes surface runoff to increase river discharge.

***Physical:* Relief**
Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.

***Human:* Land Use**
Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

Upper Course of a River

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Middle Course of a River

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

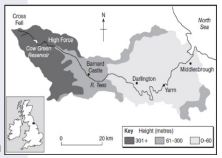
Lower Course of a River

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

River Valley Example: The River Tees

Location and Background
Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.

Upper – Features include V-Shaped valley, rapids and waterfalls. Highforce Waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed.
Middle – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.

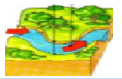


Coastal Features Example – Dorset Coast

Swanage Dorset lies on the south coast of England.
Poole Harbour – two spits have formed at the mouth
Studland Bay – lagoons, saltmarshes, sand dunes and beaches
Discordant coastline – creates headlands and bays and cave, arch, stack & stumps (Old Harry Rocks)
Concordant coastline – created Lulworth Cove

Formation of Ox-bow Lakes

Step 1

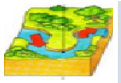


Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.

Step 2

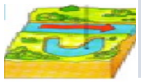
Further hydraulic action and abrasion of outer banks, neck gets smaller.

Step 3



Erosion breaks through neck, so river takes the fastest route, redirecting flow

Step 4



Evaporation and deposition cuts off main channel leaving an oxbow lake.

River Management Schemes

Soft Engineering

Afforestation – plant trees to soak up rainwater, reduces flood risk.
Demountable Flood Barriers put in place when warning raised.
Managed Flooding – naturally let areas flood, protect settlements.

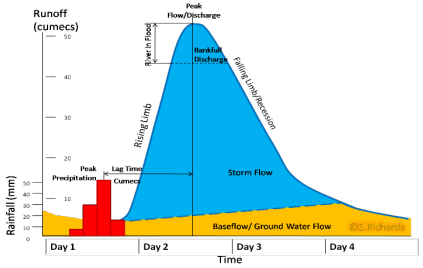
Hard Engineering

Straightening Channel – increases velocity to remove flood water.
Artificial Levees – heightens river so flood water is contained.
Deepening or widening river to increase capacity for a flood.

Hydrographs and River Discharge

River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.



Flood Management Example - Banbury

Banbury is about 50km north of Oxford, in the Cotswolds. Much of the town is on the floodplain.
Why was the scheme required?
Banbury has a history of flooding e.g. 1998 flooding closed the railway station, shut roads and caused £12.5 million of damage. In 2007, it flooded again.

What is the management scheme?
2.9km earth embankment built parallel to the M40 motorway to create a flood storage area
The A361 was raised, plus improvements were made to drainage
A new pumping station to transfer excess rainwater into the river below the town
A New Biodiversity Action Plan (BAP) – create habitats with ponds, trees and hedgerows to absorb and store excess water

Social	Economic	Environmental
Raised road will avoid disruption in a flood Quality of life improved with new footpaths & green areas Reduced levels of anxiety	Cost £18.5 million Protecting 441 houses and 73 commercial properties – the benefits as estimated to be over £100 million	Around 100,000 tonnes of earth was required to build the embankment, extracted locally creating a small reservoir A new habitat has been created with ponds, trees…

Unit 1a
The Challenge of Natural Hazards

AQA

What are Natural Hazards?

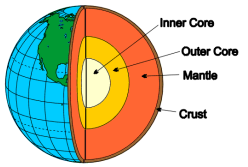
Natural hazards are physical events such as earthquakes and volcanoes that have the potential to do damage to humans and property. Hazards include tectonic hazards, tropical storms and forest fires.

What affects hazard risk?

Population growth
Global climate change
Deforestation
Wealth - LICs are particularly at risk as they do not have the money to protect themselves

Structure of the Earth

The earth has 4 layers
The core (divided into inner and outer), mantle and crust.



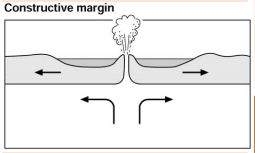
The crust is split into major sections called **tectonic plates**.

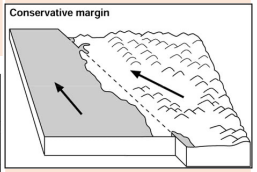
There are 2 types of crust: **Oceanic** (thin and younger but dense) and **Continental** (old and thicker but less dense).

These plates move due to convection currents in the mantle and, where they meet, tectonic activity (volcanoes and earthquakes) occurs..

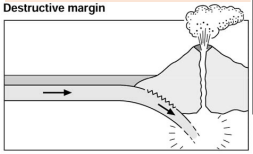
Plates either move towards each other (**destructive** margin) away from each other (**constructive**) or past each other (**conservative**).

Constructive margin





Destructive margin



Earthquakes and Volcanoes

Volcanoes	Earthquakes
- **Constructive** margins – Hot magma rises between the plates e.g. Iceland. Forms Shield volcanoes. - **Destructive** margins – an oceanic plate subducts under a continental plate. Friction causes oceanic plate to melt and pressure forces magma up to form composite volcanoes e.g. the west coast of South America.	- **Constructive** margins – usually small earthquakes as plates pull apart. - **Destructive** margins – violent earthquakes as pressure builds and is then released. - **Conservative** margins – plates slide past each other. They catch and then as pressure builds it is released e.g. San Andreas fault.

Effects of Tectonic Hazards

Primary effects happen immediately. Secondary effects happen as a result of the primary effects and are therefore often later.

Primary - Earthquakes	Secondary - Earthquakes
- Property and buildings destroyed. - People injured or killed. - Ports, roads, railways damaged. - Pipes (water and gas) and electricity cables broken.	- Business reduced as money spent repairing property. - Blocked transport hinders emergency services. - Broken gas pipes cause fire. - Broken water pipes lead to a lack of fresh water.
Primary - Volcanoes	**Secondary - Volcanoes**
- Property and farm land destroyed. - People and animals killed or injured. - Air travel halted due to volcanic ash. - Water supplies contaminated.	- Economy slows down. Emergency services struggle to arrive. - Possible flooding if ice melts Tourism can increase as people come to watch. - Ash breaks down leading to fertile farm land.

