Kemnal Technology College

KTC Geography GCSE Edexcel Spec A Graphic Organiser

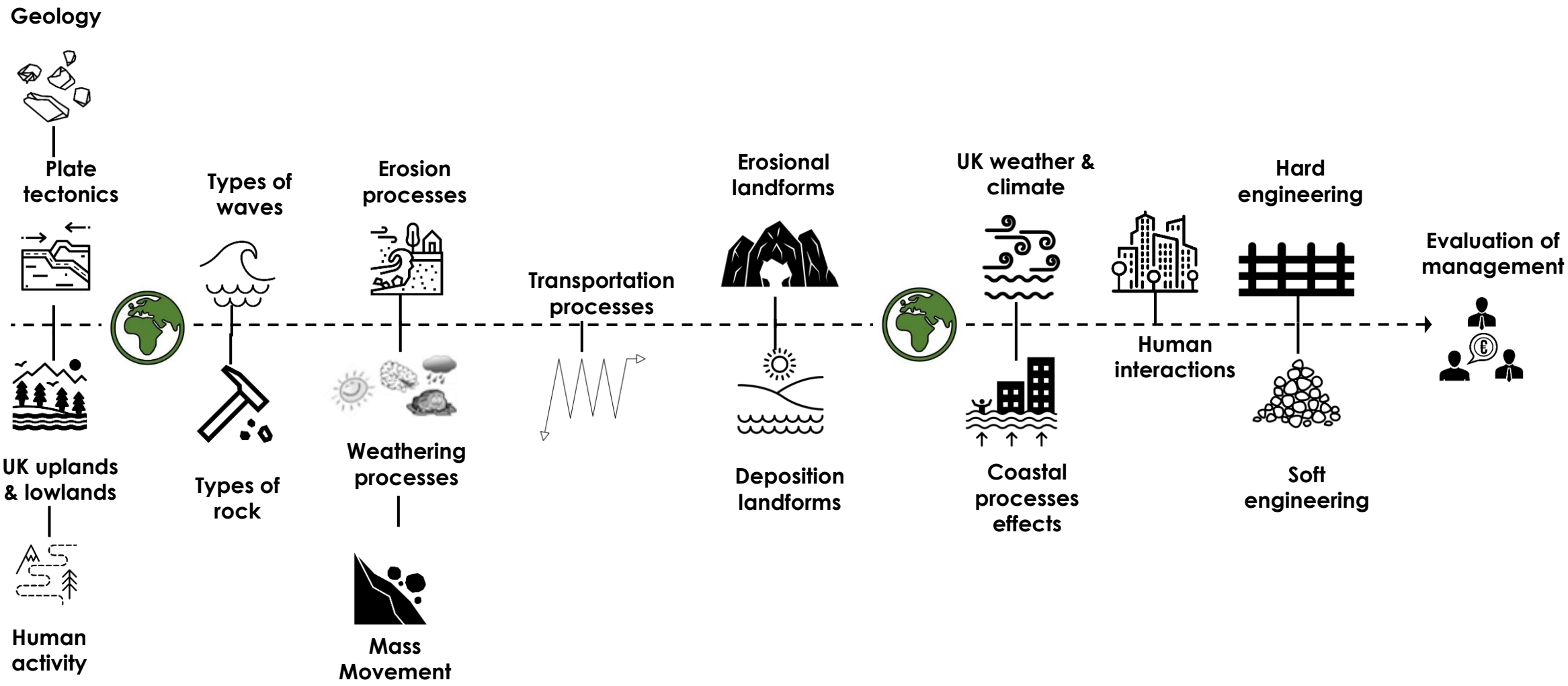
How to use this Graphic Organiser

1. Study each Topic route map
2. Check you know and understand each section of the route map by studying the details on the following pages
3. Self-test (or test each other) on your knowledge and understand of each process or concept
4. Make flash cards, especially of the parts that you struggled with on the self-test
5. Go back over the Google Classroom lessons for those parts you found really difficult to understand
6. Design flow charts for concepts, models and Case Studies
7. Visit Seneca and test yourself on those parts that are really difficult
8. Make your own vocabulary book with definitions of the keywords
9. Check out the Command Words for this spec and know what writing and Geography is required for each Command Word
10. Create spider diagrams to show how each topic is linked to others and explain why they are linked

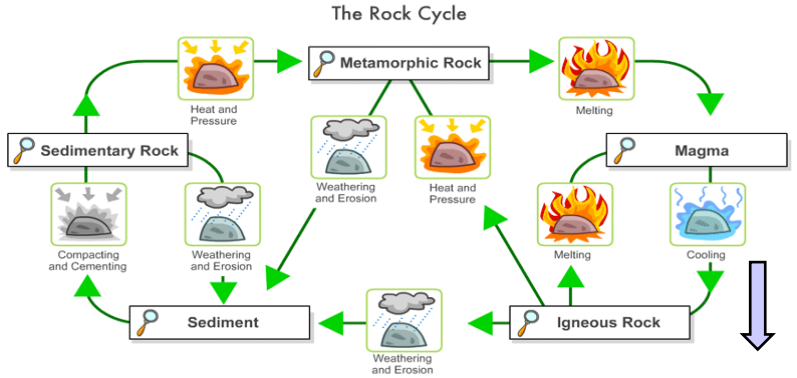
Paper 1 Topic 1 The changing landscape of the UK – Geology and Coasts

UK landscapes overview

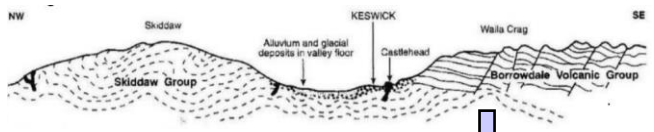
Coasts overview



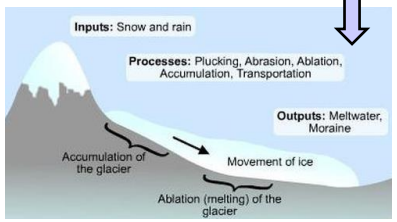
Paper 1 Topic 1 The changing landscape of the UK - Geology



- **Geology = type of underlying rock – igneous, metamorphic, sedimentary**
- **Tectonic processes = movement of the Earth's tectonic plates**
- **Glaciation = process of land or water being covered by glaciers or ice sheets**



Tectonic processes



Glacial processes

Weathering – the breaking down of rock by heat, wind & water

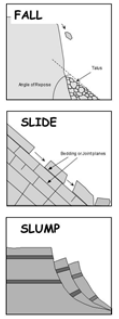
Freeze-thaw

Onion skin

Chemical

Biological

Mass Movement

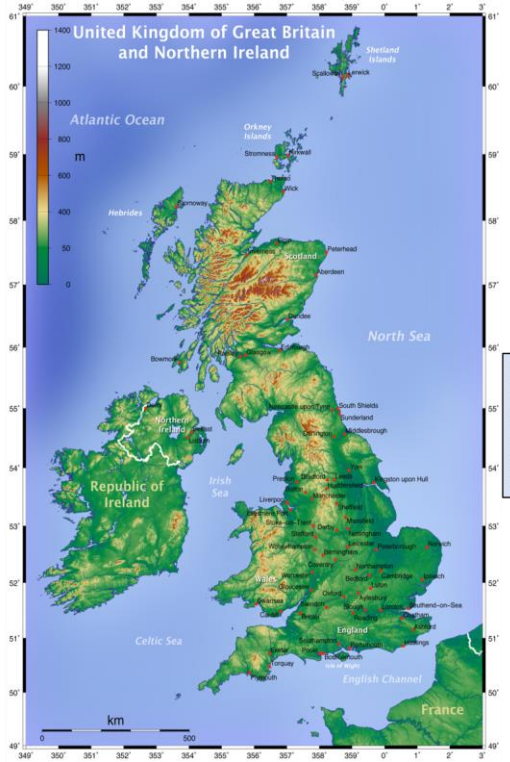


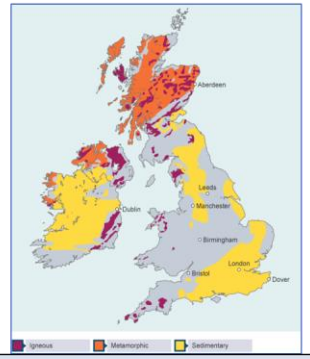
Uplands
Scotland - The Northwest Highlands, the Cairngorm Mountains, the Grampian Mountains and the Southern Uplands. **Ben Nevis** is the UK's highest peak and is found in the Grampian Mountains.

Uplands
England - The Pennines, Lake District, Dartmoor and Exmoor. **Scafell Pike** is the highest mountain in England and is found in the Lake District.

Uplands
Wales - Snowdonia and the Brecon Beacons. **Snowdon** is the highest mountain in Wales and is found in Snowdonia.

Lowland areas
England - around The Wash (East Anglia and Lincolnshire), The Midlands, The London Basin, The Vale of York,
The Fens in East Anglia - the lowest place in the UK





The UK's main rock types
Rocks can be classified in to three main groups - **igneous**, **metamorphic** and **sedimentary**. These three different rock types can be found in distinct areas of the UK.

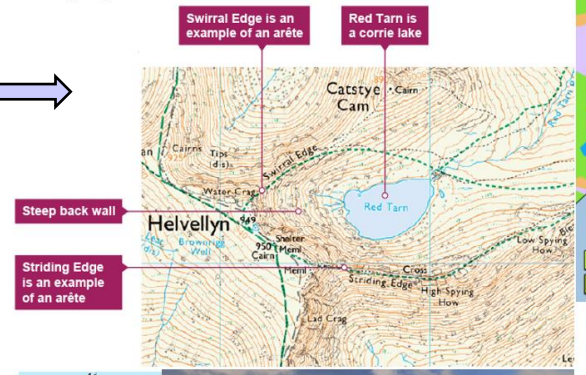
Igneous rocks - these rocks are a result of **tectonic processes** in the past, when Britain was close to a plate boundary.

Metamorphic rocks - these are rocks that have been changed in shape and form by **intense heat and pressure** at a plate boundary or along a fault line.

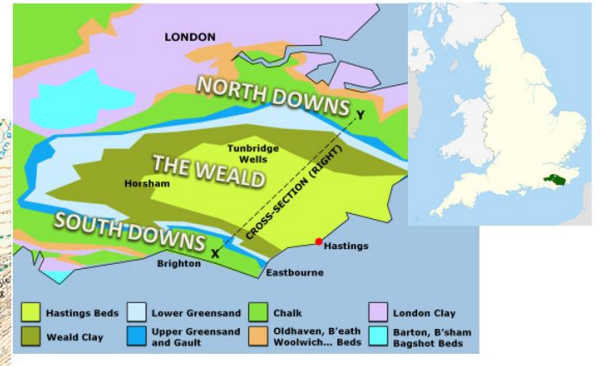
Sedimentary rocks – these are made up of small particles of sand and rock, which have been transported by the **wind, rivers and ice** and are usually deposited on lake or seabed

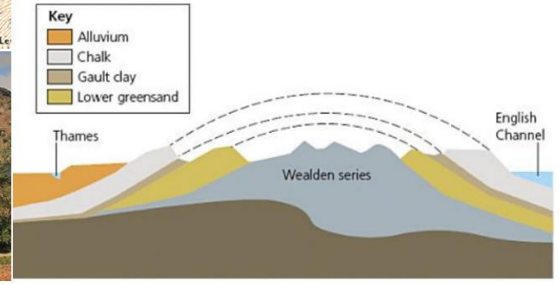
Case Studies: The Lake District & The Weald

Helvellyn stands as one of England's highest mountain, standing at 949 metres above sea level in the Lake District in north-west England. It is made up of **igneous** rocks which were formed 450 million years ago. Many of the landscape features visible around Helvellyn today were formed during the last ice age over 20,000 years ago. Large **glaciers** dominated the landscape and through their erosive power, carved out classic glaciated landforms such as **arêtes**, **corries** and **glacial troughs**. Helvellyn is a mountain, which contains several glacial landforms. Two arêtes ascend to the summit of Helvellyn, Striding edge and Swirral edge. Striding Edge forms the back wall of the Red Tarn corrie.

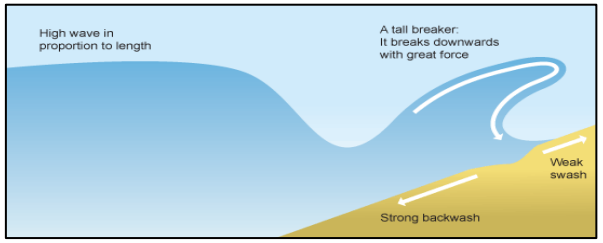


The Weald is an area of upland landscape in lowland southern Britain, in Kent and Sussex. It is about 250m above sea level and was originally an anticline of folded rocks that has been ben exposed to much **weathering**. This weathering has resulted in different layers of strata being exposed, with more resistant rocks such as chalk being exposed as escarpments. This gives a scarp and vale landscape between the North and South Downs.





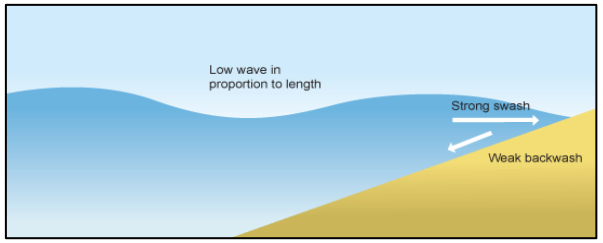
Paper 1 Topic 1 The changing landscape of the UK – Coastal processes



Destructive waves

Waves are created by **wind** blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a **swell** in the water. The energy of the wind causes water particles to rotate inside the swell and this moves the wave forward.
The size and energy of a wave is influenced by:

- how long the wind has been blowing
- the strength of the wind
- how far the wave has travelled (the **fetch**)



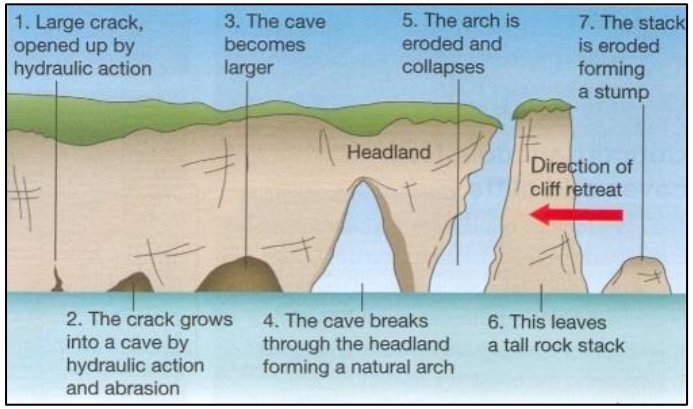
Constructive waves

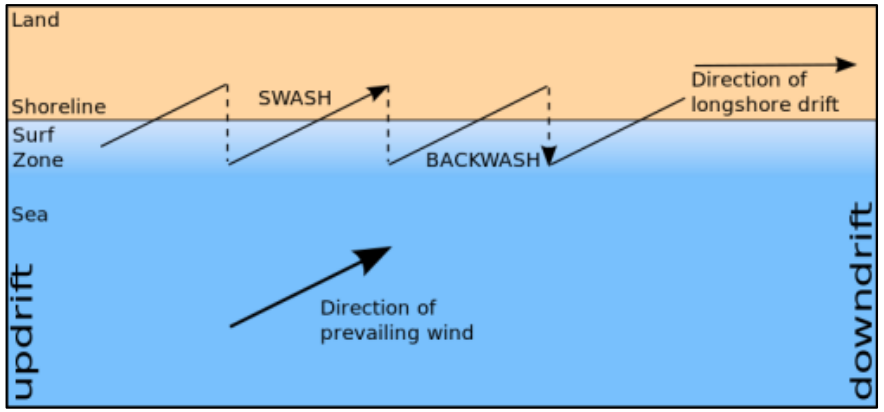
When a wave breaks, water is washed up the beach - this is called the **swash**. Then the water runs back down the beach - this is called the **backwash**. With a constructive wave, the **swash is stronger** than the backwash. With a destructive wave, the **backwash is stronger** than the swash.

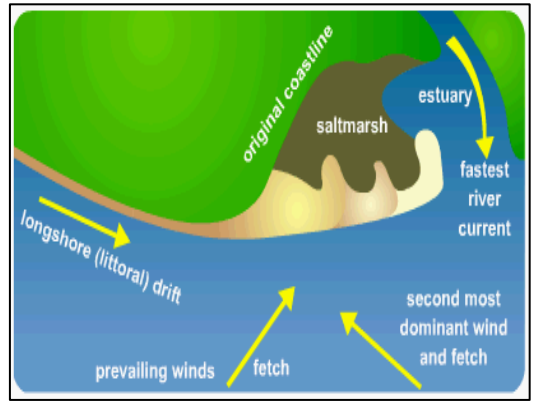
Coastal Processes
Erosion
Hydraulic action
Abrasion
Attrition
Corrosion

Coastal Processes
Transportation – longshore drift
Traction
Saltation
Suspension
Solution

Coastal Processes
Deposition
Heaviest material 1st
Change in coastline

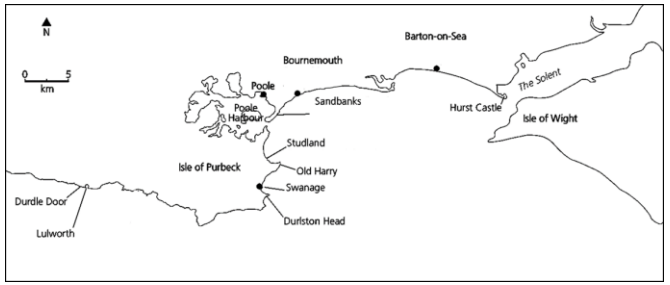




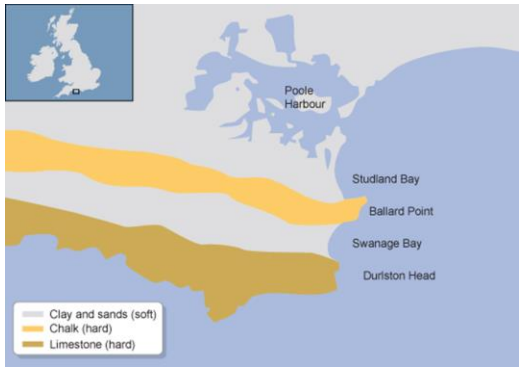


Paper 1 Topic 1 The changing landscape of the UK – Coastal Management

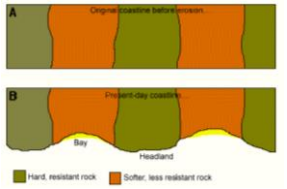
Case Study: Coastal landforms Dorset Coast



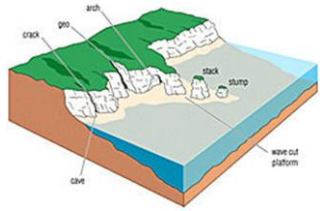
Where: Dorset coast (Jurassic Coast)
Why: Lines of hard and soft rock, **concordant and discordant coastline**, prevailing SW winds
Who: Main urban areas Swanage, Poole, Bournemouth



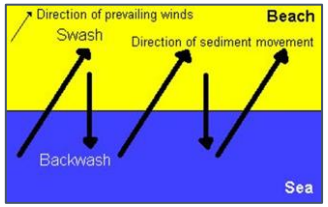
How: **Swanage Bay = discordant coastline -** formed through erosion of soft clay and sands, **headlands** remain of harder limestone and chalk



How: **Old Harrys Rocks** formed through hydraulic action, abrasion and attrition.
Crack → Cave → Arch → Stack → Stump



How: **Sandbanks spit** formed by longshore drift and deposition at estuary at **Poole Harbour**



Main industries: Tourism (Swanage and Jurassic Coast), transportation (Poole Harbour), Oil refinery (Bournemouth)

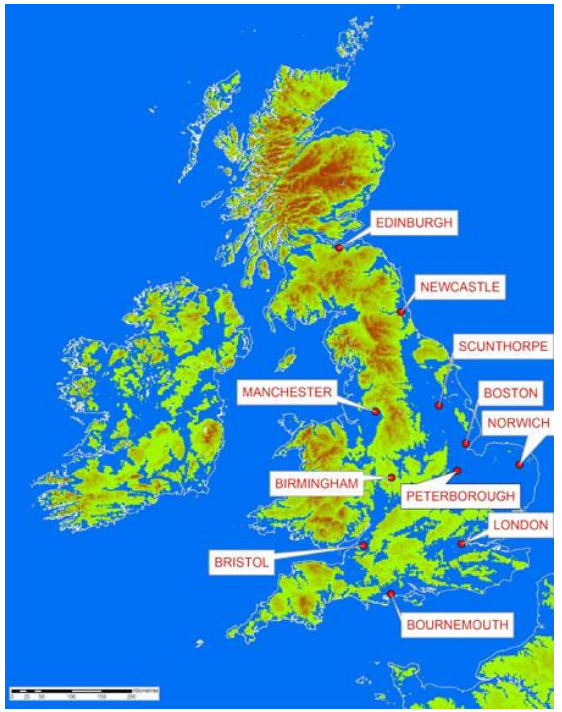
Paper 1 Topic 1 The changing landscape of the UK – Coastal Management

Erosion processes remove land from some parts of the coastline, whereas deposition processes create new land in other places. In addition, the fact that the sea level is rising locally and globally could add to these erosion and deposition problems whilst also removing land from use at the coastline. It is for these reasons that human beings have long sought to control and MANAGE the coastline. However, there is a huge debate as to how to do this - either by using HARD ENGINEERING or SOFT engineering.