Responses to Tectonic Hazards

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

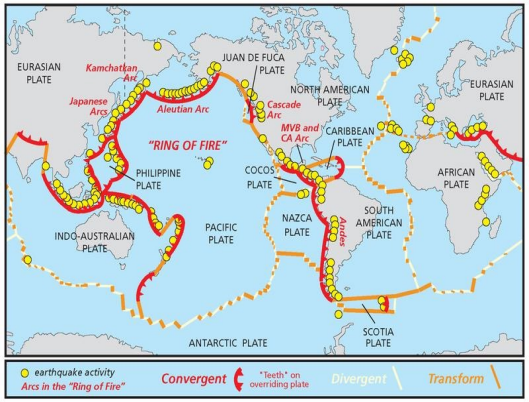
Comparing Earthquakes – Nepal and Chile

Nepal. 25 April 2015. Magnitude 7.9	Chile, 27 Feb 2010. Magnitude 8.8
Primary Effects	
9000 deaths 23000 injured Over 500,000 homes destroyed Historic buildings including Dharahara Tower fell 26 hospitals and 50% of schools destroyed	500 people killed 12,000 injured Over 220,000 homes destroyed Port of Talcahuano and Santiago airport badly damaged 4500 schools, 56 hospitals destroyed
Secondary Effects	
Avalanche on Mount Everest killing 19 people. Loss of income from tourism (which was 8.9% of Nepal's GDP). Rice seed stored in homes was ruined as homes collapsed. This caused food shortages.	Several coastal towns devastated by tsunami – warnings prevented loss of life 1500km of road damaged mainly by landslides – remote communities cut off for many days
Immediate Responses	
Nepal requested international help. UK's DEC raised $126 million. Red Cross- tents for 225,000 people. UN and WHO distributed medical supplies to the worst districts. Facebook launched a safety feature so people could indicate they were safe.	Emergency services acted swiftly Temporary repairs made to the important Route 5 highway within 24 hours Power and water restored to 90% of homes within 10 days A national appeal raised US$60 million – enough to build 30,000 small emergency shelters
Long term responses	
Thousands of homeless to be re-housed International conference to discuss reconstruction and seek support from other countries	Estimated 4 years to fully recover Chile's strong economy could be rebuilt without the need for much foreign aid

LICs suffer more than HICs from natural disasters because they are not as prepared and struggle to react effectively.

Distribution of tectonic activity

Along plate boundaries.
On the edge of continents.
Around the edge of the Pacific.

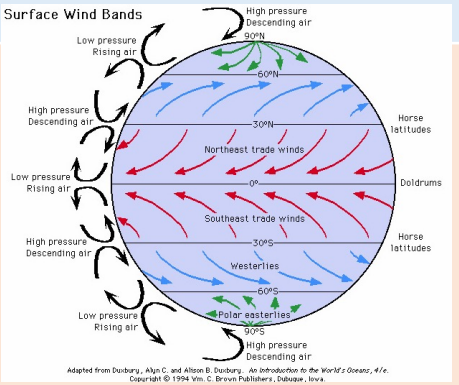


Reducing the impact of tectonic hazards

Monitoring	Prediction
Seismometers measure earth movement. Volcanoes give off gases.	**By observing monitoring data, this can allow evacuation before event.**
Protection	**Planning**
Reinforced buildings and making building foundations that absorb movement. Automatic shut offs for gas and electricity.	**Avoid building in at risk areas. Training for emergency services and planned evacuation routes and drills.**

Global atmospheric circulation

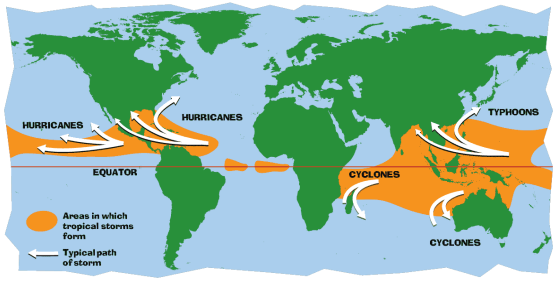
At the equator, the sun's rays are most concentrated. This means it is hotter. This one fact causes global atmospheric circulation at different latitudes.



High pressure = dry
Low pressure = wet
As the air heats it rises – causing low pressure. As it cools, it sinks, causing high pressure. Winds move from high pressure to low pressure. They curve because of the **Coriolis** effect (the turning of the Earth)

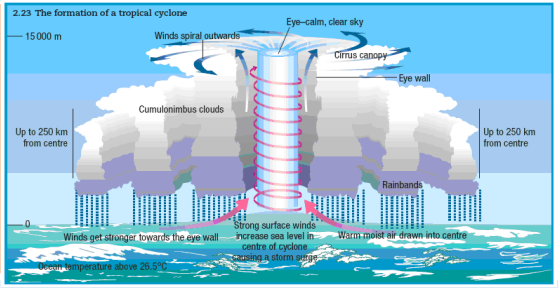
Tropical Storms

Occur in low latitudes between 5° and 30° north and south of the equator (in the tropics). Ocean temperature needs to be above 27° C. Happen between summer and autumn.



Sequence of a Tropical Storm

1. **Air is heated above warm tropical oceans.**
2. **Air rises under low pressure conditions.**
3. **Strong winds form as rising air draws in more air and moisture causing torrential rain.**
4. **Air spins due to Coriolis effect around a calm eye of the storm.**
5. **Cold air sinks in the eye so it is clear and dry.**
6. **Heat is given off as it cools powering the storm.**
7. **On meeting land, it loses source of heat and moisture so loses power.**



Climate change will affect tropical storms too. Warmer oceans will lead to more intense storms – but not necessarily more frequent ones.

Extreme weather in the UK

Rain – can cause flooding damaging homes and business.
Snow & Ice – causes injuries and disruption to schools and business. Destroys farm crops.
Hail – causes damage to property and crops.
Drought – limited water supply can damage crops.
Wind – damage to property and damage to trees potentially leading to injury.
Thunderstorms – lightening can cause fires or even death.
Heat waves – causes breathing difficulties and can disrupt travel.

UK weather is getting more extreme due to climate change. Temperatures are more extreme and rain is more frequent and intense leading to more flooding events. Since 1980 average temperature has increased 1 degree and winter rainfall has increased.

Typhoon Haiyan, Philippines, November 2013

Primary Effects	Secondary Effects
At least 6340 killed 314 km/hr wind speeds. 5m Storm Surge 90% buildings in Tacloban destroyed Habitats & Crops destroyed	$14 Billion of damage Water supply polluted 130,000 houses destroyed, leaving 4.2 million homeless Public Order – Looting Airports unusable for supplies

Immediate Responses	Long-term Responses
1,069 emergency shelters set up in public buildings. Disaster Emergency Committee helped 3,316,500 people outside these centres by providing aid. UK aid charities provided shelter, food and medical supplies.	UN appeal raised $300 million. Typhoon warning systems have been improved. People are now better educated about how to respond.