Hard engineering

- Sea Wall
- Rip-rap
- Gabions
- Off-shore breakwater
- Groynes

Sea level rise around the UK



Soft engineering

- Beach nourishment
- Dune regeneration
- Salt marsh
- Coastal zoning
- Mangrove swamps (tropical climates)

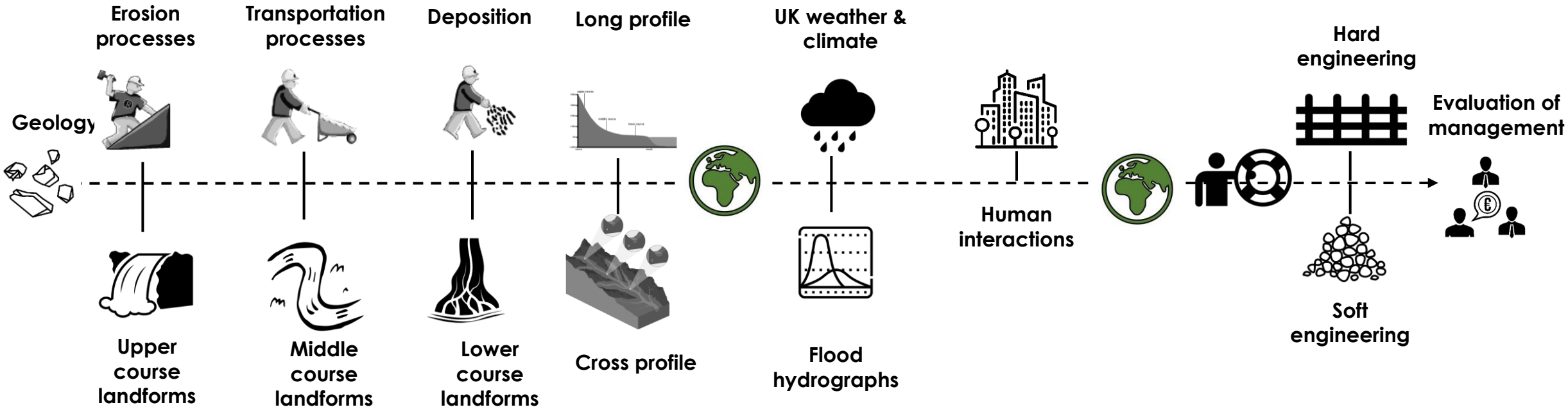
Shoreline Management Plans (SMP's) use one of 4 options to manage the coast:

- **Advance the line**: move the coastline seaward – expensive
- **Hold the Line**: use of hard or soft engineering methods – expensive but preferred by locals
- **Managed retr**eat: allows coastline to move inland – cheap but causes conflict
- **Do nothing**: allow natural erosion and flooding – cheap but causes great conflict

Paper 1 Topic 1 The changing landscape of the UK – Rivers

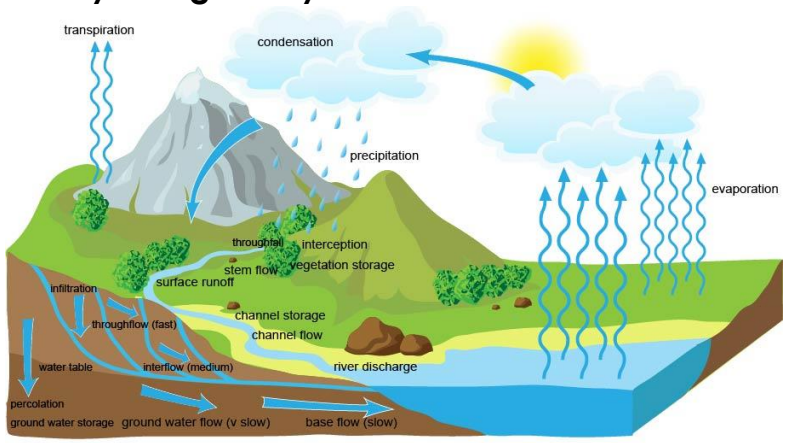
UK landscapes overview

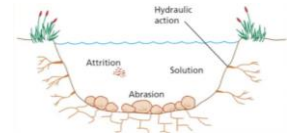
Rivers overview

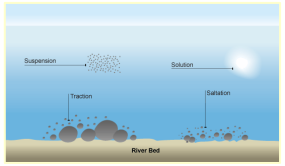


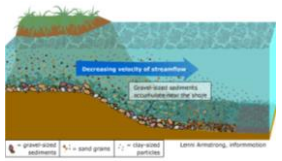
Paper 1 Topic 1 The changing landscape of the UK – River processes

The Hydrological Cycle









Hydrological Processes

Erosion
- Hydraulic action
- Abrasion
- Attrition
- Corrosion

Transportation
- Traction
- Saltation
- Suspension
- Solution

Deposition
- Heaviest pebbles 1st

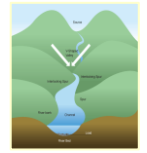
River Landforms

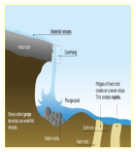
Upper Course
- V-shaped Valleys
- Interlocking spurs
- Rapids
- Waterfalls and Gorges

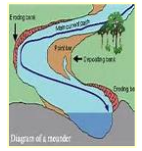
Middle Course
- Meanders
- Ox-bow lakes
- Floodplains
- Levees

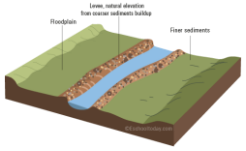
Lower Course
- Estuaries and deltas

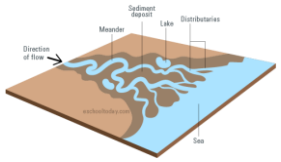
Source → Mouth



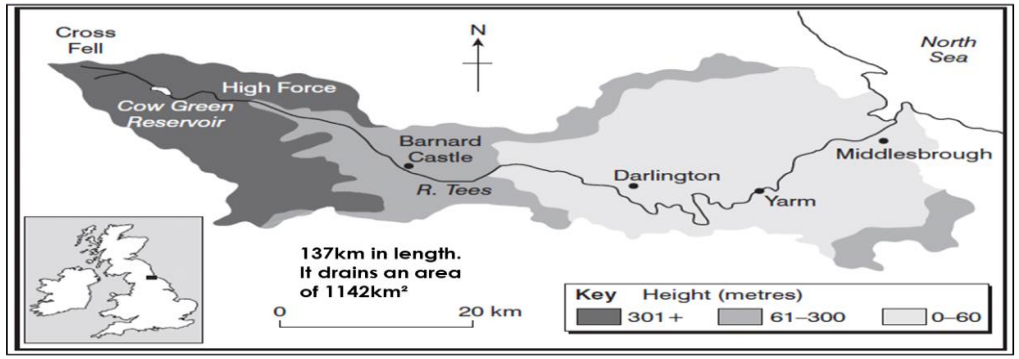








Case Study: River Landforms - River Tees

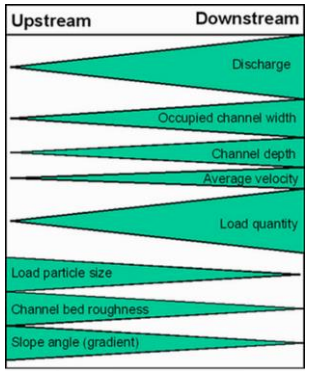


Upper Course
- **Source** high in the Pennines (893m above sea level)
- High run off as steep **V shaped valleys** of impermeable rock
- High **rainfall** – good water supply
- Many **tributaries**
- Famous high fall **waterfall** – tallest in England 21m high – **High Force**
- **Gorges**, **rapids** and **potholes**

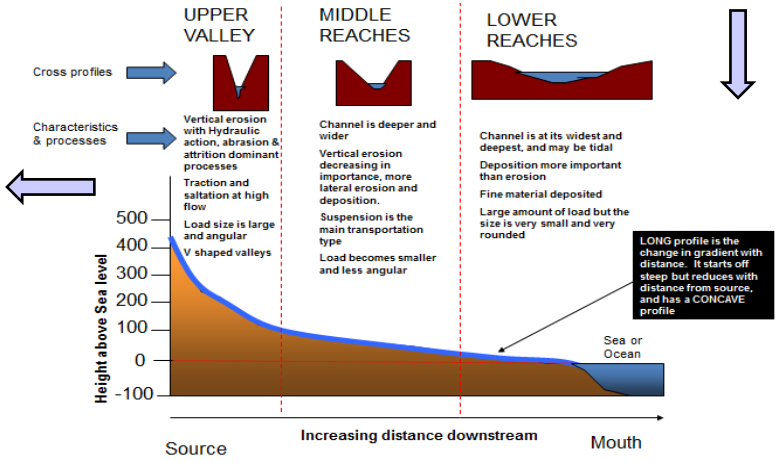
Middle Course
- Clear widening and **meandering**
- **Meanders** cut off in the 19th century
- Sides become **less steep**
- **Lateral erosion**
- **Fertile soil**

Lower Course
- Very **urbanised** and large populations. Eg **Yarm**
- Important **wildlife** seals & migratory birds also **SSSI**
- **Ox bow lakes**
- Large oil, gas and petrochemical industries (as **flat land**)
- Natural **levees** formed due to silt build up
- **Mouth** is in the North sea
- Wide mudflat **estuary** (tidal)
- Huge water sports complex **Tees Barrage**

River Management
- Long history of **flash flooding**
- **Cow Green reservoir**, controls water supply for industries along the river
- **Straighten** the river for easier navigation during the industrial revolution
- **Flood protection** schemes in Yarm



The Bradshaw Model



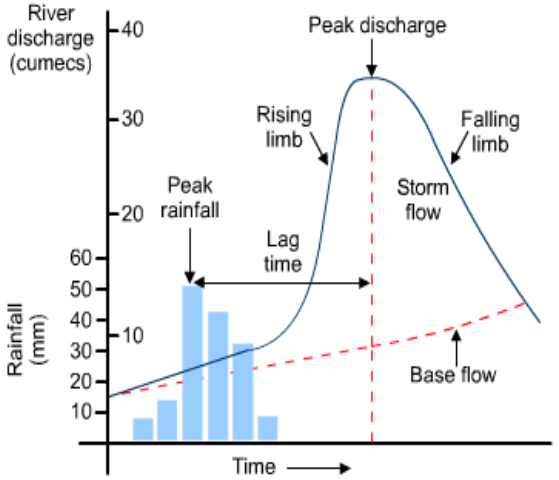
The **long profile** of a river shows the changes of the **relief** of a typical river as it moves from its upstream source to its downstream mouth.
The **Bradshaw Model** shows why these changes occur. **Discharge increases because there is a larger drainage basin/catchment.**

Paper 1 Topic 1 The changing landscape of the UK – River Management

Rivers are managed in a huge variety ways and for a variety of different reasons. We use rivers for collecting water for drinking, industry and farming, and we manage then to prevent damage caused by deposition, erosion and flooding. Management can be split into 2 areas - HARD and SOFT ENGINEERING.

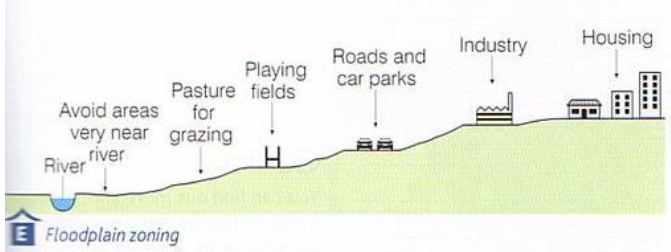
Hard engineering

- Dams and reservoirs
- Channelization
- Culverts
- Sluice gates
- Flood walls or levees
- River groynes (deflectors)
- Weir
- Gabions
- Flood relief channels
- Dredging



Soft engineering

- Afforestation
- Managed flooding, washlands, floodplain restoration or preservation
- Floodplain zoning



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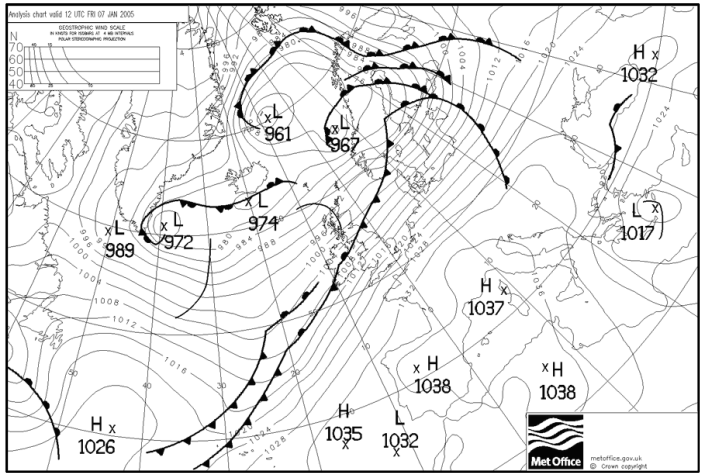
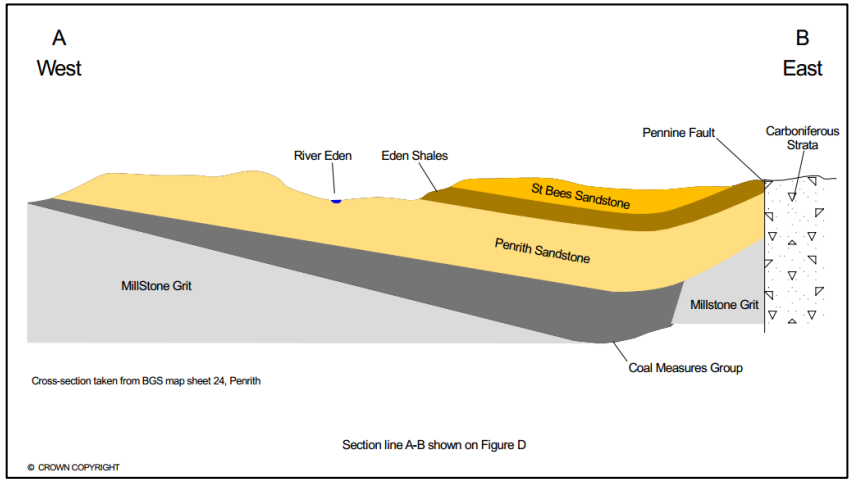
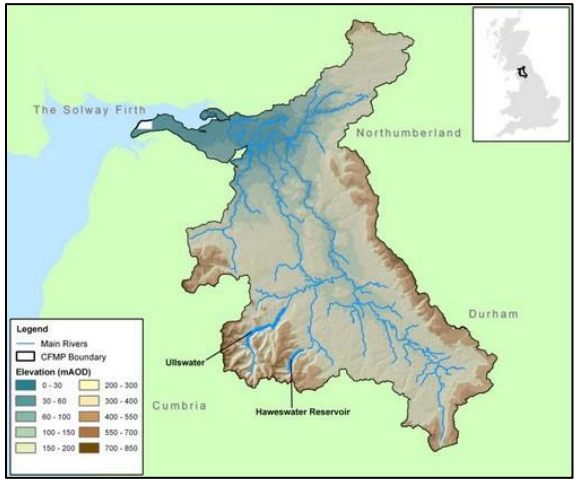
Paper 1 Topic 1 The changing landscape of the UK – River Management

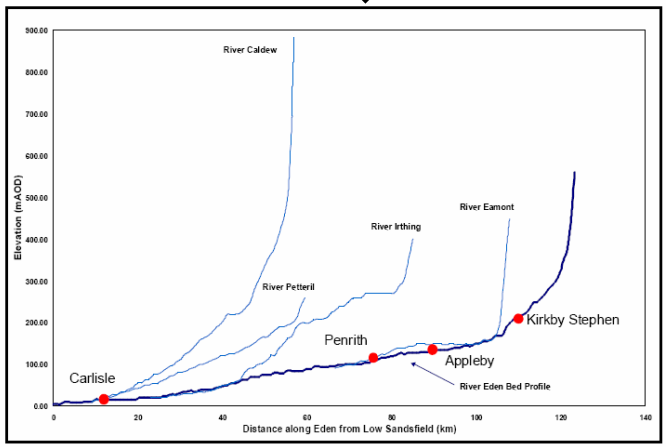
Case Study: River Eden floods, Carlisle, UK

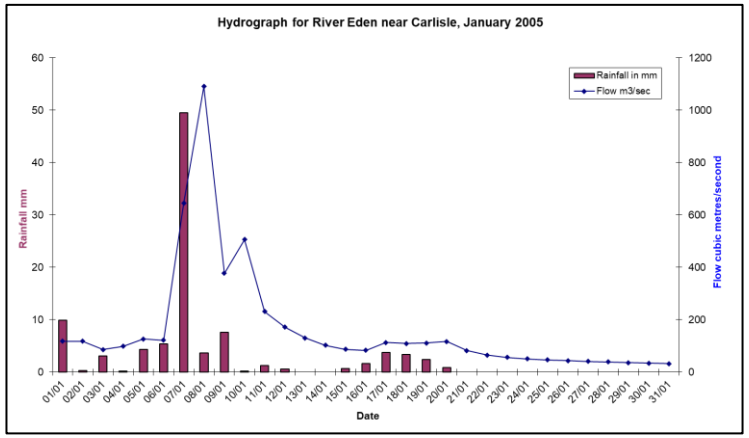
What: UK Floods **When**: 6th to 8th January 2005 **Where**: River Eden, Carlisle, Cumbria, Lake District, England **Who**: Population 105,562

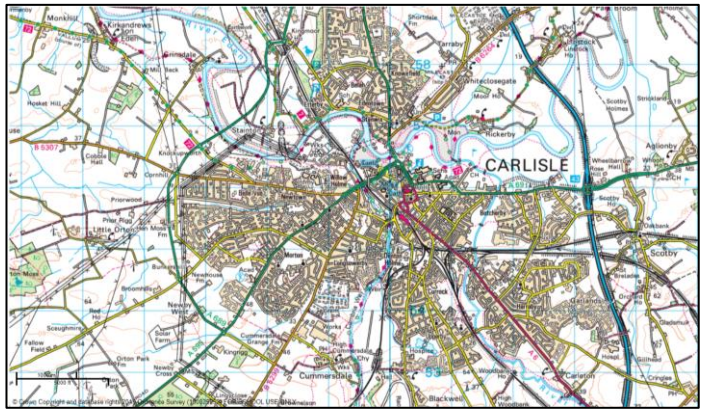












Paper 1 Topic 1 The changing landscape of the UK – River Management

Case Study: River Eden floods, Carlisle, UK

What: UK Floods **When**: 6th to 8th January 2005 **Where**: River Eden, Carlisle, Cumbria, Lake District, England **Who**: Population 105,562

Causes:

Social: Carlisle is built on the floodplain of the River Eden and lies at the confluence of the River Eden, River Caldew and River Petterill

Technological: Limited flood management schemes

Economic: Sheep farming compacted soil upstream leading to greater surface run-off

Environmental: Intense low pressure system (depression 980mb) stayed over NW England, precipitation fell constantly for several days, 180mm with some areas experiencing 100mm in 24 hours (7.12.2004), saturated ground on top of impermeable underlying bedrock.