Prediction	Planning	Protection
Monitoring wind patterns allows path to be predicted. Use of satellites to monitor path to allow evacuation	Avoid building in high risk areas Emergency drills Evacuation routes	Reinforced buildings and stilts to make safe Flood defences e.g. levees and sea walls Replanting Mangroves

The Somerset Levels Floods, 2014

The Somerset Levels and the Somerset Moors form an extensive areas of low-lying farmland and wetlands bordered by the Bristol Channel, Quantock & Mendip Hills

Causes

- Wettest January since records began in 1910
- About 350mm of rain fell in January and February (100mm above average)
- High tides & storm surges swept up rivers from the Bristol Channel
- Rivers had not been dredged for at least 20 years

Social Effects	Economic Effects	Environmental Effects
Over 600 houses flooded 16 farms evacuated Villages cut off	£10 million damage 14000 ha of agricultural land under water	Floodwaters heavily contaminated with sewage & pollutants Debris to be cleared

Immediate Responses	Longer-term Responses
Boats used as mode of transport to go shopping or attend school Communities supported each other	£20 million Flood Action Plan 8km of R.Tone & Parratt were dredged River banks raised & strengthened

Climate Change – natural or human?

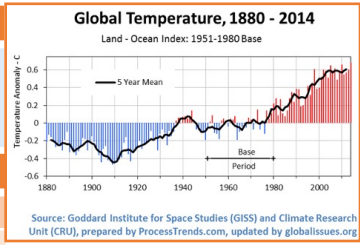
Evidence for climate change shows changes before humans were on the planet. So some of it must be natural. However, the **rate** of change since the 1970s is unprecedented.
Humans are responsible – despite what Mr Trump says!

Causes

Natural	Human
- Orbital changes – The sun's energy on the Earth's surface changes as the Earth's orbit is elliptical its axis is tilted on an angle. **- Solar Output** – sunspots increase to a maximum every 11 years. **- Volcanic activity** – volcanic aerosols reflect sunlight away reducing global temperatures temporarily.	**- Fossil fuels –** release carbon dioxide with accounts for 50% of greenhouse gases. **- Agriculture –** accounts for around 20% of greenhouse gases due to methane production from cows etc. Larger populations and growing demand for met and rice increase contribution. **- Deforestation –** logging and clearing land for agriculture increases carbon dioxide in the atmosphere and reduces ability to planet to absorb carbon through photosynthesis.

Effects of Climate Change

Social	Environmental
- Increased disease e.g. skin cancer and heat stroke. - Winter deaths decrease with milder winters. - Crop yields affected by up to 12% in South America but will increase in Northern Europe but will need more irrigation. - Less ice in Arctic Ocean increases shipping and extraction of oil and gas reserves. - Droughts reduce food and water supply in sub-Saharan Africa. Water scarcity in South and South East UK. - Increased flood risk. 70% of Asia is at risk of increased flooding - Declining fish in some areas affect diet and jobs. - Increased extreme weather - Skiing industry in Alps threatened.	- Increased drought in Mediterranean region. - Lower rainfall causes food shortages for orangutans in Borneo and Indonesia. - Sea level rise leads to flooding and coastal erosion. - Ice melts threaten habitats of polar bears. - Warmer rivers affect marine wildlife. - Forests in North America may experience more pests, disease and forest fires. - Coral bleaching and decline in biodiversity.



Evidence for Climate Change

The Met Office has reliable climate evidence since 1914 – but we can tell what happened before that using several methods.

Ice and Sediment Cores

- Ice sheets are made up of layers of snow, one per year. Gases trapped in layers of ice can be analysed. Ice cores from Antarctica show changes over the last 400 000 years.
- Remains of organisms found in cores from the ocean floor can by traced back 5 million years.

Pollen Analysis

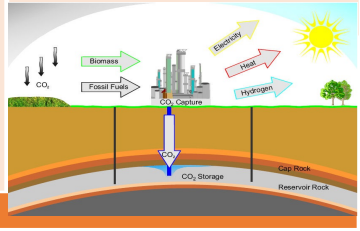
- Pollen is preserved in sediment. Different species need different climatic conditions.

Tree Rings

- A tree grows one new ring each year. Rings are thicker in warm, wet conditions
- This gives us reliable evidence for the last 10 000 years.

Temperature Records

- Historical records date back to the 1850s. Historical records also tell us about harvest and weather reports.



Managing Climate Change

Mitigation

- **Alternative energy production** will reduce CO_2 production.
- **Planting Trees** – helps to remove carbon dioxide.
- **Carbon Capture** – takes carbon dioxide from emission sources is stored underground.
- **International Agreements** e.g. the Paris Climate Agreement.

Adaption

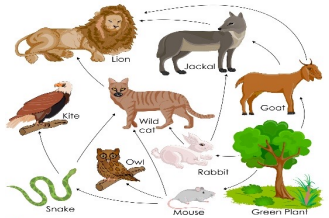
- **Changes in agricultural systems** need to react to changing rainfall and temperature patterns and threat of disease and pests.
- **Managing water supplies** – e.g. by installing water efficient devices and increasing supply through **desalination** plants.
- **Reducing risk** from rising sea levels involves constructing defences e.g. the Thames Flood Barrier or restoring mangrove forests, or raising buildings on stilts.

What is an Ecosystem?

An ecosystem is a system in which organisms interact with each other and with their environment.

Ecosystem's Components

Abiotic	These are **non-living**, such as air, water, heat and rock.
Biotic	These are **living**, such as plants, insects, and animals.
Flora	**Plant life** occurring in a particular region or time.
Fauna	**Animal life** of any particular region or time.



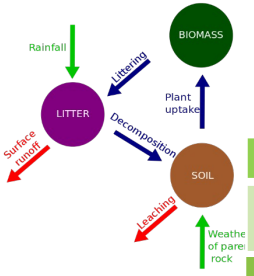
Food Web and Chains

Simple **food chains** are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level. **Food webs** however consists of a network of many food chains interconnected together.

Nutrient cycle

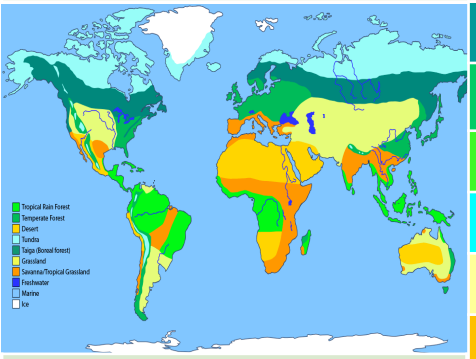
Plants take in **nutrients** to build into new organic matter. Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by **decomposers**.