Political: Government was unprepared for one in 200 year weather experience. Lack of funding from local and central government for flood protection schemes

Impacts:

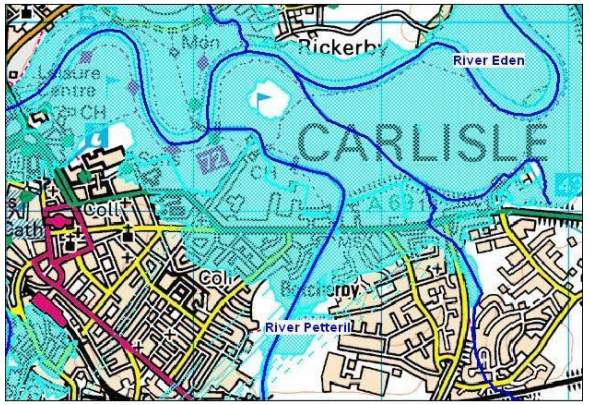
Social: 3 people died, 2,700 homes affected, 50% of residents had not signed up to received flood warning messages, several schools temporarily closed

Technological: Transport systems damaged as impassable, no electricity for several days

Economic: Cost estimated at over £400 million, many local businesses affected including McVities biscuit factory, where several people lost their jobs, many homes were not insured or under insured

Environmental: Up to 2.5m of water in some places, increased bank erosion, drains and sewerage system could not cope

Political: Fire station and police station flooded, people rescued by the coastguard



Paper 1 Topic 1 The changing landscape of the UK – River Management

Case Study: River Eden floods, Carlisle, UK

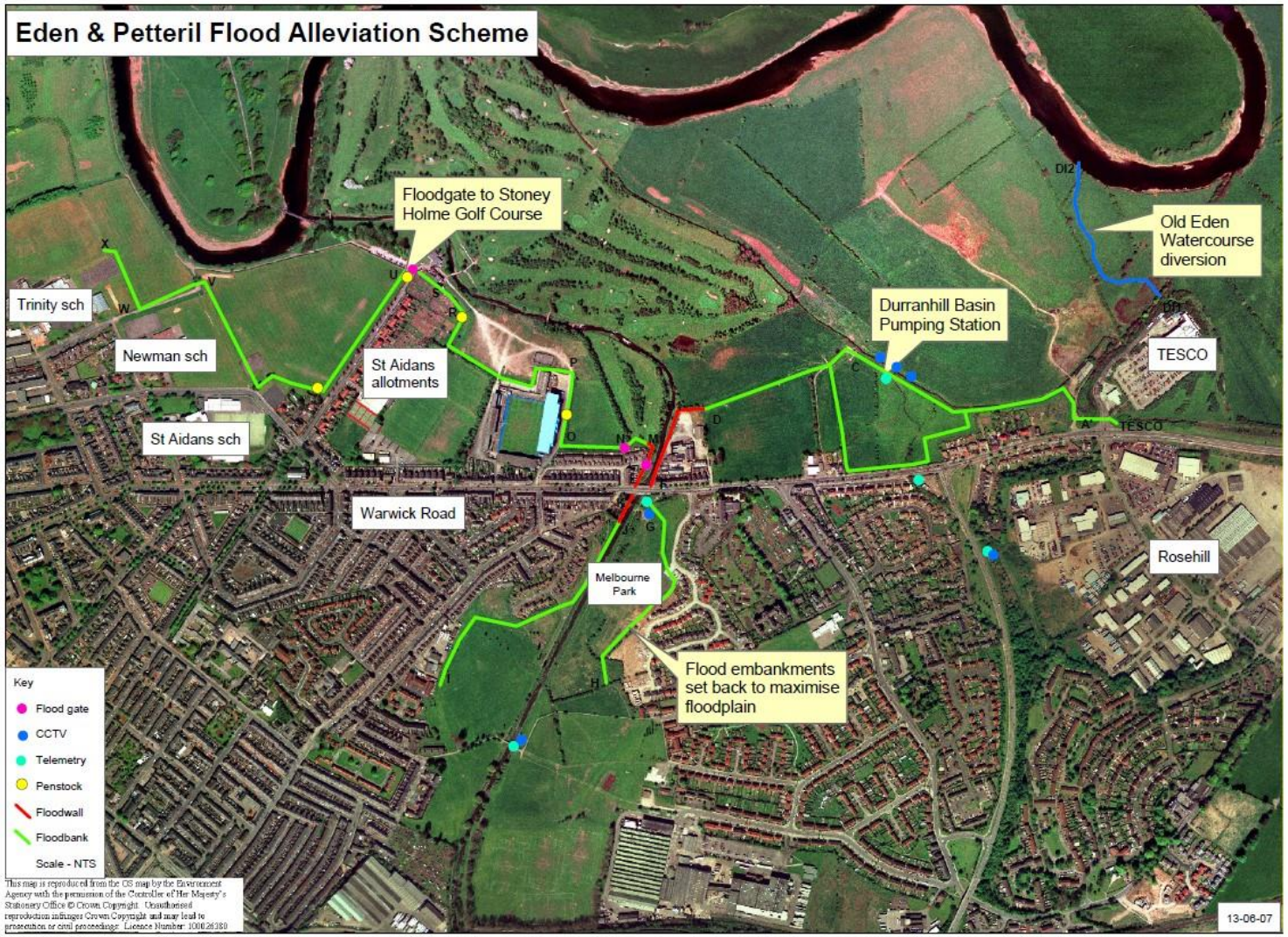
What: UK Floods **When**: 6th to 8th January 2005 **Where**: River Eden, Carlisle, Cumbria, Lake District, England **Who**: Population 2005 = 105,562

Management:
Rivers Eden and Peterill Flood Alleviation Scheme

- Raised embankments
- Flood gates
- Diversion of river course
- Flood warning system
- Flood storage areas allocated
- River wall at Carlisle United FC ground
- New sewers
- £36 million project

Floods since 2005:

2009 150 flooded homes
2015 Storm Desmond 7,500 flooded properties



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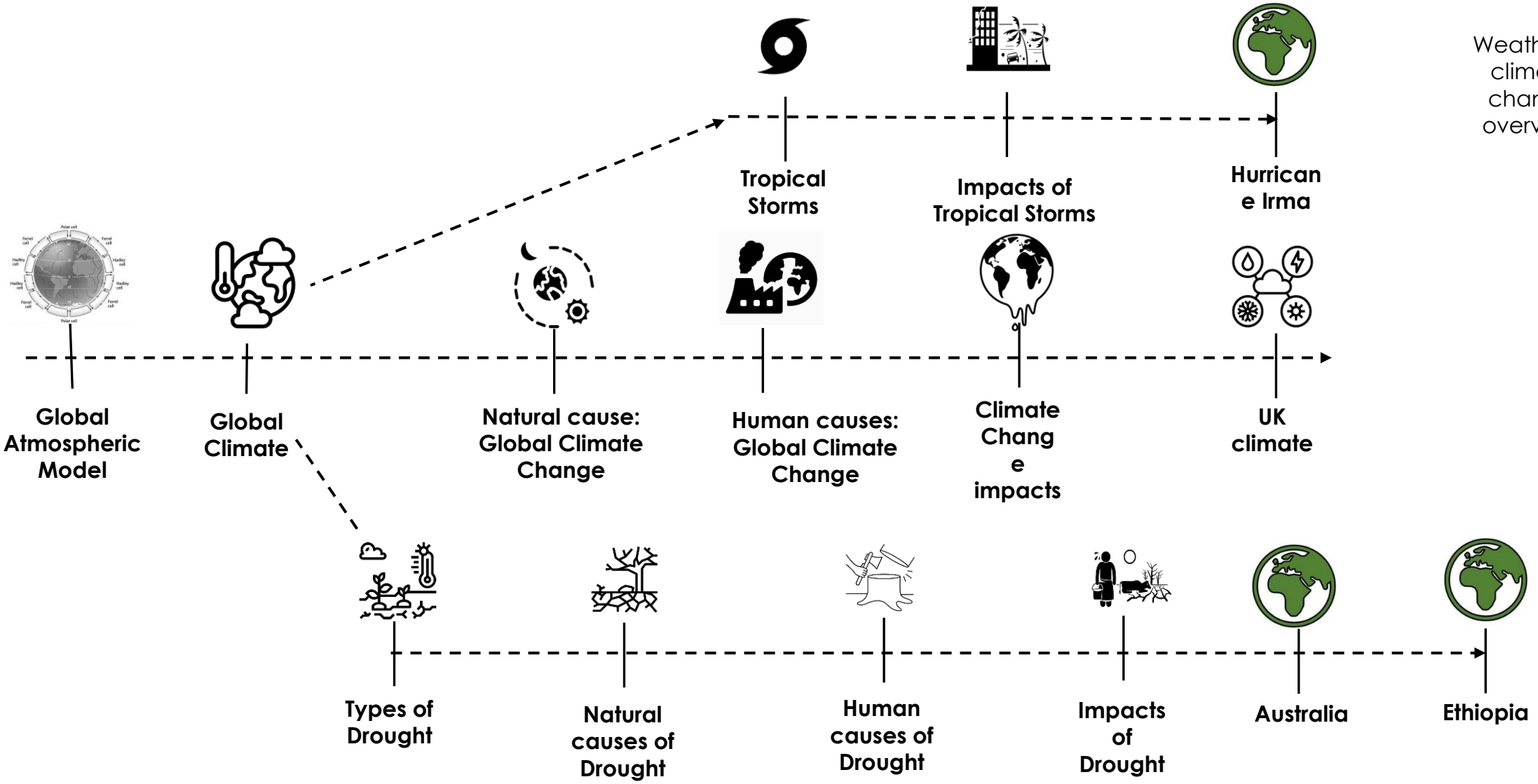
Paper 1 Topic 2 Weather hazards and climate change

Weather & climate change overview



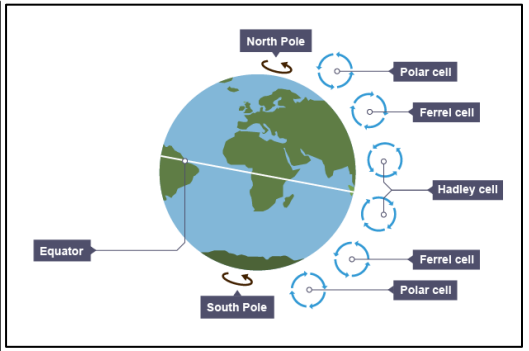
Paper 1 Topic 2 Weather hazards and climate change - GAC

The movement of air across the planet occurs in a specific pattern. The whole system is driven by the equator, which is the hottest part of the Earth. Air rises at the equator, leading to low pressure and rainfall. When the air reaches the edge of the atmosphere, it cannot go any further and so it travels to the north and south. The air becomes colder and denser, and falls, creating high pressure and dry conditions at around 30° north and south of the equator. Large cells of air are created in this way.
Air rises again at around 60° north and south and descends again around 90° north and south. The names of the cells are shown in the diagram.

The Hadley cell
The first cell is called the Hadley cell. At the equator, the ground is intensely heated by the sun. This causes the air to rise which creates a **low-pressure** zone on the Earth's surface. As the air rises, it cools and forms thick cumulonimbus (storm) clouds. The air continues to rise up to the upper atmosphere, and the following then happens:
•The air separates and starts to move both north and south towards the poles.
•When it reaches about 30° north and south, the air cools and sinks towards the ground forming the subtropical **high-pressure** zone.
•As the air sinks, it becomes warmer and drier. This creates an area of little cloud and low rainfall, where deserts are found.
•The Hadley cell is then complete. The air completes the cycle and flows back towards the equator as the **trade winds**.
•In the northern hemisphere, the winds flow to the right and are called northeast trade winds. In the southern hemisphere the winds flow to the left and are called the southeast trade winds. This is down to the **Coriolis force** and friction.

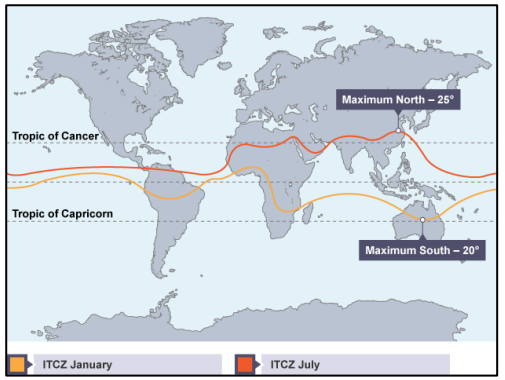
The Ferrel cell
The Ferrel cell occurs at higher latitudes (between 30 degrees and 60 degrees N and 30 degrees and 60 degrees S):
•Air on the surface is pulled **towards** the poles, forming the warm south-westerly winds in the northern hemisphere and north-westerly winds in the southern hemisphere.
•These winds pick up moisture as they travel over the oceans. At around 60 degrees N and 60 degrees S, they meet cold air, which has drifted from the poles.
•The warmer air from the tropics is lighter than the dense, cold polar air and so it rises as the two air masses meet.
•This uplift of air causes low pressure at the surface and the unstable weather conditions that are associated with the **mid-latitude depressions**. Much of our wet and windy weather in the UK is determined by this.

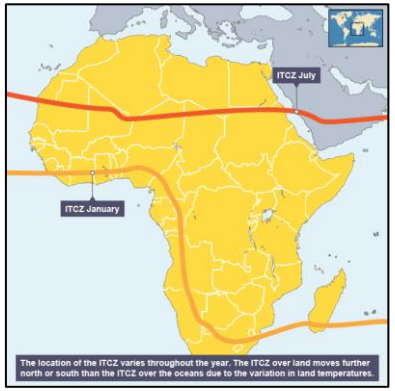
The Polar cell
At the poles, air is cooled and sinks towards the ground forming high pressure, this known as the **Polar high**. It then flows towards the lower latitudes. At about 60 degrees N and S, the cold polar air mixes with warmer tropical air and rises **upwards**, creating a zone of low pressure called the **subpolar low**. The boundary between the warm and cold air is called the **polar front**. It accounts for a great deal of the unstable weather experienced in these latitudes.

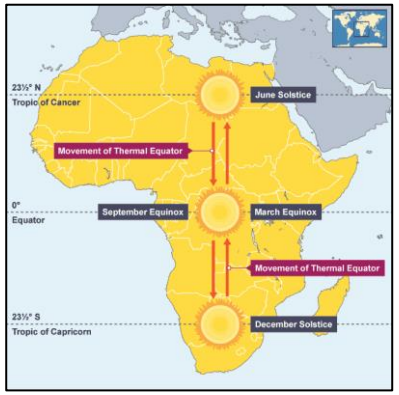


Global atmospheric circulation creates winds across the planet and leads to areas of high rainfall, like the tropical rainforests, and areas of dry air, like deserts.

The **ITCZ** is a zone of convergence at the thermal equator where the trade winds meet. It is a low pressure belt and migrates with the changing position of the thermal equator.
The thermal equator receives the **most intense heat** from the Sun. Around 20th June each year the Sun is overhead at 23½° North, the Tropic of Cancer. Around 20th December the Sun is overhead at 23½° South, the Tropic of Capricorn.







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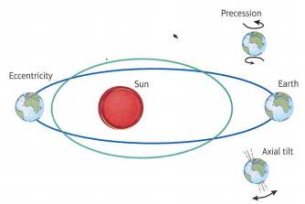
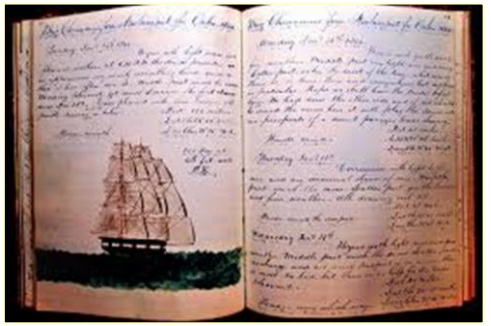
Paper 1 Topic 2 Weather hazards and climate change – Natural causes

Climate change – is the average climate conditions of the planet. They vary over time. The earth has a history of going between warm (interglacial) and cold (glacial) periods. **Climate change can be caused by both natural events and humans**

Factor	Effect
Milankovitch Cycles 	These are natural changes to the earth's orbit and position that affect how much solar radiation we receive from the sun • Eccentricity – The orbit becomes elliptical so at times the earth is further from the sun causing it to be much cooler • Axial tilt – The angle of the earth's tilt changes so summers and winters are more extreme when this happens • Precession – The earth sometimes wobbles on it's axis and it changes seasons slightly.
Solar Variation	The amount of radiation the sun produces varies over time. Lower solar activity are likely to end in glacials.
Volcanism	Large-scale eruptions can lead to lots of ash in the atmosphere, sometimes it's so great it can block out the sunlight reducing global temperatures
Surface impact	Asteroids and comets can impact the earth's surface and cause lots of ash blocking out sunlight and reducing global temperatures



Historical Sources:
Historical documents such as diaries, paintings etc. can describe what the climate is like at the time

What is the evidence?

Ice Cores
Ice sheets in Greenland or Antarctica has built up over many years. In some places ice can be 3,000m deep. As snow falls and compacts as ice, it traps air bubbles – these contain a sample of what the atmosphere was like at that time.
Water in the ice also contains isotopes – scientists can measure the temperature of the earth at the time

Tree rings:
As trees grow they produce growth rings. In warmer climates growth rings are further apart. In cooler climates they are closer together.
These can indicate what the climate was like 100,1000 years ago

Paper 1 Topic 2 Weather hazards and climate change – Human causes

Transport:
As cars are more affordable now than ever – more people are buying and using them. As well as this, flights are now cheaper so people fly more. All modes of transport rely on fossil fuels

Energy:
The demand for electricity is growing because of increasing population, standard of living improves, technology improves and people because richer

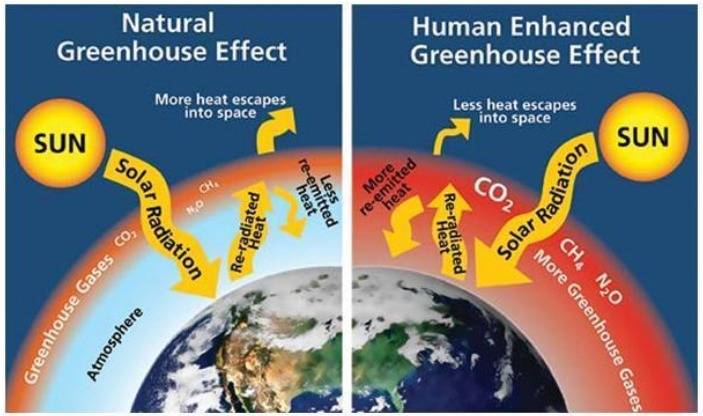
How do humans cause global warming?