Litter	This is the **surface layer** of vegetation, which over time breaks down to become **humus**.
Biomass	The total **mass of living organisms** per unit area.



Biomes

A biome is a **large geographical area of distinctive plant and animal groups**, which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.



Coniferous forest
Deciduous forest
Tropical rainforests
Tundra
Temperate grasslands
Tropical grasslands
Hot deserts.

The **most productive biomes** – which have the greatest biomass- grow in climates that are **hot and wet**.

Biome's climate and plants

Biome	Location	Temperature	Rainfall	Flora	Fauna
Tropical rainforest	Centred along the Equator.	Hot all year (25-30°C)	Very high (over 200mm/year)	Tall trees forming a canopy; wide variety of species.	Greatest range of different animal species. Most live in canopy layer
Tropical grasslands	Between latitudes 5°- 30° north & south of Equator.	Warm all year (20-30°C)	Wet + dry season (500-1500mm/year)	Grasslands with widely spaced trees.	Large hoofed herbivores and carnivores dominate.
Hot desert	Found along the tropics of Cancer and Capricorn.	Hot by day (over 30°C) Cold by night	Very low (below 300mm/year)	Lack of plants and few species; adapted to drought.	Many animals are small and nocturnal: except for the camel.
Temperate forest	Between latitudes 40°- 60° north of Equator.	Warm summers + mild winters (5-20°C)	Variable rainfall (500-1500m /year)	Mainly deciduous trees; a variety of species.	Animals adapt to colder and warmer climates. Some migrate.
Tundra	Far Latitudes of 65° north and south of Equator	Cold winter + cool summers (below 10°C)	Low rainfall (below 500mm/ year)	Small plants grow close to the ground and only in summer.	Low number of species. Most animals found along coast.
Coral Reefs	Found within 30° north – south of Equator in tropical waters.	Warm water all year round with temperatures of 18°C	Wet + dry seasons. Rainfall varies greatly due to location.	Small range of plant life which includes algae and sea grasses that shelters reef animals.	Dominated by polyps and a diverse range of fish species.

Unit 1b

AQA

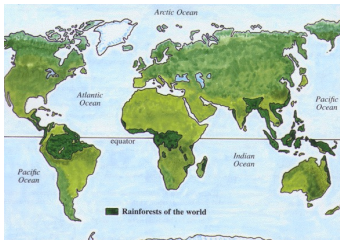
The Living World

Tropical Rainforest Biome

Tropical rainforest cover about **2 per cent** of the Earth's surface yet they are home to **over half of the world's plant and animals**.

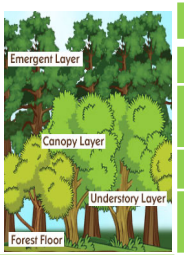
Interdependence in the rainforest

A rainforest works through **interdependence**. This is where the plants and animals **depend on each other** for survival. If one component changes, there can be **serious knock-up effects** for the entire ecosystem.



Distribution of Tropical Rainforests

Tropical rainforests are **centred along the Equator** between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and So uth-East Asia. **The Amazon** is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.



Layers of the Rainforest

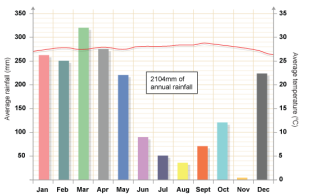
Emergent	Highest layer with trees reaching **50 metres.**
Canopy	Most life is found here as It receives **70% of the sunlight** and **80% of the life.**
U-Canopy	Consists of trees that reach **20 metres high.**
Shrub Layer	Lowest layer with **small trees** that have adapted to living in the **shade.**

Rainforest nutrient cycle

The **hot, damp conditions** on the forest floor allow for the **rapid decomposition** of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are in high demand from the many fast-growing plants, they do not remain in the soil for long and stay close to the surface. If vegetation is removed, the soils quickly become **infertile**.

Climate of Tropical Rainforests

- Evening temperatures rarely fall below **22°C.**
- Due to the **presence of clouds**, temperatures rarely rise above **32°C**.
- Most afternoons have heavy showers.
- At night with no clouds insulating, temperature drops.



Example: UK Ecosystem: Epping Forest

Located in East London
The remains of a much larger forest that colonised England at the end of the last Ice Age
A large number of native trees include Oak, Elm, Ash and Beech
May find 20 species of dragonfly in the shrub layer
A lower shrub layer of Holly and Hazel at 5m overlying a field layer of grasses, brambles, bracken, fern and flowering plants
177 species of moss and lichen grow at Epping Forest
Mammals, amphibian and reptile species call Epping Forest their home. You may find them close to the forest floor or in the shrub layer
38 species of birds are supported in the tree foliage
700 species of Fungi can be found at Epping Forest, most likely on the forest floor
Epping Forest has more cattle grazing being introduced into the ecosystem to encourage growth of flora such as veteran trees (e.g. oak) as these declined from 1976-1988 due to extreme weather causing drought and felled trees, the oak allows fauna (animals) to consume it increasing or maintaining the number of species in the forest

Adaptations to the rainforest

Orangutans	Large arms to swing & support in the tree canopy.
Drip Tips	Allows heavy rain to **run off leaves easily**.
Lianas & Vines	**Climbs** trees to reach sunlight at canopy.

Rainforest inhabitants

Many tribes have developed sustainable ways of survival. The rainforest provides inhabitants with…

- **Food** through hunting and gathering.
- **Natural medicines** from forest plants.
- **Homes and boats** from forest wood.

Issues related to biodiversity

Why are there high rates of biodiversity?

- **Warm and wet climate** encourages a wide range of vegetation to grow.
- There is **rapid recycling of nutrients** to speed plant growth.
- Most of the rainforest is **untouched.**

Main issues with biodiversity decline

- **Keystone species** (a species that are important of other species) are extremely important in the TRF ecosystem. Humans are threatening these vital components.
- **Decline in species** could cause tribes being unable to survive.
- **Plants** & **animals** may become **extinct.**
- Key medical **plants** may become **extinct.**

Sustainability for the Rainforest.

Uncontrolled and unchecked exploitation can cause irreversible damage such as loss of biodiversity, soil erosion and climate change.