Industry:
As people have more disposable income increases, so does the demand for the production of industrial goods. This leads to more fossil fuels being used

Agriculture:
Increased population growth means there is an increased need for food. This then leads to more intensive agricultural practises that require machinery which use fossil fuels

<u>The natural greenhouse Effect:</u>

This is a **natural process**, which keeps the earth warm.
Greenhouse gases (carbon dioxide, methane, nitrogen) trap some of the heat that is radiated from the surface which would have been lost into space.
Without this the temperature of the earth would be a lot cooler

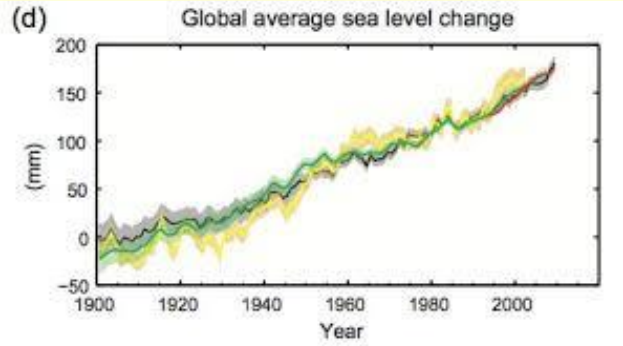


<u>The enhanced greenhouse Effect:</u>

Human activity has resulted in an increased amount of greenhouse gases in the atmosphere.
This means the earth absorbs **more** solar radiation and less radiation is able to escape – this causes an increase in temperatures.

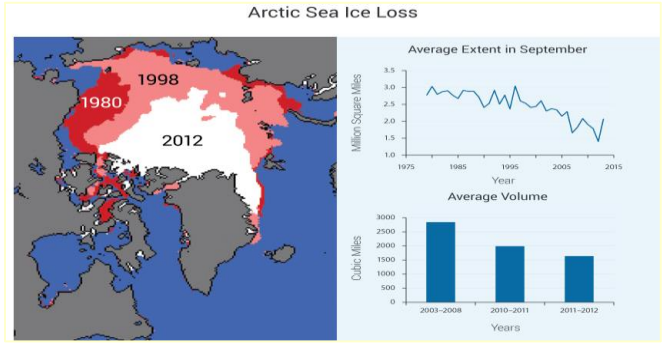
Paper 1 Topic 2 Weather hazards and climate change – Evidence

Evidence of climate change

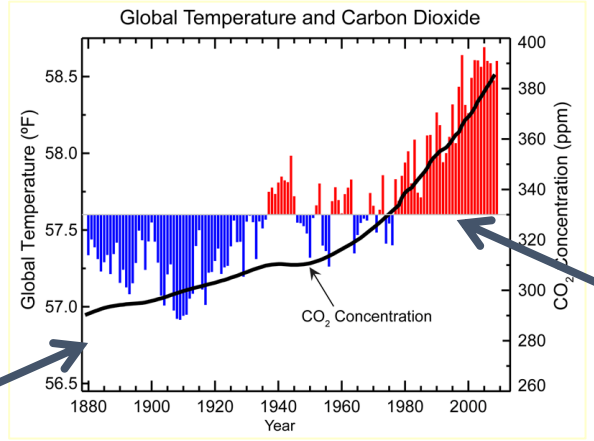


Sea Level Change:
- Long-term measurement of sea levels shows there has been 20cm increase since 1900
- Rises have increased recently to 3.2mm per year and are more in some areas.

Melting Ice Caps:
- Sea level change is caused by **thermal expansion** – when water warms up it expands
- The Arctic Ice Caps have decreased. Warmer temperatures meant that sea ice has declined



Warmer Global temperatures and Carbon Dioxide
- The rise in global temperatures is closely linked to the increase of carbon dioxide.
- The increase in carbon dioxide since 1950 has been much higher and much more rapid than anything recorded for the last 400,000 years.
- Human activity is the reason for much of this increase.



Warmer Global temperatures:
- Measurements of average global atmospheric temperatures show a steep rise from around the 1950s to the present. Although temperatures have risen before it is unusual for the increase to be so rapid

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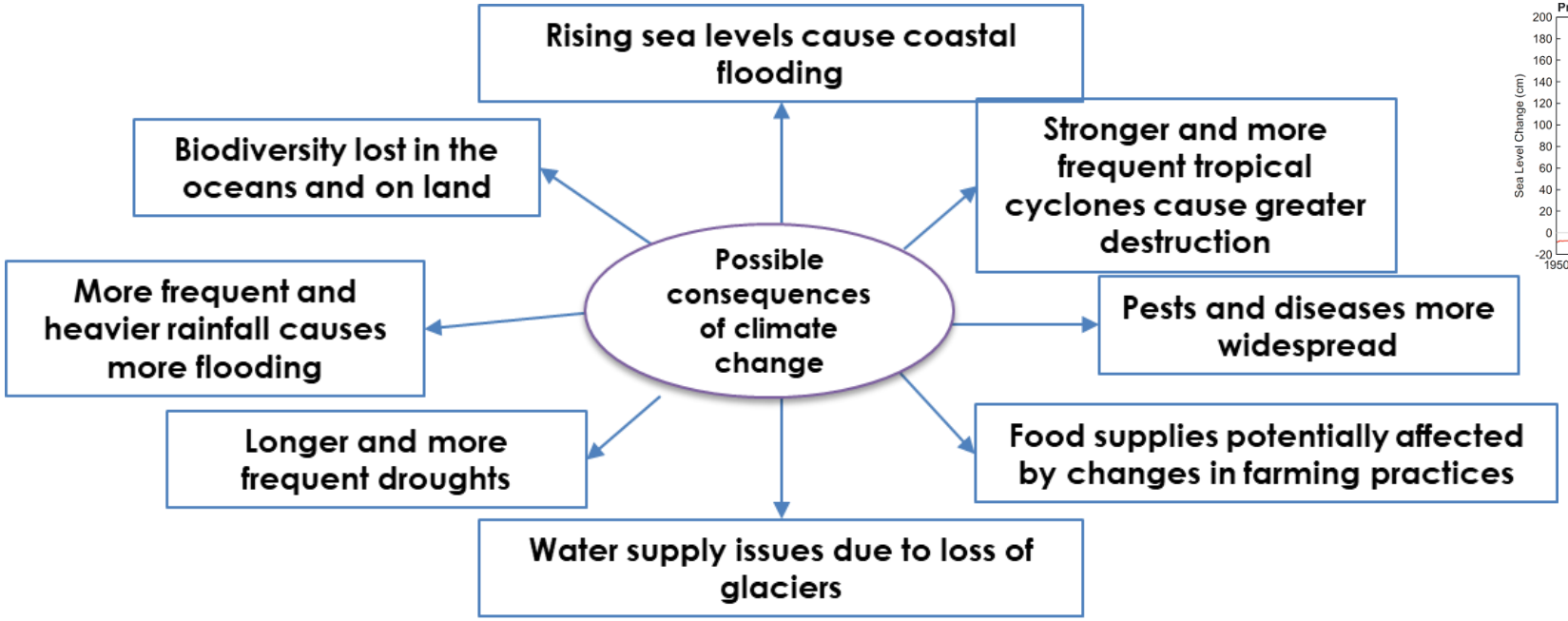
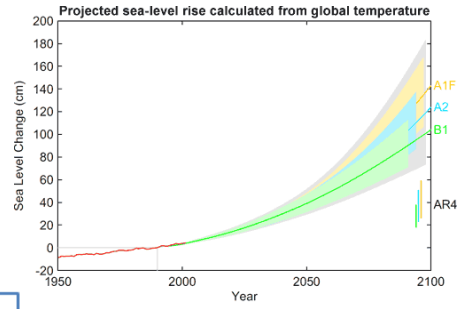
Paper 1 Topic 2 Weather hazards and climate change – Impacts





Sea Level Rises:
Around 23% of the worlds population live within 100km of the coast – this means lots of people are at risk of coastal flooding
The effects of 1m rise in sea level is:

- Low-lying islands will be submerged (e.g. Maldives) – causing land to be abandoned
- New sea defences will need to be built – costing millions!
- Salt water intrusions will contaminate farmland and groundwater supplies (making water unusable)

Future projections:
Future predictions are difficult to predict because it changes (will greenhouse gases continue to rise or will we find ways to reduce emissions?)
Climate change organisations have modelled 4 scenarios:

1. Emissions peak at 2020 then decline
2. Emissions peak at 2040 then decline
3. Emissions peak at 2080 then decline
4. Emissions continue to rise

- The loss of Greenland's ice sheet would raise sea levels by 7m
- The Antarctic ice sheets would add 13m
- Sea level rise will be higher in some areas than others due to prevailing winds and currents. Also where the land is sinking sea level will be higher

Increased Temperatures:
Warmer temperatures can impact on food production as some areas will experience drought conditions.
More pests will spread quicker due to the warmer weather
Ecosystems and habitats suffer as temperatures increase as animals and plants struggle to adapt leading to a loss of biodiversity

Extreme weather events:
Experts believe there will be a rise in extreme weather events: Tropical Cyclones, drought, intense prolonged rainfall and heavy snowfall. This leads to a greater number of people at risk

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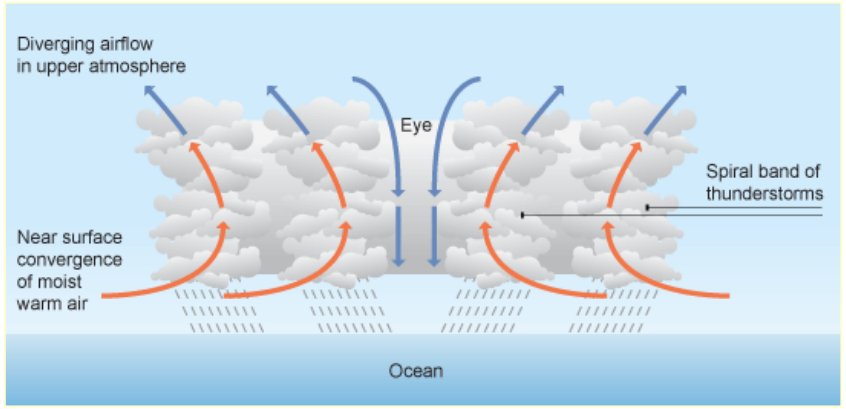
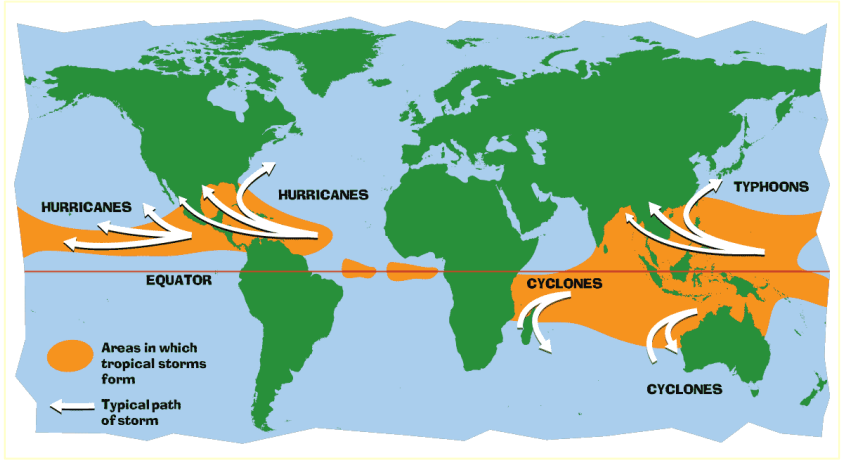
Paper 1 Topic 2 Weather hazards and climate change – Tropical storms

Hurricanes
The strongest tropical storms are called **hurricanes**, **typhoons** or **tropical cyclones**. The different names all mean the same thing, but are used in different parts of the world. If these huge storms start in the Atlantic, off the west coast of Africa, they are called **hurricanes**.
In an average year, over a dozen hurricanes form over the Atlantic Ocean and head westwards towards the Caribbean, the east coast of Central America and the southern USA (Florida in particular). Hurricanes may last as long as a month and although they travel very slowly - usually at about 24 km/h (15 mph) - wind speeds can reach over 120 km/h (75 mph).

How hurricanes form
When this warm and wet air rises, it condenses to form towering clouds, heavy rainfall. It also creates a low pressure zone near the surface of the water.
Rising warm air causes the pressure to decrease at higher altitudes. Warm air is under a higher pressure than cold air, so moves towards the 'space' occupied by the colder, lower pressure, air. So the low pressure 'sucks in' air from the warm surroundings, which then also rises. A continuous upflow of warm and wet air continues to create clouds and rain.
Air that surrounds the low pressure zone at the centre flows in a spiral at very high speeds - anti-clockwise in the northern hemisphere - at speeds of around 120 km/h (75 mph).
Air is ejected at the top of the storm – which can be 15km high – and falls to the outside of the storm, out and over the top, away from the eye of the storm. As this happens, it reduces the mass of air over the 'eye of the storm' - causing the wind speed to increase further. Some ejected air also cools and dries, and sinks through the eye of the storm, adding to the low pressure at the centre.
The faster the winds blow, the lower the air pressure in the centre, and so the cycle continues. The hurricane grows stronger and stronger.
Seen from above, hurricanes are huge circular bodies of thick cloud around 450 km (300 miles) wide. The cloud brings heavy rain, thunder and lightning.
In the centre is the **eye of the hurricane**, about 45 km across (30 miles) across. Often there will be no clouds in the eye. Seen from below it will seem calmer, with a circle of blue sky above. The eye is formed because this is the only part of the hurricane where cold air is descending.
In the northern hemisphere, the prevailing easterly tropical winds tend to steer hurricanes toward land - although their course is unpredictable. As hurricanes move inshore, their power gradually reduces because their energy comes from sucking up moist sea air.





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Paper 1 Topic 2 Weather hazards and climate change – Tropical storms

	Description	Impact on people	Impact on environment
High Winds	Winds from 119 – 250 kmph	• Infrastructure such as power lines damaged • Buildings destroyed • Loss of life/injury	• Trees uprooted
Intense Rainfall	Heavy rainfall causing surface flooding	• Damage property • Injury • Potential loss of life	• Flooding • Pollution of water systems
Storm Surges	Low pressure allows local sea level to rise, the winds help push the water up on land	• Coastal defences destroyed • Flooded inland areas contaminating farmland • Damage to properties	• Beaches and coastal habitats destroyed
Coastal Flooding	Intense rain and storm surges leads to coastal flooding	• Peoples lives and properties at risk of destruction • Farming, tourism and industry at risk of flooding	• Salt water intrusion • Habitats destroyed • Water contamination
Landslides	Intense rain in high relief areas can saturate the soil quickly, making it heavy. This can mean the soil can't hold together	• Settlements destroyed/damaged • Transport routes cut off • Loss of life and injury • Displacement	• River flooding if a channel is blocked • Habitats destroyed • Debris contaminate water

Physical vulnerability:
Coastal areas are more at risk as tropical cyclones form over oceans and seas. Island nations (e.g. Maldives and the Philippines) are more vulnerable as they are surrounded by warm water and are low-lying. They are more likely to suffer flooding, storm surges and high wind speeds. Some areas are also at risk from heavy rain and landslides

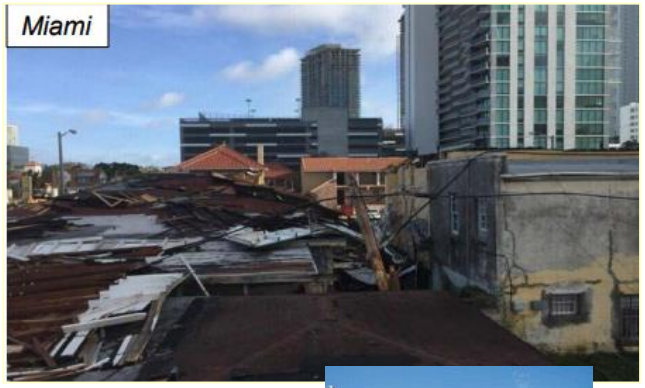
Economic vulnerability:
Countries with higher levels of development are more likely to have better technology to prediction and monitoring systems and are therefore able to prepare for tropical cyclones by evacuating areas and putting up coastal defences and preparing emergency response teams

Social vulnerability:
Areas with high poverty are more vulnerable as infrastructure (buildings etc) are not very stable and will be easily damaged or destroyed. The after effects also worse in poorer areas as there might not be access to food, water, medical supplies etc often resulting in higher losses of life. Age is another social inequality, older and younger people are more vulnerable as they are likely to suffer an injury during evacuation and have more difficulty in evacuation too. Young and old are more likely to catch illnesses and diseases

Paper 1 Topic 2 Weather hazards and climate change – Case Study Hurricane Irma

What: Hurricane Irma, Category 5
When: 8th to 11th September 2017
Where: Gulf of Mexico
Who: Barbuda, Caribbean Islands, Florida, USA

Why/How: **Causes**
Description:
Tropical depression formed in the Atlantic Ocean. Spinning vortex of winds as heat energy is evaporated from the ocean to fill gap of very low air pressure.
Sea temperatures 32˚C in Gulf of Mexico. Air pressure 915mb. Trade winds blowing away from the Equator.

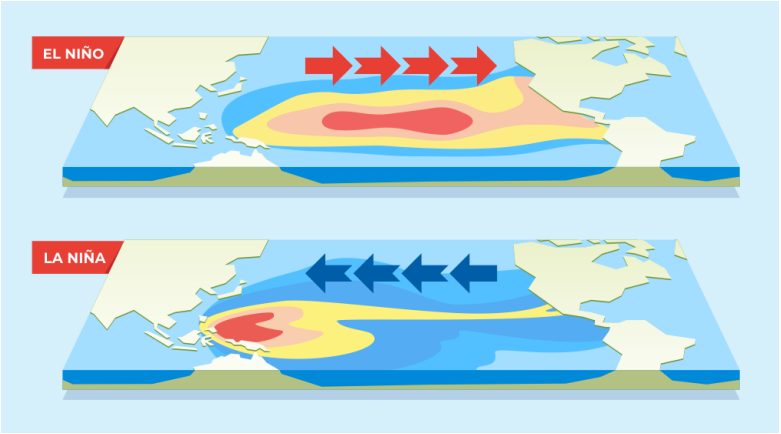


Developing country	Developed country
Caribbean – Barbuda • Up to 185mp winds • 600 students had to go to school on other islands • 90% properties damages • 68 sq. miles covered by Category 5 hurricane • No water or communications – island considered uninhabitable • 3 deaths • Most people evacuated from Barbuda to Antigua • $250 million in damages = 12% of islands GDP • 1,800 residents evacuated • 3m storm surge causing significant flooding • 60 tons of relief supplies sent by USA and British Aid Agencies	**USA – Florida Keys** • 7 direct deaths in USA 85 indirect deaths of which 80 were in Florida • 77,000 people in shelters • 6.5 million ordered to evacuate • 70% buildings built before 1994 • 6.9 million homes left without power • 2 – 3 m storm surge causing significant flooding • 250 to 300mm rainfall an hour • $62.5 million in damages • Loss of tourism trade

Paper 1 Topic 2 Weather hazards and climate change – Droughts

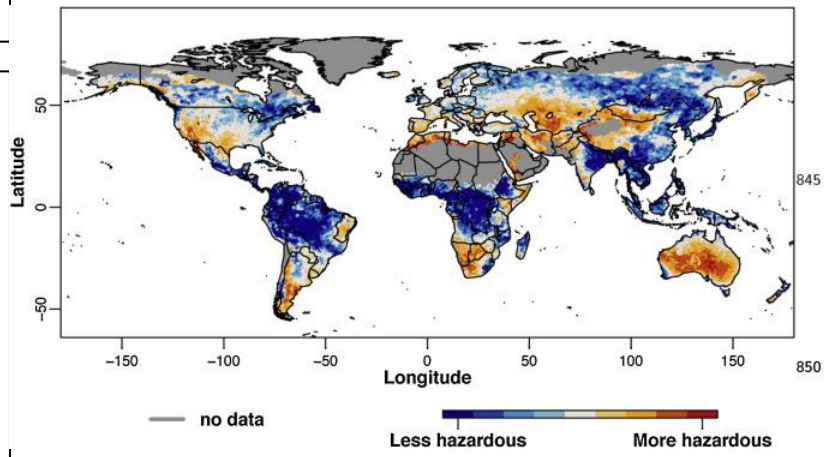
Characteristics and types of droughts
Droughts occur when there is abnormally low rainfall for an extended period of time. This means that a desert would not be considered in drought unless it had less rainfall than normal, for a long period of time. Droughts can last from weeks to months and even years.