- **Agro-forestry** - Growing trees and crops at the same time. It prevents soil erosion and the crops benefit from the nutrients.
- **Selective logging** - Trees are only felled when they reach a particular height.
- **Education** - Ensuring those people understand the consequences of deforestation
- **Afforestation** - If trees are cut down, they are replaced.
- **Forest reserves** - Areas protected from exploitation.
- **Ecotourism** - tourism that promotes the environments & conservation

Tropical Rainforests: Case Study Malaysia

Malaysia is a LIC country is south-east Asia. 67% of Malaysia is a tropical rainforest with 18% of it not being interfered with. However , Malaysia has the fastest rate of deforestation compared to anywhere in the world

What are the causes of deforestation?

Logging

- Most widely reported cause of destructions to biodiversity.
- Timber creates **commercial items** such as furniture and paper.
- **Violent confrontation** between indigenous tribes and logging companies.

Agriculture

- Large scale **'slash and burn'** of land for ranches and palm oil.
- Increases **carbon emission**.
- **River saltation** and **soil erosion** increasing due to the large areas of **exposed land.**
- Increase in **palm oil** is making the **soil infertile**.

Mineral Extraction

- **Precious metals** are found in TRF
- Areas **mined** can experience **soil and water contamination**.
- **Indigenous people** are becoming **displaced** from their land due to roads being built to transport products.

Tourism

- **Mass tourism** is resulting in the building of hotels in extremely **vulnerable areas**.
- **Negative relationship** between the government and indigenous tribes
- Tourism has **exposed animals** to human **diseases.**

Energy Development

- The **high rainfall** creates ideal conditions for **hydro-electric power**
- The **Bakun Dam** in Malaysia is key for creating energy in this developing country, however, both people and environment have suffered.

Road Building

- **Roads** are needed to bring supplies and **provide access** to new mining areas, settlements and energy projects.
- Logging companies use an **extensive network of roads** for heavy machinery and to transport wood.

Impacts of deforestation

Economic development

+ Mining, farming and logging creates employment and tax income for government.
+ Products such as palm oil provide valuable income for countries.
- The loss of biodiversity will reduce tourism.

Soil erosion

- Once the land is **exposed by deforestation,** the soil is more **vulnerable to rain**.
- With **no roots to bind soil together**, soil can easily **wash away.**

Climate Change

-When rainforests are cut down, the climate becomes **drier.**
-Trees are **carbon 'sinks'**. With greater deforestation comes more greenhouse emissions in the atmosphere.
-When trees are burnt, they **release more carbon in the atmosphere**. This will enhance the **greenhouse effect.**

Distribution of the world's Cold Environments

Most of the world's cold environments (tundra, polar) are found in the far Latitudes of 65° north and south of Equator

Major characteristics of Cold Environments

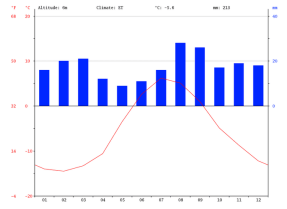
- **Climate –** low precipitation, freezing temperatures in winter (-50°C in polar, -20°C in tundra)
- **Soils** are frozen (permafrost)

Cold Environment inhabitants

- People have to **dress very warmly** (e.g. thermal underwear, jumpers, etc…)
- Working outdoors has to be limited during the winter due to the **extreme temperature** & **limited light**

Climate of Cold Environments

- **Low rainfall** below **500 mm per year.**
- Cold winters temperatures of - 20°C in tundra areas but can be as cold as - 50°C in polar areas
- Cool summers of below 10°C, summers are also short in length



Adaptations to the Cold Environment

Bearberry	• **Very low growing** to survive the strong winds • **Stems** have thick bark for stability in windy conditions • **Bright red** berries are eaten by birds and owls and this helps to distribute seeds
Polar Bear	• Thick fur to retain heat along with an insulating layer of fat • Foot pads – to walk over snow and to aid swimming

Cold Environment: Case Study Svalbard

Svalbard is a Norwegian territory in the Arctic Ocean and the most northerly permanently inhabited group of islands in the world. It has five major islands, the largest of which is Spitzbergen. The population is about 2700, most living in the main town of Longyearbyen

Opportunities and challenges in the Cold Environment

Opportunities

- **Svalbard has rich coal reserves – coal mining is vital to the economy – 300 people employed in the mines**
- **Most likely future source of energy is geothermal as it is located close to the Mid-Atlantic Ridge**
- **The cold waters of the Barents Sea are one of the most richest fishing grounds in the world – 150 species of fish including herring and haddock**
- **Tourism has grown recently – 70,000 visitors in 2011**

Challenges

- **Extreme temperatures of below -30°C**
- **Construction – working outdoors in extreme temperatures and also in limited light during the winter can be difficult**
- **Services need to be kept off the ground to prevent them melting the permafrost and for access**
- **Accessibility – Svalbard is remote, only reached by ship or plane. Only 50km of road in Longyearbyen**

Why do Cold Environments need protecting?

- Extremely **fragile** and can be **easily damaged** by human activity
- Tundra vegetation takes a long time to become established – can be **easily disturbed**
- Tundra can take a very **long time to recover** from any damage by human activity
- Many **indigenous people** live a traditional life here and depend on the wildlife and survive by hunting and fishing
- Unpolluted and unspoiled, cold environments are **important for scientific research** such as the effects of climate change
- **Home to many birds, animals and plants** such as penguins, polar bears, the Arctic fox

Strategies to reduce the risk to Cold Environments

- **Action by governments -** e.g. the USA has been involved in the protection of Alaska since oil was discovered there in the 1960s
- **International agreements** – The Antarctic Treaty was signed by countries in 1959 with its main aim to protect the natural environment of the largest wilderness on Earth
- **Conservation groups** – WWF helps protect Arctic environments in Canada – it provides scientific information, expertise and resources
- **Use of technology** – The trans-Alaskan pipeline opened in 1974 and allowed oil to be transported the 1300km from Prudhoe Bay to the port of Valdez

Human fieldwork- Bristol

Fieldwork enquiry question: How successful is regeneration at Temple Quay?

Hypothesis and aims:

It is predicted that regeneration of Temple Quay has been successful

Reason location is suitable for physical enquiry:

The location was chosen as Temple Quay has recently been regenerated. This means that new businesses and locals are able to give fair perspectives on how the area has changed and its comparative success. The area is also very close to the school, allowing for easy access and fieldwork to be completed within one day. Finally, the area of Bristol is comparatively safe (according to police.net data), meaning that the risks of conducting fieldwork here are significantly reduced.