Why are some areas more vulnerable to droughts?
Droughts can occur all over the world. However, there is a link between drought and some climate patterns.
•A lack of water vapour in the atmosphere means there is less **precipitation** and more chance of drought. High-pressure systems reduce evaporation and moisture in the atmosphere.
•**El Niño** – as the surface temperature of the Pacific Ocean around the central South American coast **increases**, storm patterns are disrupted. This phenomenon is thought to create droughts in Indonesia and Australia.
•**La Niña** - as the surface temperature of the Pacific Ocean around the central South American coast **decreases**, storms are again disrupted and North and South America are prone to



Types of droughts
There are three main types of drought:
•**Meteorological drought** – when the amount of precipitation received in a specific area is less than the average.
•**Hydrological drought** – when reduced precipitation impacts on **water supply**, eg there is decreased streamflow, soil moisture, reservoir and lake levels, and groundwater.
•**Agricultural drought** – when the above two types of drought impact on agricultural activities, eg reduced soil moisture or reservoir levels required for **irrigation**.

Hazardous impacts of droughts
Droughts, unlike **earthquakes** and **volcanic eruptions**, are not a sudden hazard event. Instead, their beginning and end are hard to gauge and they can last for months and even years.
Approximately 780 million people worldwide lack a reliable and sufficient water supply. This can have many serious impacts:
•A lack of clean and reliable water can cause people in developing countries to drink contaminated water which could cause a range of diseases such as cholera and typhoid.
•Commercial and **subsistence farmers** can experience high crop or livestock losses and a reduction in the land's value. Subsistence farmers may experience **famine**.
•With less moisture and rainfall, wildfires can become common, damaging crops, buildings and even causing death.
•Businesses and services which rely on clean water may be closed, eg hospitals and restaurants.
•Conflicts or war between people and countries can occur when pressure is put on water supplies. It can also lead to people having to migrate away from drought-stricken areas.



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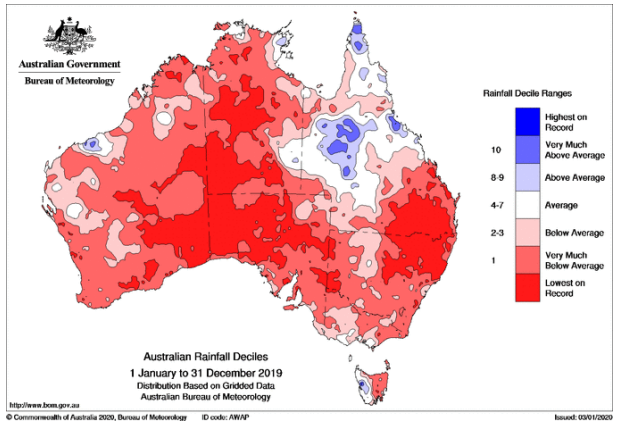
Paper 1 Topic 2 Weather hazards and climate change – Case Study Australia

What: Worst drought in 125 years
When: 2002 to 2009
Where: South-east Australia
Who: Everyone, especially farmers

Why/How: **Causes**
Description:
This was credited to El Niño, where moist trade winds are reversed, so instead of bringing rainfall to Australia they travelled west towards South America, leaving south-east Australia with a lack of rainfall. Some scientists believe climate change exacerbated this drought by also reducing rainfall.

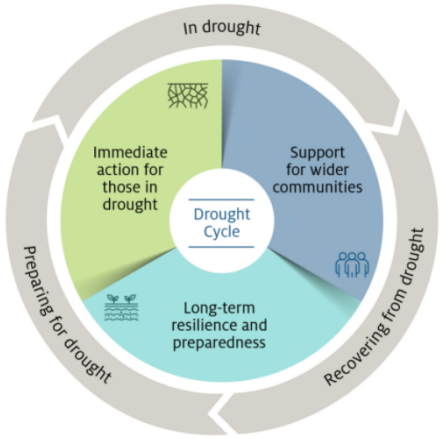
The region most affected was the Murray-Darling River Basin in New South Wales. This area usually provides 75% of Australia's water, 40% of Australia's agricultural produce and is home to nearly 2 million people.

This drought had severe **agricultural impacts**:
•Significant loss of livestock and crops. Some farmers had to sell machinery, land or even move elsewhere and lose their livelihood.
•With fewer crops and livestock, Australia had to import more food. This increased the price of food for the whole country.
•Droughts degrade the quality of the soil, affecting farming for years to come.
This drought had severe impacts on the **natural ecosystem**:
•Wildfires caused by drought destroyed vegetation and animals' habitats.
•Creeks and rivers dried up causing the organisms relying on them to die or migrate.
•Increased soil erosion destroyed vegetation and the creatures which relied on it to survive.



Responses

$11.1 billion in Australian Government funding committed to drought-related programs since 2018-19 (as at 31 December 2021)



Long-term resilience and preparedness

$5 billion Future Drought Fund
8 drought resilience hubs
80 soil and agricultural landscapes projects

Immediate action for those in drought

2,567 drought loans to farmers
124 drought loans to small businesses
11,389 rebates for on-farm emergency water infrastructure
16,800+ farmers received Farm Household Allowance (since 2014)
1,591 small regional businesses accessed rural financial counselling
57 regional climate guides

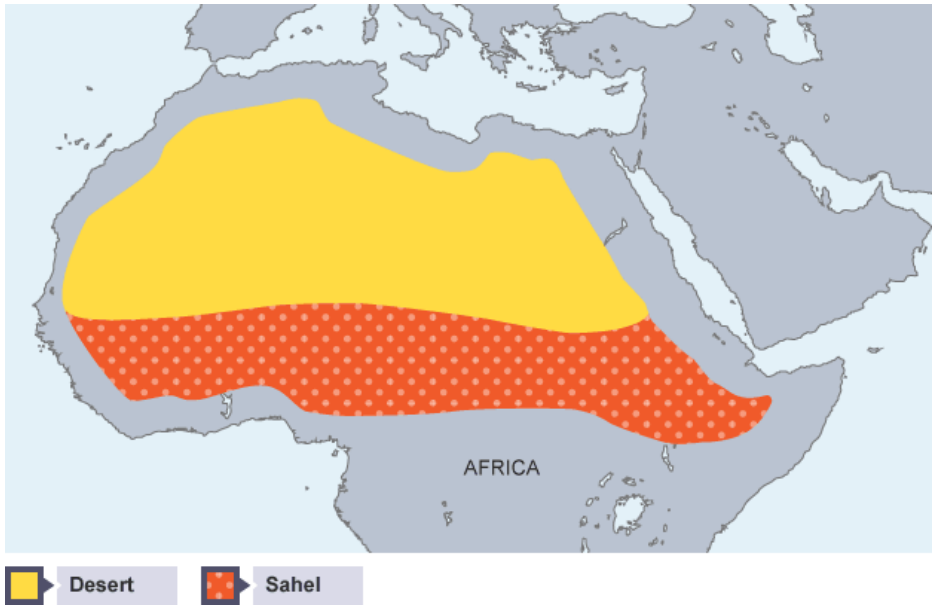
Support for wider communities affected by drought

57,000+ households assisted to pay urgent expenses
Support for **180** local government areas (infrastructure & other projects)
Support for **250** schools
$10+ million in cash and/or voucher support for farmers

Paper 1 Topic 2 Weather hazards and climate change – Case Study The Sahel Ethiopia

The Sahel is located directly south of the Sahara desert and stretches from the east to the west of Africa. The Sahel is semi-**arid**, receiving between 250 and 450 mm of rainfall in total in an average year, however it only falls in one or two months. This region provides Africa with food and cash crops such as millet and cotton.

Since the 1970s, the Sahel has experienced drought conditions on a regular basis. This is down to physical and human factors:
•**Overgrazing** and **deforestation** on **marginal land** can lead to **desertification**. With less vegetation there is less **transpiration** and **evaporation** from the soil, causing less rainfall.
•Changes in surrounding ocean temperature – the temperatures of the south Atlantic and Indian Oceans increased, with a smaller temperature gap between land and ocean, and **monsoon** rains were reduced.
•Some scientists believe climate change has reduced rainfall or made it less predictable.



The social and economic impacts of drought in the Sahel
Social impacts
•Subsistence farmers' crops fail and livestock dies. This can lead to famine and hunger.
•Commercial farms growing cash crops such as cotton lose income, which may cause unemployment.
•With less food being grown and an increase in demand, food prices increase.
•Increased soil erosion makes the land less fertile, creating a long-term issue for the farming community.
•Clean water is not available for people to drink, increasing the use of contaminated water and diseases such as cholera.
•People (usually women and children) travel further to find water, which means children miss school and the carrying of heavy loads can lead to back problems.

Environmental impacts
•Seasonal rivers and water holes dry up, so organisms which live in them or rely on them for water may die.
•Vegetation dies causing animals depending on it for food or shelter to perish or migrate.
•Increased soil erosion. Eroded material is washed into rivers or water holes resulting in contamination.

Attempted solutions
•Encouraging farmers to grow drought-resistant crops.
•Improving knowledge and understanding of droughts across the region by launching the Africa Climate Exchange
•Use of drip irrigation systems to reduce water usage.
•Lines of rocks are placed across the land to slow flowing rainwater and encourage the **deposition** of sediments (rich in nutrients). This is a cost-effective option.

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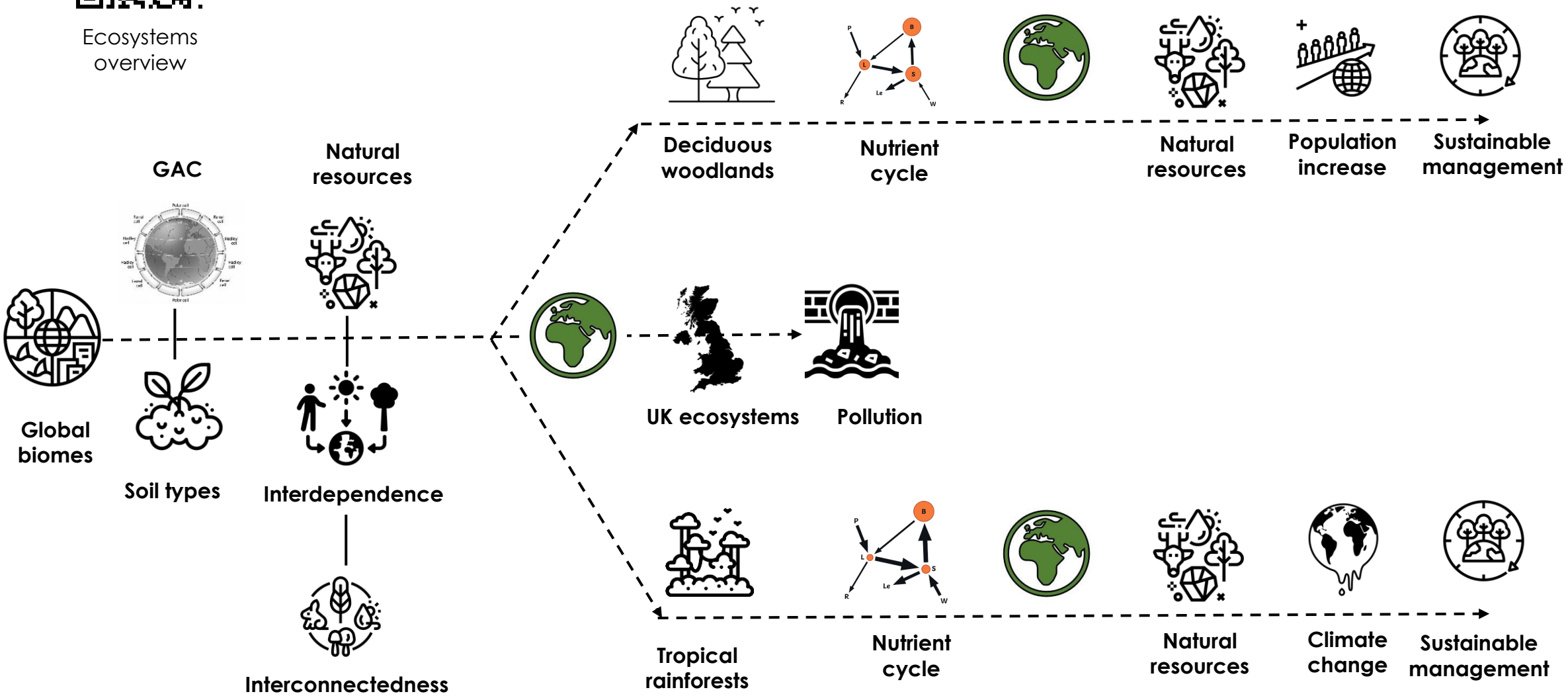
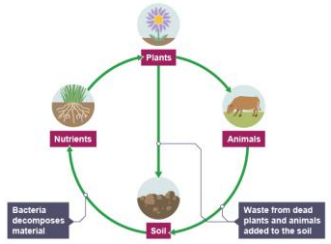
Paper 1 Topic 3 Ecosystems, biodiversity and management

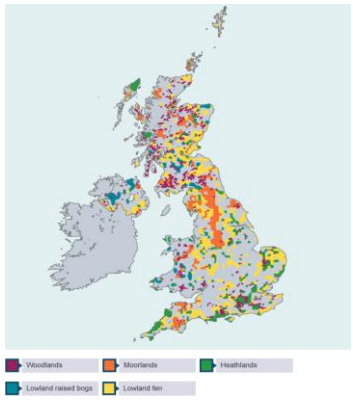
Ecosystems overview



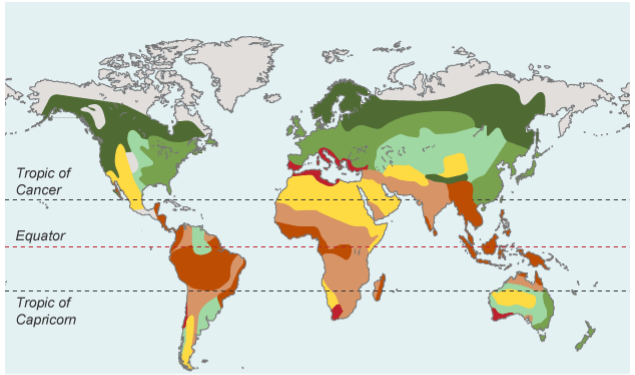
Paper 1 Topic 3 Ecosystems, biodiversity and management

An **ecosystem** is a natural environment and includes the **flora** (plants) and **fauna** (animals) that live and interact within that environment. Flora, fauna and **bacteria** are the **biotic** or **living components** of the ecosystem. Ecosystems are dependent on the following **abiotic** or **non-living components**:
•**climate** - the temperature and amount of rainfall are very important for determining what **species** can survive in the ecosystem
•**soil** - the soil type is important as this provides nutrients that will support different plants
•**water** - the amount of water available in an ecosystem will determine what plants and animals can be supported
The biotic parts of the ecosystem, which include bacteria, flora and fauna, have a complex relationship with the abiotic components - changing one will lead to a change in the other.



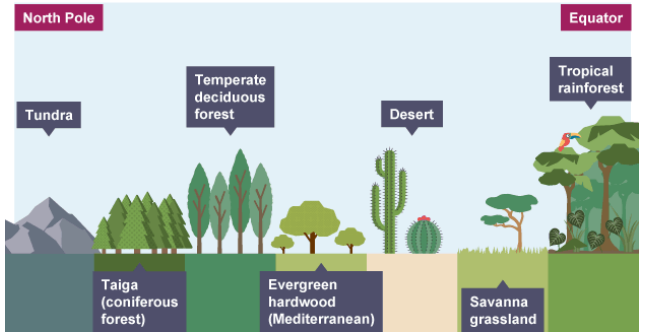


Ecosystems are very sensitive to change. The **living** and **non-living components** of the ecosystem can be altered by either **natural factors** or **human management**.
Changes to the ecosystem caused by **natural factors** include:
•drought
•flood
•fire
•disease
Changes to the ecosystem caused by **human management** include:
•introducing more fish (fish stocking)
•altering the drainage of the land which may influence the amount of water
•changing the **pH level** of the water
•altering the nutrient levels of the water if fertilisers are **leached** into the water resulting in **eutrophication**
Any of these changes can have a negative impact on the ecosystem and could result in the collapse of a **food chain**.



Only 12% of the land area of the UK is made up of woodland. 80% of these are less than 100 years old and only 5% could be considered 'ancient' woodlands. In England they are mainly made up of broadleaf **deciduous** trees such as oak and ash, whilst in Wales, Scotland and Northern Ireland the trees are mainly **coniferous** such as firs and pines. The largest forests are Galloway Forest Park in Scotland, Kielder Forest Park in north-east England and the New Forest in southern England.

The UK has some of the best **marine ecosystems** in Europe, with a wide diversity of underwater habitats and species. Many of our marine habitats and species are particularly rare and therefore of international importance, for example, the bottlenose dolphin. These marine ecosystems are under threat from bycatch, overfishing, pollution and shipping



Paper 1 Topic 3 Ecosystems, biodiversity and management – tropical rainforests

Tropical rainforests have distinct characteristics that support a wide variety of different **species**. This means that they have a high **biodiversity**. The **biotic** or living components of the ecosystem and the **abiotic** or non-living components of the ecosystem depend on one another - a change in one leads to a change in the other.

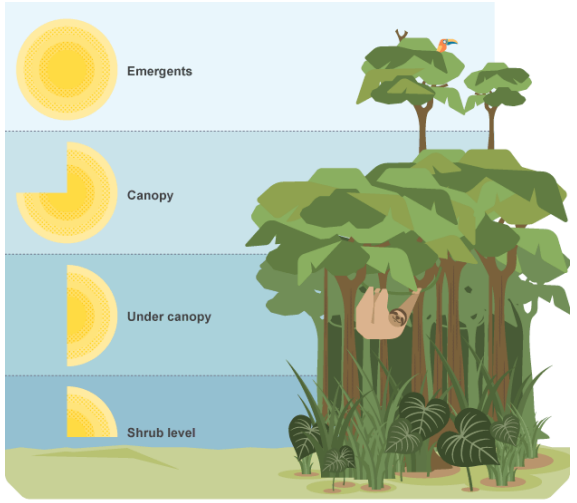
Climate
•Very wet with over 2,000 mm of rainfall per year.
•Very warm with an average daily temperature of 28°C. The temperature never drops below 20°C and rarely exceeds 35°C.
•The atmosphere is hot and **humid**.
•The climate is consistent all year round. There are no seasons.

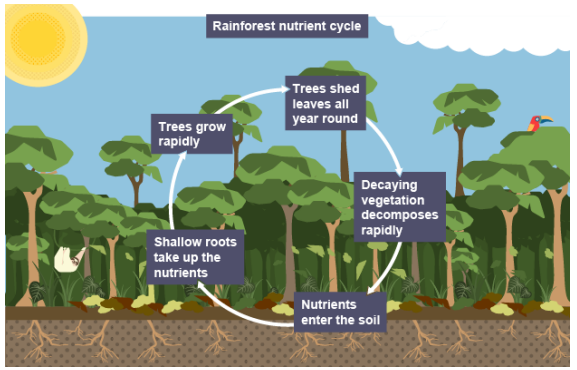
Soil
•Most of the soil is not very **fertile**.
•A thin layer of fertile soil is found at the surface where the dead leaves decompose.
•It is red in colour because it is rich in iron.
•Due to heavy rainfall the nutrients are quickly washed out of the soil.

Plants and animals
•The warm and very wet climate provides perfect conditions for plant growth.
•The wide range of plant **species** supports many different animals, birds and insects.
•Species have **adapted** to the conditions of the rainforest, eg trees and plants have shallow-reaching roots to absorb nutrients from the thin fertile layer in the soil.