Risk assessment - Risk assessment is the fundamental tool to ensure safety is effectively managed.

Falling into the river	Students are at risk of falling into the River Avon, as most of our fieldwork will involve investigations close to the river	Students told not to go too close to the river bank and to take care when boarding the boat.
Getting lost	Students are at risk of getting lost in a city they may have never visited	Students are to travel in groups, with at least one working phone and within eyesight of staff
Harm to students	Members of the public may pose a physical risk to students	Students are to travel in groups, with at least one working phone and within eyesight of staff

Key terms

Primary data	Data collected that are original and collected for the first time e.g. fieldwork data
Secondary data	Data collected by using already available sources e.g. published materials
Quantitative data	Data that records quantities (e.g. numbers, sizes or frequencies).
Qualitative data	Data that records subjective qualities (e.g. opinions, attitudes and beliefs).

Method 1: Questionnaires

Sampling method: Random sampling
Sample size: 20+
Description: Create a questionnaire which focuses on finding out the impacts of regeneration from people's perspective.

Strengths
Allows us to get the opinions of different people which can be very useful evidence.
We can create questions which are closed and easy to compare using graphs
If we can get a large sample we can get a real overview of peoples perception.

Weaknesses
People may have motivations or pressures which can influence their answers. This can be overcome with a large sample.
We only conducted the fieldwork on one day. To find if defences are successful, we need to find the views of day/night users and weekday/weekend users and this would be very time consuming.
People may only be tourists, so wouldn't know the long term benefits/issues of each defence

Presentation methods

Radar graph – bipolar analysis	• Very visual – easy to see patterns • Easy to compare data sets	• Difficult to construct • Difficult to spot anomalies • Difficult to scale
Pie charts – questionnaire responses	• Quick visual impression of results • Clearly shows larger/smaller groups	• Can be hard to make • Do not show exact values • Don't show patterns over time

Evaluation

Sample size/method	More questionnaire results and ensuring that only locals responded would have enhanced the validity of our questionnaires. Bipolar analyses of the past site would have aided in understanding the environmental change to the area.
Timings	The fieldwork could have been more successful had we visited Bristol on different days/times, as a wider range of results and opinions could have been constructed over time

Conclusion

It is evident from the results that regeneration has been managed successfully.

Method 2: Historical photographs/field sketches

Sampling method: random sampling
Sample size: 3 sites
Description: Take photographs/draw sketches of three different sites within Temple Quay and compare to historical photographs via annotations

Strengths
- They enable you to analyse an area back in the classroom this is important as BTQ is an urban area where it is difficult to analyse features as there may be nothing to lean on or the weather may be poor.
- They can be compared to historic photographs that you can find online and this can be used to provide evidence of how sustainable a place is.

Weaknesses
-They are difficult to annotate in the field.
- If the light is poor then important features can be missed.

Method 3: Bipolar analysis

Sampling method: systematic sampling (fixed intervals)
Sample size: 4 different defences tested
Description: Opposite adjectives are chosen and written down - some should be fact based, for examples historical and modern. Others should be value based, for example ugly and attractive.

Strengths
- Gives a numerical score for each defence, which allows each defence to be compared to one another very effectively. You can calculate totals and averages which improves comparison.
- Easy to complete in the field

Weaknesses
- They are based on opinions, making them subject to different viewpoints dependent on the observer.

Results

1. Questionnaires	Overall, the vast majority of people questioned believed that the regeneration of the area had been a significant success.
2. Bipolar analysis	The bipolar analysis confirmed that the environment for each of the three sites was very good. However, these scores couldn't be compared with what the area looked like in the past. This meant that the data did not help us reach an overall conclusion on the success of regeneration
3. Historical Photographs	Historical photographs showed how the identity and look of the area had changed significantly over time. Although Sites 1 and 2 had improved significantly, Site 3 (the Royal Mail sorting office) hadn't as it was still to undergo any form of regeneration. As such, this method showed some success and gaps in regeneration in the area

Physical fieldwork- Lyme Regis

Fieldwork enquiry question: How successful is the coastal management at Lyme Regis?

Hypothesis and aims:

It is predicted that coastal management strategies have been successful.

Reason location is suitable for physical enquiry:

The location was chosen as Lyme Regis is on a stretch of coastline that is affected by the process of coastal erosion. As a result of this process and in order to keep the beach for tourists the local council has installed hard and soft engineering methods to protect the coastline. The area is also easily accessible by coach from our school, meaning fieldwork can be conducted in the course of a day. It is easily accessible due to safe parking facilities and access onto the beach. Also clear walking footpaths to the coast and along the beach front.

Risk assessment - Risk assessment is the fundamental tool to ensure safety is effectively managed.

Tides	Students are at risk of powerful waves, creating risk of drowning.	Students told not to go too close to the shore and to stay out of the sea. Consultation of tide timetables.
Cliff collapse	All are in danger of cliff collapse and falling rocks.	Avoid walking near the foot of cliff encase of cliff collapse. Students warned of this and kept well away from the back of the beach.
Weather	Wet weather is dangerous due to slippery groynes etc. Hot weather also poses the risk of dehydration.	Students advised to bring plenty of water and sun cream if the weather forecast is hot. If the weather forecast is wet, students are advised to bring appropriate clothing and footwear.

Key terms

Primary data	Data collected that are original and collected for the first time e.g. fieldwork data
Secondary data	Data collected by using already available sources e.g. published materials
Quantitative data	Data that records quantities (e.g. numbers, sizes or frequencies).
Qualitative data	Data that records subjective qualities (e.g. opinions, attitudes and beliefs).

Method 1: Questionnaires

Sampling method: Random sampling
Sample size: 20+
Description: Create a questionnaire which focuses on finding out the impacts of coastal erosion and defences from people's perspective.

Strengths

Allows us to get the opinions of different people which can be very useful evidence.

We can create questions which are closed and easy to compare using graphs

If we can get a large sample we can get a real overview of peoples perception.

Weaknesses

People may have motivations or pressures which can influence their answers. This can be overcome with a large sample.

We only conducted the fieldwork on one day. To find if defences are successful, we need to find the views of day/night users and weekday/weekend users and this would be very time consuming.