Structure of a tropical rainforest
A tropical rainforest is made up of the following layers:
•ground level
•shrub layer
•under canopy
•(main) canopy
•emergents

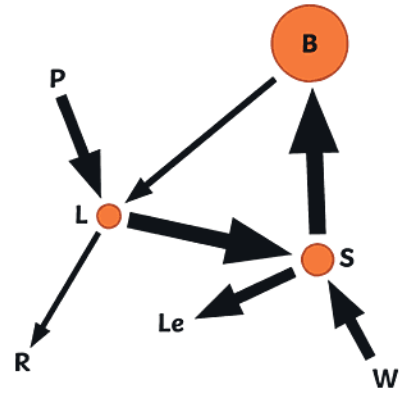
Both plants and animals have adapted to live in the tropical rainforest but climate change threatens their habitats





Tropical rainforests act as life support systems for the planet as they:
- **regulate the atmosphere**
- **maintain soil health**
- **influence the hydrological cycle**
- **Provide food, cash crops, medicines and raw materials**

Threats to the tropical rainforests through deforestation include:
- **agriculture**
- **logging**
- **mining**
- **roads**
- **HEP**
- **population growth**



Paper 1 Topic 3 Ecosystems, biodiversity and management – Case Study Ecuador

Since the 1960s millions of hectares of rainforest have been cut down to make way for oil and mineral extraction, logging, cattle ranching and plantations. Today deforestation continues at an alarming rate – an area the size of Wales is lost every year. The promise of riches has also brought millions of new workers and colonists to the Amazon changing the lives indigenous peoples forever.

Threats and challenges

Political and economic primary causes - Government sanctioned oil extraction from 1960's by PetroAmazonas (TNC) was expected to increase GDP but each oil well needs around 2 hectares of forest to be cut down, waste products were pumped to the surface to mix with waste water creating toxic soil, liquid leeches through the soil into rivers leading to no fish, destroying the food chain.

Political and economic secondary causes - creation of roads through the rainforest led to barriers for movement of animals reducing breeding spaces, population increase of 'colonists' (described as neo-colonial environmentalism) into the rainforest who removed the smaller trees for building and using 'slash and burn' techniques for small-scale farming, leading to nutrient-poor soil commercial loggers removed larger trees, often illegally, poor soil led to large-scale cattle ranchers rearing beef for sale in in Europe and the US.

Palm oil plantations (cash crop) - in many products used world-wide are not native to the rainforest and so require very large areas of rainforest to be cleared, reducing biodiversity (monoculture) (130 000 hectares cleared for palm oil production) and using pesticides to control plagues, which further leeches into the water system. Oil has increased Ecuadorian economy but more than 80% of indigenous people in the oil producing areas live below the poverty line.

Political sustainable management

Government policies - creation of Yasuni National Park - proposed the international community pay Ecuador 3.6 billion US$ to leave the oil and it's carbon emissions in the ground which would be used to help indigenous communities and reforest the area but limited economic response from other governments and oil extraction began in 2014. Following decline in oil prices Ecuadorian government sanctioned Fruta Del Norte to mine for gold in attempt to reduce poverty. Signed global agreements such as the Paris Agreement to limit CO^2 emissions.

Large-scale NGOs - RAMSAR sites - Limoncocha National Park and Nature Reserve attracts 10,000 tourists a year allowing protection of endangered species, protecting the forest against development, protecting biodiversity and local communities

Small-scale NGO's - Sumak Allpa - conservation and protection of, for example, Woolley monkeys and red-tailed Boa Constrictor funded by private individuals, or NGOs like the WWF

Economic policies - Yachana Lodge - sustainably built log cabins using solar panels to generate electricity and rainwater collections for showers and toilets, tourists are confined to guided trails

Microfinance - small scale loans to assist individuals to start up sustainable logging and agriculture businesses

Education policies - Yachana Foundation - runs residential training courses for local communities providing further employment opportunities, training courses in sustainable crop management and Forest Stewardship courses in sustainable logging

Paper 1 Topic 3 Ecosystems, biodiversity and management – deciduous woodlands

Deciduous woodlands have distinct characteristics that support a variety of different **species**. This means that they have a moderate **biodiversity**. The **biotic** or living components of the ecosystem and the **abiotic** or non-living components of the ecosystem depend on one another - a change in one leads to a change in the other.

Climate
- no extremes of temperature or rainfall - 4 seasons
- average summer temperature 15-17° C, winter is cooler but usually above freezing, leading to long growing season
- rainfall quite high, about 1000mm a year.

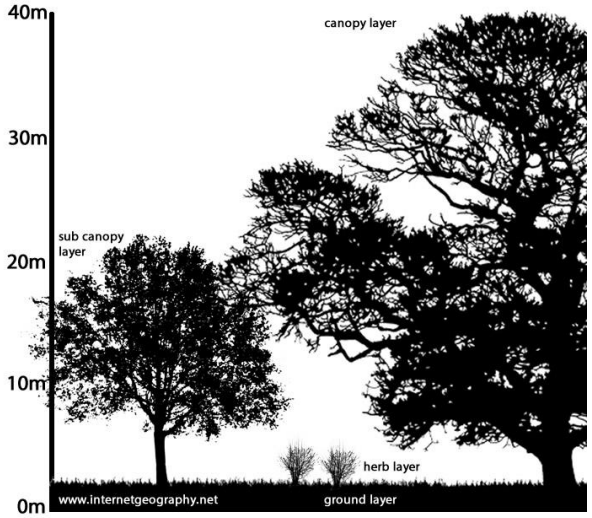
Soil
- fallen leaves decompose quite quickly forming think layer of organic matter (humus) enriching the soil
- earthworms and other decomposers mix humus with minerals from bedrock to create thick, rich soil called brown

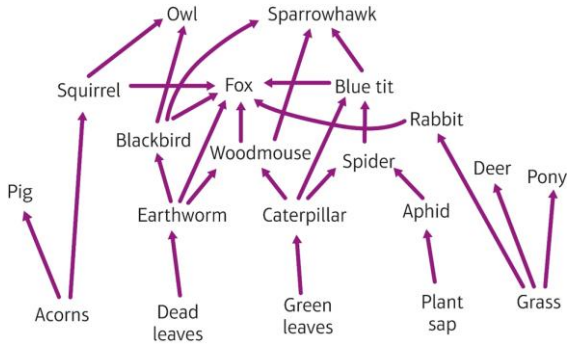
Plants and animals
- dominated by tall, broad-leaved trees - leaf loss in autumn, stratified layers
- stratified layers provide a variety of habitats for birds, insects and small mammals, larger animals such as foxes and rabbits burrow in the ground under the trees
- ancient woodlands used by humans for wood fuel, nuts, fruit, tree sap, timber and recreation

Structure of a tropical rainforest

A deciduous woodland is made up of the following layers:
- ground level
- herb layer
- sub canopy
- (main) canopy

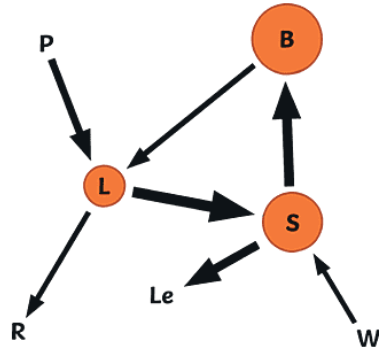
Both plants and animals have adapted to live in the deciduous woodlands but climate change and population growth threatens their habitats





Deciduous woodlands provide many natural resources including:
- **timber**
- **fuel**
- **conservation**
- **recreation**

Threats to deciduous woodlands through deforestation include:
- **agriculture**
- **population growth**
- **urbanisation**
- **timber extraction**
- **HEP**
- **population growth**



Paper 1 Topic 3 Ecosystems, biodiversity and management – Case Study The New Forest

The New Forest is a National Park in Hampshire, south east England, awarded status in 2005. About 175,000 people live in the area and up to 15 million people visit the area annually.

Threats and challenges

Social causes of deforestation

Increasing population numbers in the UK means that more land is required for housing. The government need to build around 240,000 homes a year to cope with demand. Forests are cleared in order to accommodate this

Increasing urbanisation in the UK has led to forested areas being converted for additional land use including the expansion of cities to create jobs for people

Traffic congestion is an increasing problem and so areas of woodland are cleared to make carriageways wider

Economic causes of deforestation

Tourists can damage plants by trampling, footpaths are eroded by walking, cycling, horse-riding and car parking on verges and risk of starting fires with barbeques

Timber is extracted form both softwood (coniferous) and hardwood (deciduous) trees. Non-native conifers are easier and faster growing which means a faster profit.

Over 40% of the New Forest is **privately owned** and not managed.

Pesticides and herbicides used to control weeds in agricultural areas damages edges of woodlands

Sustainable Management

Controlled tree felling - trees are selectively cleared and replaced by other deciduous species in higher numbers

Limit pesticide use to prevent damage to plant and animal species

National Park Authority set up to raise awareness through campaigns

Landowners funded to plant trees, encourages better use of the land

Sustainable transport schemes – electric scooters, bikes and tour buses

Green leaf tourism – limits tourists numbers, ensures hotels operate in a 'greener' way, promotes use of local products

Restrict logging April-August to protect nesting birds

NEW FOREST NATIONAL PARK

Paper 2 Topic 4 Changing Cities

Changing cities overview








UK Population urban areas | London location | Urban structure London | Population | De-industrialisation | IMD | Shopping | Regeneration




Urbanisation

Developed
Emerging
Developing

Internal and International Migration







Mumbai location | Urban structure Mumbai | Population increase | Colonialism | Chawls | Redevelopment

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Paper 2 Topic 4 Changing Cities

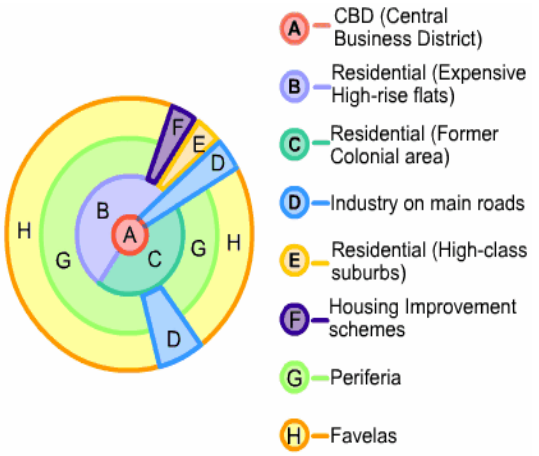
The world's population is growing rapidly and reached 7.3 billion people in 2011. The highest rates of population growth are occurring in **developing countries**, such as Zimbabwe, Malawi and Niger. Some countries are experiencing population decline, for example Japan, Russia and Ukraine.
Today more than 50% of the world's population live in **urban areas**. The number of cities with over 10 million people is increasing. These are called **megacities**. There are now 34 megacities in the world. The table and map below shows the top 10 megacities.

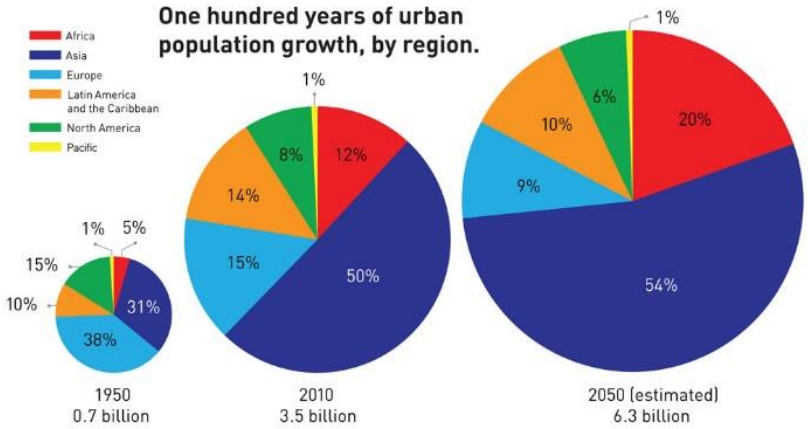
Top ten megacities (Source: Demographia World Urban Areas 2015)

Rank	Urban area	Country	Population estimate
1	Tokyo-Yokohama	Japan	37,843,000
2	Jakarta	Indonesia	30,539,000
3	Delhi	India	24,998,000
4	Manila	Philippines	24,123,000
5	Seoul-Incheon	South Korea	23,480,000
6	Shanghai	China	23,416,000
7	Karachi	Pakistan	22,123,000
8	Beijing	China	21,009,000
9	New York	United States	20,630,000
10	Guangzhou-Foshan	China	20,597,000

Causes of urban growth
The population of cities usually changes in one of two ways:
1.Natural increase (or decrease) - this is the difference between the number of births and the number of deaths.
2.Migration - this is the movement of people into or out of the city.
More and more people are leaving **rural areas** and moving to cities. This is called rural to urban **migration**. People move because of **push** and **pull factors**.
Push factors are things that **make people want to leave** rural areas and **pull factors** are the things that **attract people** to a city.

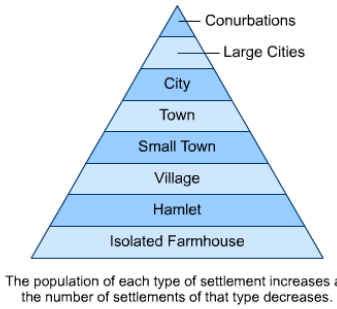
Poorer rural to urban migrants in developing and emerging countries tend to cluster in **spontaneous settlements** on land that is not suitable for wanted for urban dwelling to work in the **informal economy**. This land is often at **greater risk** from natural hazards such as flooding or landslides and is often contaminated land.





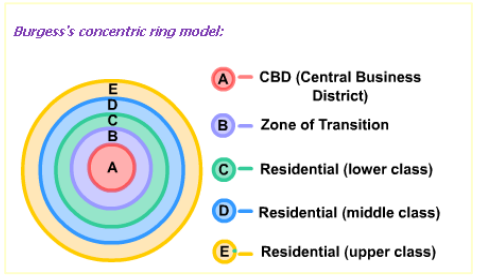
Paper 2 Topic 4 Changing Cities – Site, Situation and Structure

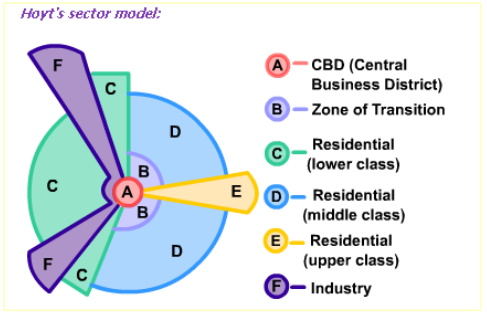
The **Site** of a settlement describes the physical nature of where it is located. Factors such as water supply, building materials, quality of soil, climate, shelter and defence were all considered when settlements were first established. **Settlements** can be described as being part of the **urban hierarchy**. Where they stand on the hierarchy depends on a number of factors, the main ones being population, the number of services a settlement has and its sphere of influence. The **function** of a settlement describes all the main activities that occur in it e.g residential, recreational, retail, government, entertainment and industrial.

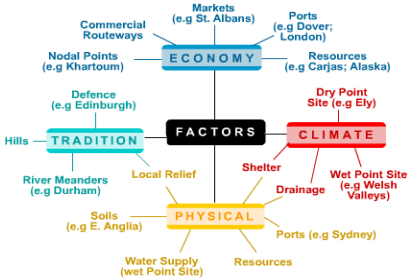


The population of each type of settlement increases as the number of settlements of that type decreases.

Services and functions



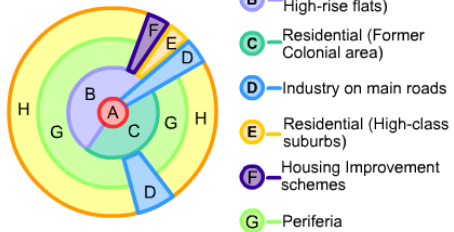




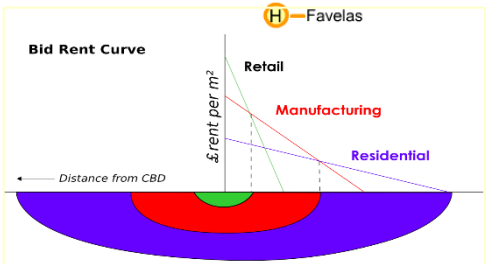
Site factors

Most **inner cities** of large urban areas in **developed countries** once had industry located there, however this has almost totally moved out. The Victorian terraces built to house the factory workers remain in many inner cities, however in some they have been replaced by huge tower blocks.
Although seemingly the solution to the problems produced by the terraces, the tower blocks also caused a wide range of social problems. Recently inner city planning has centred around **rejuvenating** the area in alternative ways, to try to encourage the growth of these declining areas.

Waugh's model of a developing world city:



Shanty Towns are the illegal squatter settlements in LEDC's. Huge numbers of people migrate from the rural areas to the cities.
•The cities most likely to have shanty towns are centres for commercial and industrial activity as well as being transport centres. They are very attractive to in-migrants.
•Most of the new in-migrants have very few skills, education or money.
•Shanty towns develop on marginal land, often close to where the in-migrants hope to get work. The high cost of land near the CBD means that shanty towns are either built on the periphery of the city or in hazardous areas closer to the city centre.



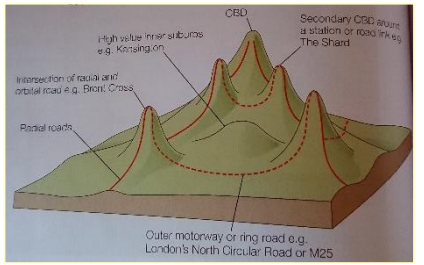
Greenbelts were established to prevent the continued growth of many of the largest cities of England and Scotland. They are rings of heavily protected open land circling an urban area. They aim **to protect the surrounding countryside** from development, and in some cases stop two large cities from merging. **Planning permission** is not usually granted for schemes on green belt land, although there is often great pressure to allow some proposals through. The M25 is built through much of London's greenbelt. One of the main problems of the greenbelts is that they have led to people commuting further into work.

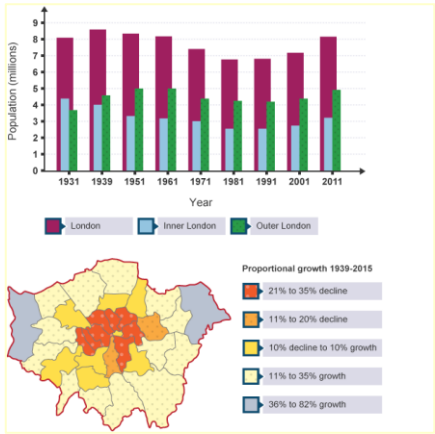
Urban zoning

Kemnal Technology College

Paper 2 Topic 4 Changing Cities – Case Study London

London has local, regional and even world importance:
•**Internal and international accessibility** - London has great importance due to its high connectivity.
•M25 orbital motorway connected to other major cities
•Rail network with terminus for Eurostar
•5 international airports
World network of financial centres - London has become the international financial centre for Europe and is one of three world financial cities alongside New York and Tokyo. Many global banks have headquarters here.
•**Transnational corporations (TNCs)** - 500 TNC's in the UK with 271 HQs in London and further 28% along M4 corridor.
•**Market** - London is the largest and most affluent market in the UK and therefore top international retailers have locations in London to take advantage of this market.

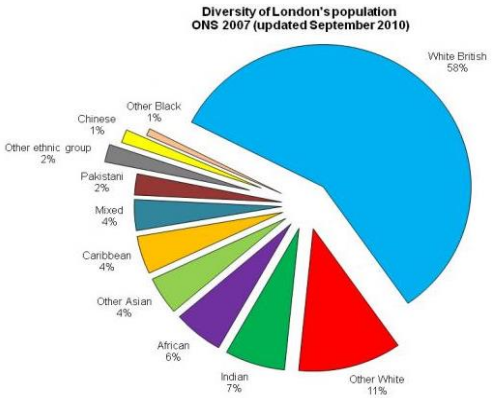


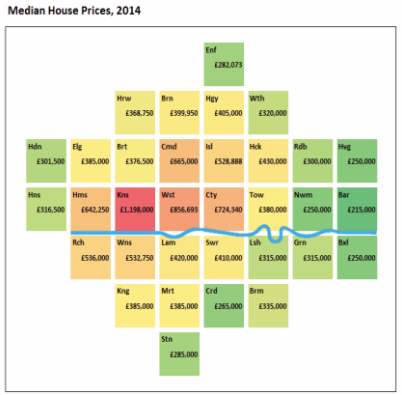


House and land prices vary across the capital with jobs, education, connectivity and environment all being major contributing factors.

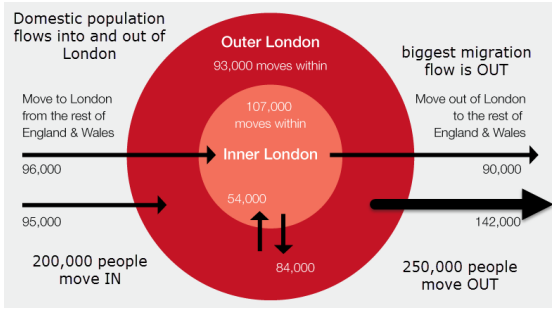
Urban sustainability
Urban areas can be made more **sustainable** by encouraging:
- **water conservation**
- **energy conservation**
- **waste recycling creating green spaces**

Transport
- **London Underground**
- **Oyster card**
- **Congestion Charging zone**
- **Bike sharing scheme**

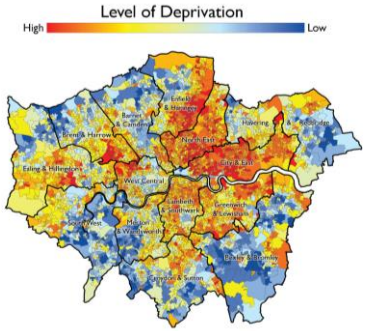


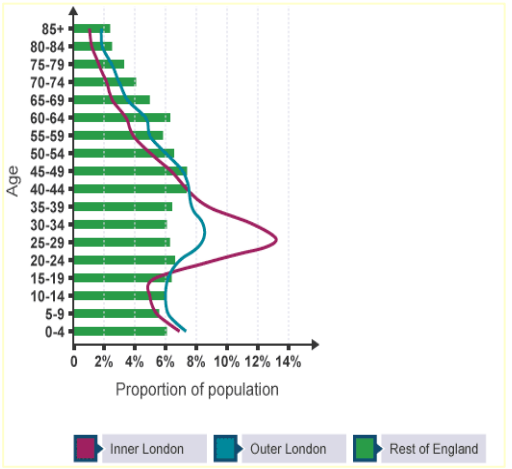


Changes in **population** are the result of the changes in the economic structure of London. For example, as the docks closed, manufacturing was lost, particularly in the Lea Valley. This led to many job losses in inner London and migration out of the city, resulting in a loss of population in inner London.



Deprivation (using the IMD) highlights areas where there is, in some cases, considerable lack of **quality of life**. This would include increased **crime** rates, poor access to **health**, **housing** and **education** services, **lower income** through low-paid, low-skilled jobs and a poorer environmental quality and **lack of green spaces**.



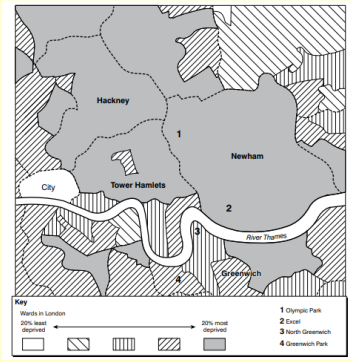


Changes through FDI and TNC investment has encouraged **international migration in London**. This has created one of the most **diverse** and **densely populated** cities in the world. Increased **urbanisation** of London has also led to **counter-urbanisation** as people move out of the city for a 'quieter life' which, in turn, has led to **urban growth** and the increase in house prices and the number of services provided on the **periphery** of the city.

Paper 2 Topic 4 Changing Cities – Case Study Stratford, London

What: Redevelopment
When: 2005 - 2012
Where: Stratford
Who: London Olympic Committee/UK govt. London Mayor, local communities, global media

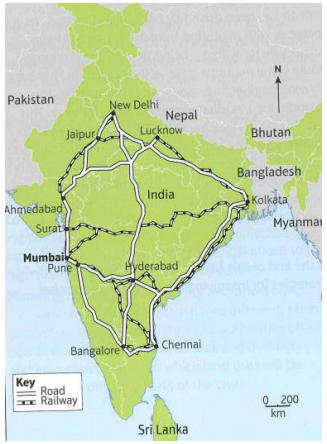
Why: Stratford, East London was chosen as the host city for the London 2012 Olympics in 2005. Stratford, in the Lower Lea Valley, lies to the north of the London Docklands. It had one of the most **deprived** communities in the country, where unemployment was high and levels of health were poor. There was a lack of **infrastructure** and the environmental quality was poor.
The 2012 London Olympics bid was partly successful on the understanding that a sporting complex would be created in Stratford for the Games and regenerated for local people to use after the competitors had left. After the Olympic Games were over, the park was named the Queen Elizabeth Olympic Park.



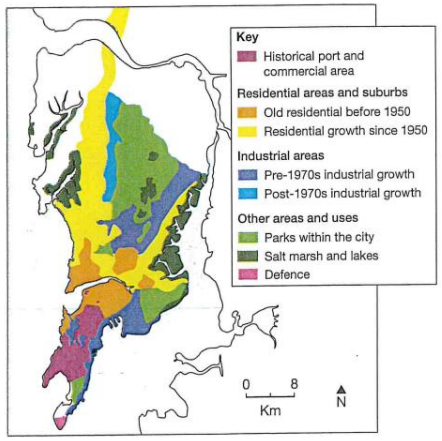
Impacts:
Social: by 2030, more than 10,000 new homes will have been built in the park. Five new neighbourhoods, with lots of green spaces planned in, will be built and around a third of those houses will be affordable. A new academy has been built, which is used to educate around 2,000 pupils between the ages of 3 and 18.
Economic: Stratford is now a well-connected area of London, which allows **commuters** to travel to work easily. New jobs in construction and tourism have created a **multiplier effect**. It is estimated that over 20,000 jobs could be created by 2030, bringing more than £5 billion into the area.
Environmental: the Olympic bid was partly successful on the basis of **sustainability**. The park is sustainable in a number of ways, eg walking and cycling routes, the provision of public transport, the water-efficient design of homes and the protection of green spaces and natural **habitats**.

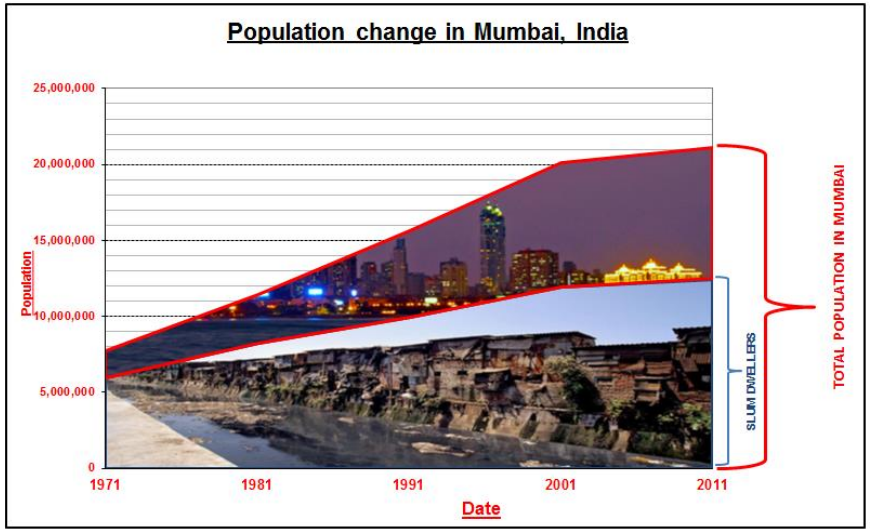
Objections: Areas such as the Carpenter Estate have not yet been **regenerated** and remain in poor condition. But demolition is expected to go ahead in certain areas.
The **redevelopment** of Carpenters Estate will bring many benefits to new and existing residents of Carpenters and Newham including:
- around 3,000 new homes including more than 1,000 high quality affordable homes
- improvements to the quality of public space
- better connections to surrounding areas including access to Stratford Station
- the re-provision and expansion of Carpenters Primary School
- the creation of long term jobs with 20,000sqm of commercial space.

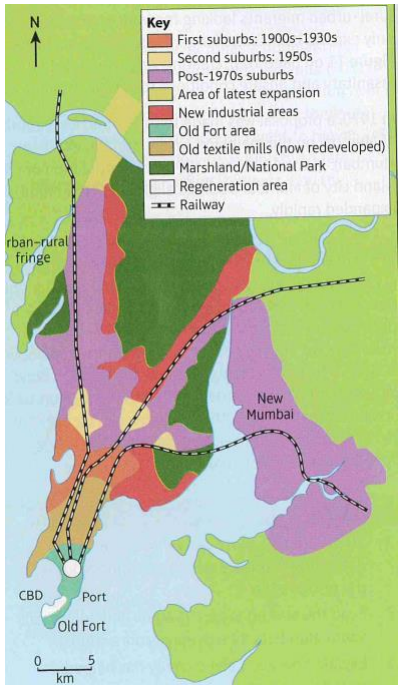
Paper 2 Topic 4 Changing Cities – Case Study Mumbai



Site - low-lying city on an island, just above sea-level, with a natural, deep harbour on the west coast of India
Situation - facing the Arabian Sea, leading to Arabian and European markets
Connectivity - about 9 hours flight time to the UK and about 4 hours to Singapore making it a 'trading bridge' between European and other Asian markets







CBD - not in the centre as it was built around the harbour, but neat the island tip, containing a mixture of old colonial buildings and new high-rise office blocks, plus main commercial centre, some industrial areas near the port, but as land is so expensive many have moved out o places such as Navi Mumbai where the land is cheaper
Inner City - old residential (pre-1950s) - wealthy areas along harbour or coastal waterfronts
Inner suburbs - poor quality permanent housing further from the CBD - low income groups live in 'chawls' - low quality multi-storey buildings where 80% are single rooms
Outer suburbs/rural-urban fringe - spontaneous shanty towns - poorest 60% of people live in informal housing, most are squatter shacks on the outskirts of the city
Homeless - thousands of homeless people live on Mumbai's streets
Industry - developed in strips out from the CBD along transport corridors leading to main roads and airports - increased since economic growth from the 1970s onwards

Estimated population in 2020: 20.6 million
Population in 1991: 9.9 million
Population growth rate: 2.9%
Migration - 1000 national migrants from other parts of India per day, looking for employment - 90% of migrants are from rural areas of India
Natural increase - more important as a cause of population growth in older, congested parts of the city
Economic opportunities - need for homes and infrastructure has created opportunities for economic development including FDI (Foreign Direct Investment and outsourcing of employment from foreign businesses, attracting high quality, highly educated migrants to the city

Urban growth first began with **British colonial trading** and textile production. Today, migrants come from all over India to work in various industries, such as aerospace, engineering and medical research - led to development of new high-rise, high-quality apartments in the inner city and increase in services, including entertainment and high-class shopping centres
Spontaneous settlements - growing as more migrants move to the city from rural areas - lack of basic amenities and services

Paper 2 Topic 4 Changing Cities – Case Study Mumbai

Housing - rapid population growth means lack of affordable housing resulting in spontaneous settlements - built on unsuitable land, liable to flooding, lack of clean water, electricity, rubbish collection or organised sewage disposal meaning a breeding ground for disease

Employment - many employed in informal, low-paid employment providing basic services in very poor conditions, some employment in 'sweatshops' also in poor conditions, with no contract or employment rights, poverty makes crime difficult to avoid

Pollution - lack of sanitation and pollution from local factories lead to water and land pollution, air pollution from high volumes of traffic, heavy industry and power stations

Inadequate services - lack of healthcare, education and transport links

Inequalities

Life at the bottom - Dharavi

Spontaneous settlements - made from any resources available, high population density (at least 300000 people per km²) people per home is between 13 and 17 with very limited sanitation and clean water supply, lack of healthcare and low literacy rates - many in informal, low-paid service industry

Life in the middle - inner suburbs

Small flats, often converted from colonial times, one family, kitchen, bathroom, living room, regular, clean water, middle income, some technology available, electricity, access to healthcare but still limited income

Life at the top - inner city and CBD

Highly educated, young, often speaks English, luxury high-spec apartments, gated communities, often employed in IT or media, able to 'shop' for consumer goods

Improving housing - (top-down) upgrading squatter settlements with proper building materials, (top-down) clearing squatter settlements (Dharavi) and rehousing residents in new blocks, (bottom-up) giving squatter-settlement residents legal ownership of their land and help in improving their homes, (top-down) providing electricity, sanitation and water to squatter settlements

Example

SPARC - Society for the Promotion of Area Resource Centres

Provide small-scale loans to build new toilet blocks and other services in slum areas, making them safer and clear to use, community-led re-housing projects, giving people more rights over where and how they live, acting as an advocate for those affected by squatter resettlement

Mumbai Slum Electrification Project - to provide safe and reliable electricity to individual squatter houses. Connection costs are 50% lower in the squatter settlements than the main city, but daily charges can still be a battle

Mumbai Slum Sanitation Program - aims to build toilets for up to 1 million squatter dwellers. Since 1990, authorities have built over 350 blocks containing around 7,000 toilets

Renovation and Redevelopment Plans - clearance of squatter settlements and rebuild with small apartments, with more facilities, however this can break apart local community networks

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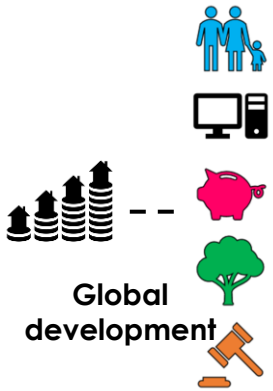
Paper 2 Topic 5 Global Development

Global Development overview



Global development

Social
Technological
Economic
Environmental
Political indicators

Global development gap

Causes of the development gap

Impacts of the development gap

International aid

Debt relief

Bottom-up

Top-down

Location

Social
Technological
Economic
Environmental
Political context

Core and periphery regions

Industry types and employment sectors

Formal and informal employment

Trade and aid

Population changes

Geopolitical relationships

Social
Technological
Economic
Environmental
Political impacts of development

Sustainable development

Paper 2 Topic 5 Global Development

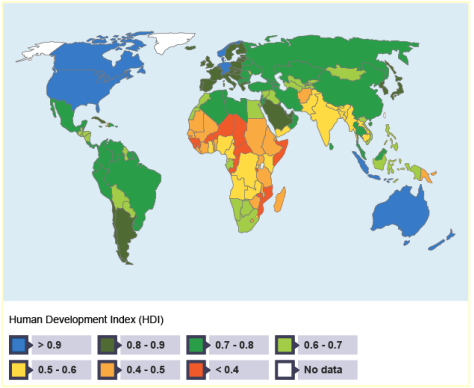
There is no single way to calculate the level of development because of the variety of economies, cultures and peoples.

The North South Divide

Developed countries are countries which have a high *standard of living* and a large *GDP*.

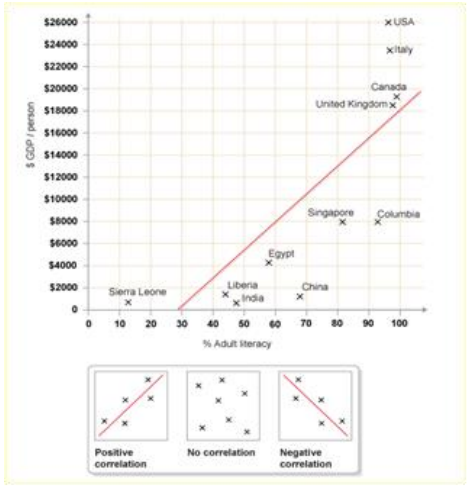
Emerging countries are countries who are going through a transition stage as they industrialise and trade more.

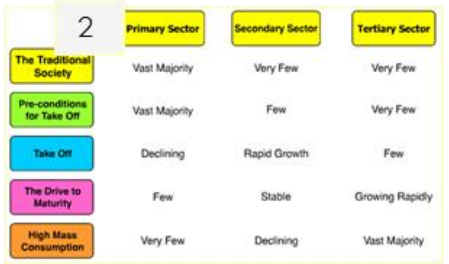
Developing countries are countries with a low standard of living and a much lower GDP.

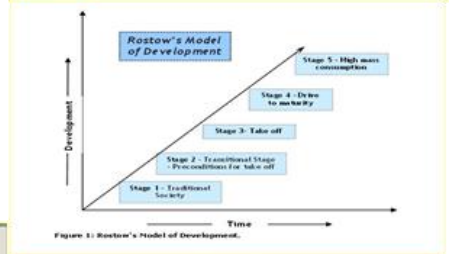


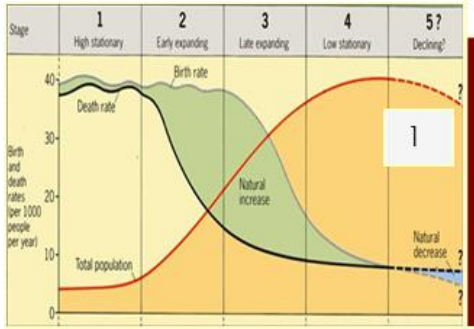
The main indicators

- **Gross Domestic Product** (GDP) - this is the value of all goods and services produced within a country. It is usually measured in US$ and calculated per capita.
- **Gross National Product** (GNP) also includes goods and services produced by that country overseas
- **Infant mortality:** this is the number of infants that die prematurely. Could be the numbers that die before they are one or five. Could be as a % of the births or a per 1,000 figure.
- **Birth Rate**, the number of people born per 1,000 people per year
- **Death rate:** the number of people who die per 1,000 people per year. It will be a clear indicator of the level of health care, quality of water, sanitation, accommodation, and food supply.
- **Literacy rates:** the percentage of people that can read and writ
- **Human development index:** Uses wealth, health and education. It is calculated each year. The best country get "1" the worst "0". This score is compared to GDP tables.









1. **DTM – Demographic Transition Model** – shows as industrialisation and healthcare improves death rate and birth rate falls
2. **Rostow –** shows 5 stages industrialised developed countries have gone through to become developed.
3. **Gunder Frank –** suggest core developed countries are reliant on periphery developing or emerging countries to provide raw materials and developing or emerging periphery countries are reliant on developed core countries to provide work and manufactured goods to develop themselves.

Reasons for lack of development:

Social: High birth rates, lack of contraception, children needed to work on farms, lack of women's rights

Economic: Lack of trading opportunities, concentration of primary jobs, overseas debt

Environmental: Lack of natural resources, lack of trade routes, poor climate, poor soil, landlocked countries, small island communities

Political: Colonialism, war, local conflict, the Slave Trade, corruption

Paper 2 Topic 5 Global Development Top-down and bottom-up aid

There are three main ways to give aid:
A country can give directly to another. This is called **bilateral aid**.
Alternatively, **multi-lateral aid** is that which is given to several countries from an international organisation like the World Bank.
Finally, there are **non-governmental organisations** that we refer to as **charities**. These try to direct the money generated by charity at the needs of the poor, local communities or environment.

Top-down development
Three Gorges Dam, Yangtze River, China.

Government imposed development – controlled flooding of river valleys and communities to build a dam to provide hydro-electric power to major cities in the east of the country.

	Positives	Negatives
Social	• Protects 100 million people from seasonal flooding	• 1.3 million people(communities) displaced with little compensation
Economic	• Generates 22,500MW electricity • Multiplier effect of jobs for people in power companies and cities upstream • Increased trade upstream as container ships can now travel on the Yangtze	• Tourism may be negatively affected • US$26 billion cost
Environmental	• Protects large areas of the river valley from seasonal flooding. • Reduces the need for coal-fired power stations limiting air pollution	• 1300 archaeological sites flooded • Yangtze river dolphin extinct • River pollution from sewerage, farm & industrial waste • Farmers no longer floodwaters
Political	• FDI investment from global developed economies	• Govt did not listen to local residents views

Bottom-up development
WaterAid, Malawi

NGO's with donations from government and the public in developed countries provide ground-water pumps which use sustainable, suitable technology and education about use of water, health, education.