People may only be tourists, so wouldn't know the long term benefits/issues of each defence

Presentation methods

Radar graph – bipolar analysis	• Very visual – easy to see patterns • Easy to compare data sets	• Difficult to construct • Difficult to spot anomalies • Difficult to scale
Pie charts – questionnaire responses	• Quick visual impression of results • Clearly shows larger/smaller groups	• Can be hard to make • Do not show exact values • Don't show patterns over time

Evaluation

Sample size	More questionnaire results and ensuring that only locals responded would have enhanced the validity of our questionnaires. More samples of groyne analysis may have aided in finding more accurate results.
Timings	The fieldwork could have been more successful had we visited Lyme Regis on different days/times, as a wider range of results and opinions could have been constructed over time

Conclusion

It is evident from the results that coastal erosion has been managed successfully.

Method 2: Groyne Analysis

Sampling method: systematic sampling (fixed intervals)
Sample size: 10 groynes
Description: identify the updrift and downdrift using a compass. Use the meter ruler to measure from the top of the groyne to the surface of the sediment on each side. Repeat for each groyne.

Strengths

-The method clearly shows whether the groynes are working.

-The method of data collection is simple to carry out and does not need special equipment.

- A large enough sample size was used (most of the groynes were measured), in order to reach a reliable conclusion.

Weaknesses

-Measurements were not taken at the same point along each groyne and several were not taken along each side.

- Care should be taken to ensure that meter ruler is held straight and does not sink into the sand- otherwise an inaccurate reading could be taken.

Method 3: Bipolar analysis

Sampling method: systematic sampling (fixed intervals)
Sample size: 4 different defences tested
Description: Opposite adjectives are chosen and written down - some should be fact based, for examples historical and modern. Others should be value based, for example ugly and attractive. Different users can be asked to place a cross on a line between the pairs of adjectives, or assign a score for a particular variable.

Strengths

- Gives a numerical score for each defence, which allows each defence to be compared to one another very effectively. You can calculate totals and averages which improves comparison.
- Easy to complete in the field

Weaknesses

- They are based on opinions, making them subject to different viewpoints dependent on the observer.

Results

1. Questionnaires	It is clear that the general public found that the defences at Lyme Regis were essential to defending the coast, and that the defences have meant that the beaches are more accessible as a facility
2. Bipolar analysis	It is clear that beach nourishment and the sea wall were deemed as the most effective defence strategies at Lyme Regis, whilst rock armour was not viewed as successful
3. Groyne Analysis	To some extent, groynes were proven to trap sediment and aid with building up beaches. However, human intervention from tourists and beach nourishment meant that results were not consistent with expectations, and there was very little difference between either side of the groynes.

Unit 2b
The Changing Economic World

What is development?

Development is an improvement in living standards through better use of resources.

Economic	This is progress in economic growth through levels of industrialisation and use of technology.
Social	This is an improvement in people's standard of living. For example, clean water and electricity.
Environmental	This involves advances in the management and protection of the environment.

Measuring development

These are used to compare and understand a country's level of development.

Economic indictors examples

Employment type	The proportion of the population working in primary, secondary, tertiary and quaternary industries.
Gross Domestic Product per capita	This is the total value of goods and services produced in a country per person, per year.
Gross National Income per capita	An average of gross national income per person, per year in US dollars.

Social indicators examples

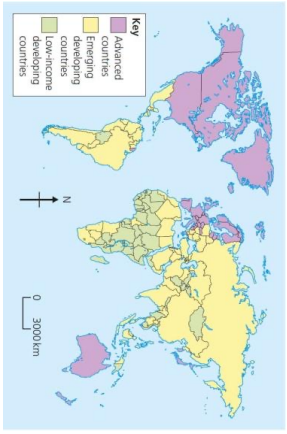
Infant mortality	The number of children who die before reaching 1 per 1000 babies born.
Literacy rate	The percentage of population over the age of 15 who can read and write.
Life expectancy	The average lifespan of someone born in that country.

Mixed indicators

Human Development Index (HDI)	A number that uses life expectancy, education level and income per person.

Variations in the level of development

LICs	Poorest countries in the world. GNI per capita is low and most citizens have a low standard of living.
NEEs	These countries are getting richer as their economy is progressing from the primary industry to the secondary industry. Greater exports leads to better wages.
HICs	These countries are wealthy with a high GNI per capita and standards of living. These countries can spend money on services.



Causes of uneven development

Development is globally uneven with most HICs located in Europe, North America and Oceania. Most NEEs are in Asia and South America, whilst most LICs are in Africa. Remember, development can also vary within countries too.

Physical factors affecting uneven development

Natural Resources

- **Fuel sources** such as oil.
- Minerals and metals for fuel.
- **Availability for timber**.
- Access to **safe water**.

Natural Hazards

- Risk of tectonic hazards.
- Benefits from **volcanic material** and **floodwater.**
- Frequent hazards **undermines redevelopment**.

Climate

- **Reliability** of rainfall to benefit farming.
- **Extreme climates** limit industry and affects health.
- Climate can **attract tourists.**

Location/Terrain

- **Landlocked countries** may find trade difficulties.
- Mountainous terrain makes farming difficult.
- **Scenery attracts tourists**.

Human factors affecting uneven development

Aid

- Aid can help some countries develop **key projects** for infrastructure faster.
- **Aid** can improve services such as schools, hospitals and roads.
- Too much **reliance on aid** might stop other trade links becoming established.

Trade

- Countries that export more than they import have a **trade surplus**. This can improve the national economy.
- Having **good trade relationships**.
- **Trading goods** and services is more profitable than raw materials.

Education

- Education creates a **skilled workforce** meaning more goods and services are produced.
- **Educated people earn more money**, meaning they also pay more taxes. This money can help develop the country in the future.

Health

- **Lack of clean water** and poor healthcare means a large number of people suffer from **diseases**.
- People who are ill cannot work so there is little contribution to the economy.
- More money on healthcare means less spent on development.

Politics

- **Corruption** in local and national governments.
- The **stability of the government** can effect the country's ability to trade.
- Ability of the country to **invest into services and infrastructure**.

History

- **Colonialism** has helped Europe develop, but slowed down development in many other countries.
- Countries that went through industrialisation a while ago, have now develop further.

Consequences of Uneven Development

Levels of development are different in different countries. This uneven development has consequences for countries, especially in wealth, health and migration.

Wealth	People in more developed countries have higher incomes than less developed countries.
Health	Better healthcare means that people in more developed countries live longer than those in less developed countries.
Migration	If nearby countries have higher levels of development or are secure, people will move to seek better opportunities and standard of living.

The Demographic Transition Model

The demographic transition model (DTM) shows population change over time. It studies how birth rate and death rate affect the total population of a country.

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
High DR *High BR* *Steady*	*BR Low* *Declining DR* *Very High*	*Rapidly falling DR* *Low BR* *High*	*Low DR* *Low BR* *Zero*	*Slowly Falling DR* *Low BR* *Negative*
e.g. Tribes	e.g. Kenya	e.g. India	e.g. UK	e.g. Japan

Reducing the Global Development Gap

Microfinance Loans
This involves people in LICs receiving smalls loans from traditional banks.
+ Loans enable people to begin their own businesses
- Its not clear they can reduce poverty at a large scale.

Foreign-direct investment
This is when one country buys property or infrastructure in another country.
+ Leads to better access to finance, technology & expertise.
- Investment can come with strings attached that country's will need to comply with.

Aid
This is given by one country to another as money or resources.
+ Improve literacy rates, building dams, improving agriculture.
- Can be wasted by corrupt governments or they can become too reliant on aid.

Debt Relief
This is when a country's debt is cancelled or interest rates are lowered.
+ Means more money can be spent on development.
- Locals might not always get a say. Some aid can be tied under condition from donor country.

Fair trade
This is a movement where farmers get a fair price for the goods produced.
+ Paid fairly so they can develop schools & health centres.
-Only a tiny proportion of the extra money reaches producers.

Technology
Includes tools, machines and affordable equipment that improve quality of life.
+ Renewable energy is less expensive and polluting.
- Requires initial investment and skills in operating technology

CS: Reducing the Development Gap In Jamaica

Location and Background
Jamaica is a LIC island nation part of the Caribbean. Location makes Jamaica an attractive place for visitors to explore the tropical blue seas, skies and palm filled sandy beaches

Tourist economy
-In 2015, **2.12 million** visited.
-Tourism **contributes 27% of GDP** and will increase to **38% by 2025**.
-**130,000 jobs** rely on tourism.
-**Global recession** 2008 caused a **decline in tourism**. Now tourism is beginning to recover.

Multiplier effect
-**Jobs from tourism** have meant **more money** has been spent in shops and other businesses.
-Government has invested in **infrastructure** to support tourism.
-**New sewage treatment** plants have reduced pollution.

Development Problems
- Tourists do not always **spend much money** outside their resorts.
- Infrastructure improvements **have not spread** to the whole island.
- Many people in Jamaica still live in **poor quality housing** and **lack basic services** such as healthcare.

Case Study: Economic Development in Nigeria

Location & Importance
Nigeria is a NEE in West Africa.
Nigeria is just north of the Equator and experiences a range of environments.
Nigeria is the most populous and economically powerful country in Africa. Economic growth has been base on oil exports.

Influences upon Nigeria's development

Political
Suffered **instability** with a **civil war** between 1967-1970.
From 1999, the country became **stable** with **free and fair elections**.
Stability has **encouraged global investment** from China and USA.

Social
Nigeria is a **multi-cultural, multi-faith society**.
Although mostly a strength, diversity has caused **regional conflicts** from groups such as the Boko Haram terrorists.

Cultural
Nigeria's **diversity** has created rich and varied **artistic culture**.
The country has **a rich music, literacy and film industry** (i.e. Nollywood).
A successful national football side.

Industrial Structures
Once mainly based on agriculture, **50% of its economy is now manufacturing and services**.
A thriving manufacturing industry is **increasing foreign investment** and **employment opportunities**.

The role of TNCs
TNCs such as **Shell** have played an important role in its economy.
+ Investment has **increased employment and income**.
- **Profits move to HICs**.
- Many **oil spills** have **damaged fragile environments**.

Changing Relationships
Nigeria plays a leading role with the **African Union** and **UN**.
Growing links with **China** with huge **investment in infrastructure**.
Main import includes petrol from the EU, cars from Brazil and phones from China.

Environmental Impacts
The 2008/09 **oil spills devastated swamps** and its **ecosystems.**
Industry has caused **toxic chemicals** to be discharged in open sewers - **risking human health**.
80% of forest have been **cut down**.
This also increases **CO^2 emissions**.

Aid & Debt relief
+ Receives **$5billion** per year in aid.
+ **Aid groups** (ActionAid) have improved health centres, provided anti-mosquito nets and helped to protect people against AIDS/HIV.
- Some aid fails to reach the people who need it due to **corruption**.

Effects of Economic Development
Life expectancy has increased from 46 to 53 years. 64% have access to safe water. Typical schooling years has increased from 7 to 9.

Case Study: Economic Change in the UK

UK in the Wider World
The UK has one of the largest economies in the world.
The UK has huge political, economic and cultural influences.
The UK is highly regarded for its fairness and tolerance.
The UK has global transport links i.e. Heathrow and the Eurostar.

Causes of Economic Change
De-industrialisation and the **decline** of the UK's industrial base.
Globalisation has meant many industries have moved overseas, where labour costs are lower.
Government investing in supporting vital businesses.

Towards Post-Industrial
The **quaternary industry** has **increased**, whilst **secondary** has **decreased**.
Numbers in **primary** and **tertiary industry** has **stayed the steady**.
Big increase in **professional** and **technical jobs**.

Cambridge Science Park
A major **quaternary industry** on the outskirts.
Good transport access to the **A14** and **M11**.
A good **location for sourcing highly educated workers** from **Cambridge University**.
Staff benefit from **attractive working conditions**.
Attracts **clusters** of related **high-tech businesses**.

Change to a Rural Landscape - South Cambridgeshire
Cambridge is one of the fastest growing cities in the UK. Current population is 155,000 but will increase to 175,000 by 2026.

Social
Rising house prices have caused tensions in villages.
Villages are **unpopulated** during the day causing **loss of identity**.
Resentment towards **poor migrant communities**.

Economic
Lack of affordable housing for local first time buyers.
Sales of farmland **has increased rural unemployment**.
Influx of poor migrants puts **pressures** on local services.

Improvements to Transport
A **£15 billion 'Road Improvement Strategy'**. This will involve 10 new roads and 1,600 extra lanes.
£50 billion HS2 railway to improve connections between key UK cities.
£18 billion on Heathrow's controversial **third runway**.
UK has many **large ports** for importing and exporting goods.

UK North/South Divide
- Wages are **lower** in the North.
- Health is **better** in the South.
- Education is **worse** in the North.
+ The government is aiming to support a **Northern Powerhouse** project to resolve regional differences.
+ More **devolving of powers** to disadvantaged regions.