	Positives	Negatives
Social	• Less time needed to collect water • Reduction in water-borne diseases • Children able to go to school instead of collecting water	• Need to train villagers to maintain and repair pumps
Economic	• Cost £292 per pump provided by NGO's • Limited repair costs • Women able to use their time more productively and provide for themselves through trade of goods	• Reliant on charitable donations from NGO's. • Does not increase country trade output as only localised
Environmental	• Clean water provided for many rural villages • Uses groundwater - can be replenished by rainfall	• Rains may not replenish groundwater • Can become over-used
Political	• Sustainable, renewable technology allows 'ownership' by the villagers	• Government does not receive money so does not benefit whole country

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Paper 2 Topic 5 Global Development - Case Study India

Site and Situation

India is the 7th largest country in the world by land mass

Continent: Asia
Nearby countries: Pakistan, Sri Lanka, Bangladesh, Nepal
Nearby oceans: Indian Ocean, Arabian Sea, Bay of Bengal

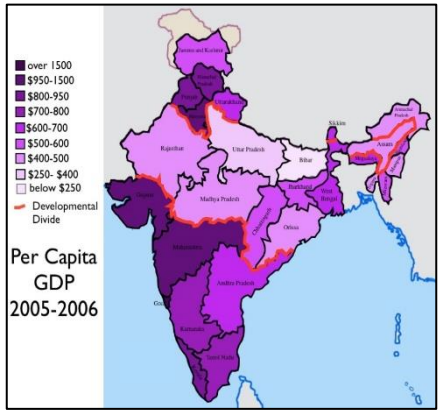
Think like a geographer: How does India's location promote economic development?

- **What other major economies are nearby?** China! Now a major economy and superpower. India and China have existing political tensions. India is a former British colony.
- **Is India landlocked? Which countries are easily accessed?** India is not landlocked, meaning it can easily transport goods internationally by boat. India aims to become a major transport hub within south east Asia.
- **Is India a large or small country? What about its population?** India is a large country, with good access to resources such as coal. India's population is rapidly growing, totals 1.324 billion (2016). This makes India the second most populous country in the world.

Development Indicators

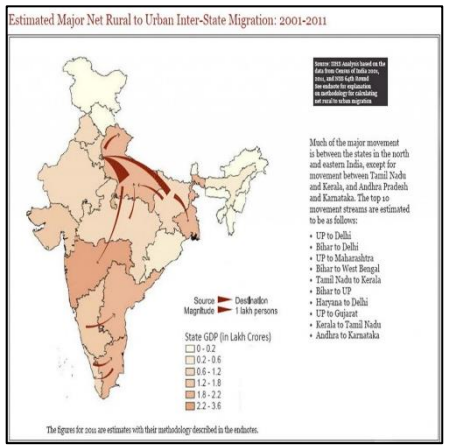
Development Indicator	Social, Economic or Environmental	Value
HDI (Human Development Index)	Social, Economic and Environmental	0.621 (131st in the world)
Life Expectancy	Social	68 years
Adult Literacy	Social	74%
Infant Mortality	Social	34 per 1000 birth
GDP (Gross domestic Product per capita)	Economic	$1,709

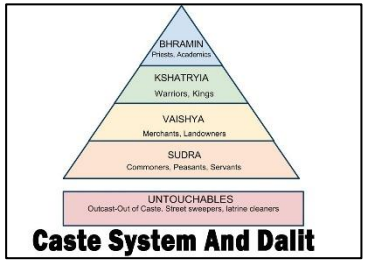
India has experienced rapid economic development since **1991** when it 'opened up' for trade.
However, this has led to **uneven development** across the country with **urbanised core** regions such as **Maharashtra and Tamil Nadu** having 6 times more GDP per capita than **rural periphery** regions such as **Bihar**. This has led to, amongst other **social disparities**, a difference in **fertility rates** across the country.



State	Fertility rate 2013
West Bengal	1.60
Punjab	1.70
Tamil Nadu	1.70
Delhi	1.70
Kerala	1.80
Andhra Pradesh	1.80
Gujarat	2.30
Assam	2.30
Rajasthan	2.80
Uttar Pradesh	3.10
Bihar	3.40

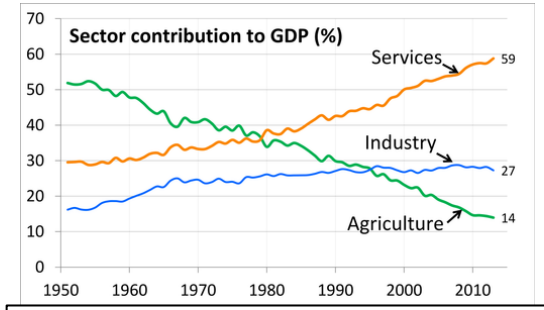
The general trend in employment has been a loss of **primary employment**, with an expansion of the **services sector**.
This, in turn, has encouraged **rural to urban migration**, leading to **urban expansion** and **slum developments.**





India's caste system is among the world's oldest forms of surviving social stratification. The caste system divides Hindus into four main categories - Brahmins, Kshatriyas, Vaishyas and the Shudras. This was encouraged by the British colonizers in order to control the majority of people. In recent decades, with the spread of secular education and growing urbanisation, the influence of caste has somewhat declined, especially in cities where different castes live side-by-side and inter-caste marriages are becoming more common.

Paper 2 Topic 5 Global Development - Case Study India



Since India gained its independence in 1947 from the British and a shift in policy since the 1980s encouraging FDI, there have been significant changes in its economic sectors:
Primary – agriculture has halved to a quarter of its GDP owing to mechanisation as people migrate from rural areas to cities in search of work
Secondary – industrialisation is increasing. However, it is causing air pollution and increasing the population density in cities (spontaneous developments)
Tertiary – services have double to over 50% of GDP owing to increased job opportunities
Quaternary – one of the fastest growing telecommunication markets in the world creating over 1 million ICT jobs
Formal employment - increasing through the number of TNC's now located in core regions
Informal employment - increasing through demand for low-paid, low-skilled services

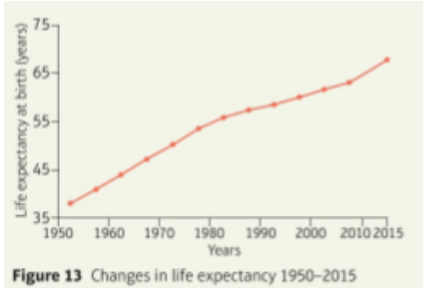
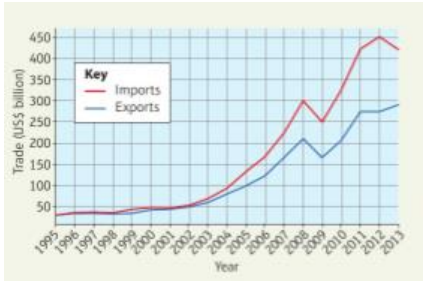


Figure 13 Changes in life expectancy 1950–2015

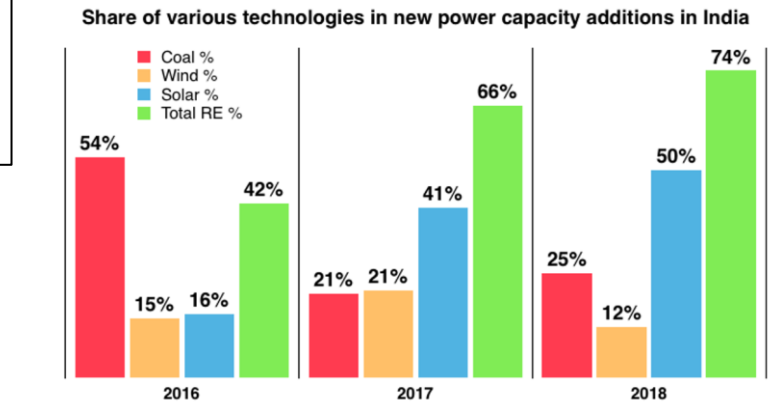
- A smaller proportion of people under 15 as the infant mortality rate drops
- A large proportion of people between (15 and 64) as dependency ratio decreases
- More people over the age of 65+ as life expectancy has improved



Changes to India's trading policy have led to a rapid rise in imports and exports. India's key imports are oil, gold, silver, and electrical goods. India's key exports are oil products, gems and jewellery. As India has developed, international aid has decreased. It now sends aid to poorer countries such as Nepal

India has agreed to invest in renewable energy such as solar power and plant more forest to absorb carbon emissions. India is also a member of the G20, having a greater influence in global politics

Social
Better jobs, income and healthcare
Lack of housing – shanty towns
Younger men benefit from jobs
Economic
Larger workforce, stronger economy
Increase in tourism - jobs
Cost of new infrastructure
Environmental
Potential to invest in renewables
Deforestation and desertification
Increased CO_2 emissions
Growing gap between core and periphery regions



Geopolitics is the impact of a country's human and physical geography on its international politics and relations. The impacts of India's relationships:
Foreign policy – India is building links with France and Canada to encourage defence, energy and infrastructure
Military pacts – India is building links with Russia to supply them with missiles and jets
Defence – India is building links with the USA to provide warships and planes for assistance and disaster relief
Territorial disputes – India is in disputes with China. Dams limit each other's water supply and a continued dispute with Pakistan over Kashmir since independence in 1947

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Paper 2 Topic 6a Resource Management

Resource Management overview

Natural resources

Biotic - living

Abiotic – non-living

Renewable

Non-renewable

The Energy Mix

Renewable energy

Fossil fuels

Reasons for different energy mix, demand and consumption

Population growth

Wealth

Availability

Technology

Impacts on people

Impacts on the environment

Fracking

Case Study: China

Case Study: Germany

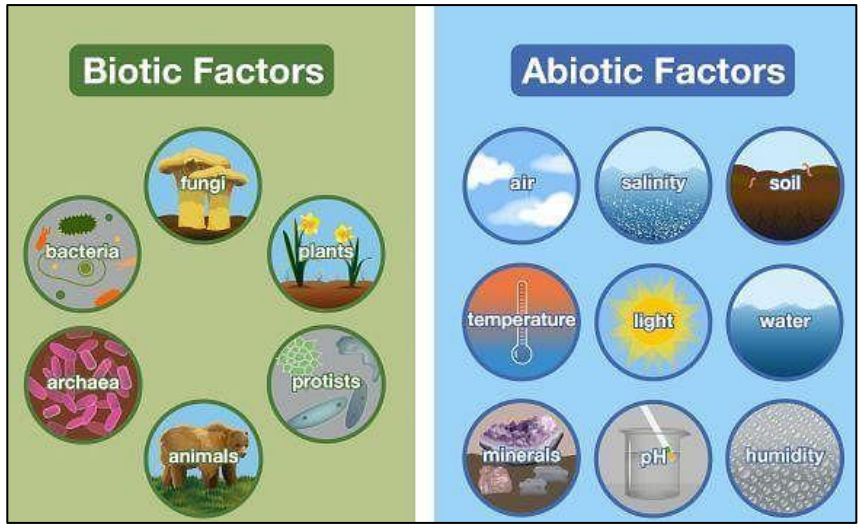
Sustainable management

Paper 2 Topic 6a Resource Management

A **natural resource** is any feature or part of the environment that can be used to meet human needs.

Types of natural resource:

Biotic (living) – obtained from the biosphere – capable of reproduction (e.g. animals and plants).
Abiotic (non-living) – obtained from the lithosphere, atmosphere and hydrosphere (e.g. soil, sunlight and water).
Non-renewable – takes millions of years to form and cannot be 'remade' (e.g. coal, oil and gas).
Renewable resources – can be naturally replenished and last forever (e.g. wind, solar and hydro-electric power).



Exploitation of these resources can have long-lasting impacts on people and the environment

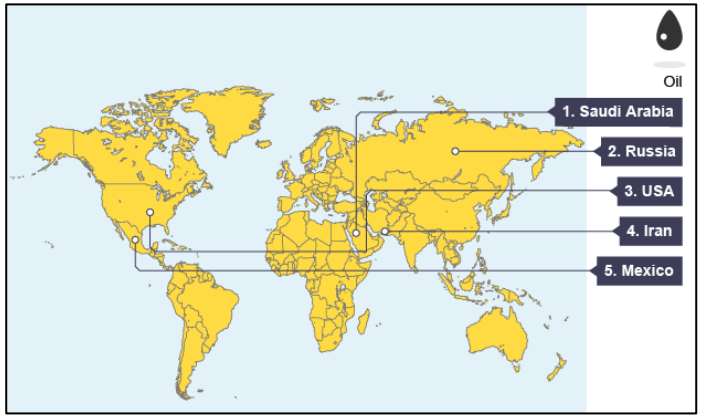
Deforestation – threatens biodiversity and causes soil erosion. Palm oil plantations destroy habitats such as those in the Amazon.
Overfishing – fishing provides a source of protein and jobs, but cod numbers have fallen in the North Sea.
Oil extraction – toxic water pollutes rivers that indigenous peoples rely on for washing, cooking and fishing.
Farming – intensive farming reduces biodiversity.

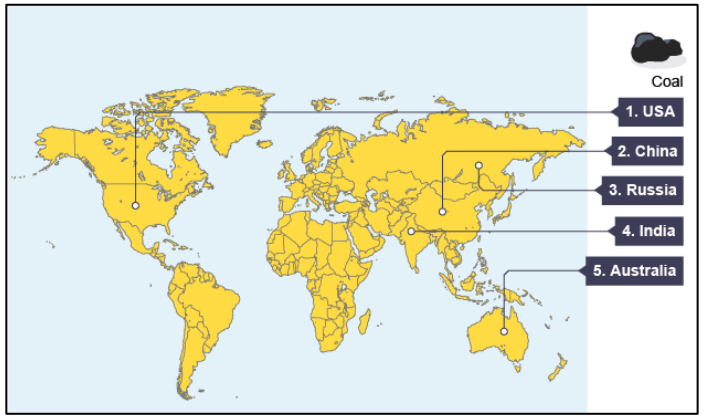
Distribution of natural resources varies around the world, depending on **geology** and **climate.**
Fossil fuels like **coal** are found in **sedimentary rock** regions such as the USA and Canada. Gold is often found in past tectonically active areas such as Australia. South America has huge reserves of copper along with South Africa.

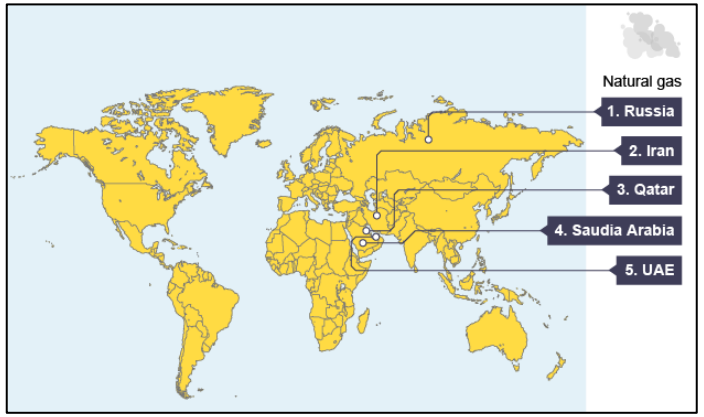
In the UK, high **precipitation** in the north and west along with upland areas mean that hill sheep farming is common. Warm summers and flatter land, along with **fertile soils**, make East Anglia perfect for arable farming. **Oil** and **gas** are extracted from the North Sea.

Usage and **consumption** are *not* evenly distributed around the world.

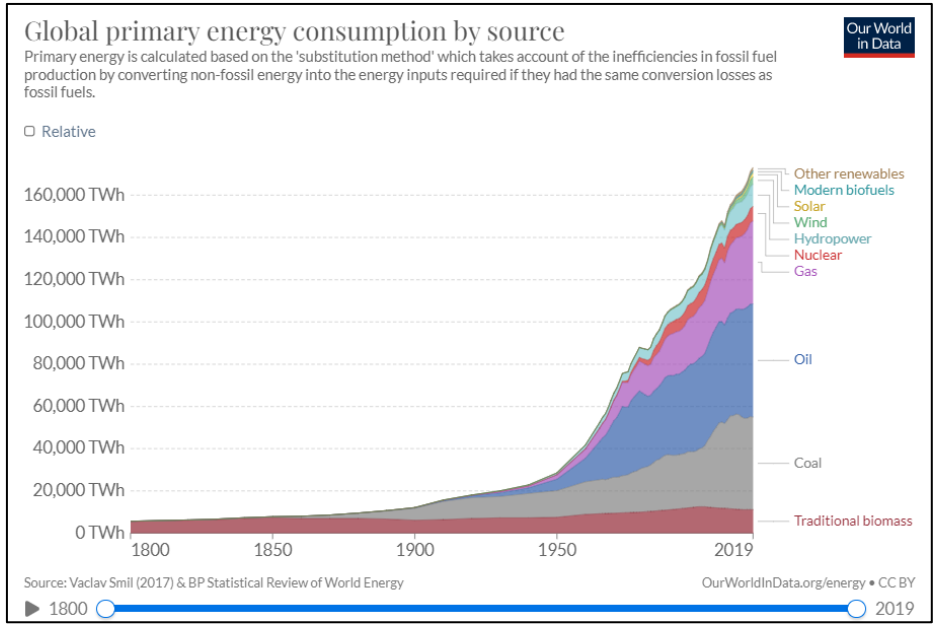
Energy usage is higher in more developed countries, is rising in China and India, and is low in less developed countries.
Food consumption is higher in wealthy countries like the USA and low in many African countries.
Water usage – water consumption is greater in more developed countries and lower in less developed countries.



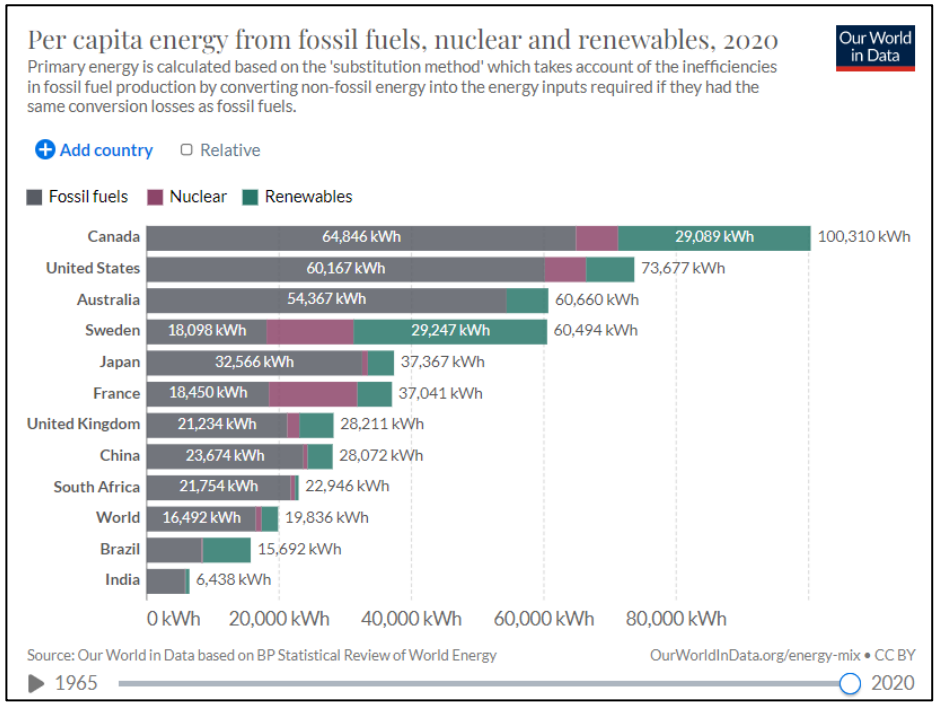




Paper 2 Topic 6a Resource Management - Energy



Reasons for increasing energy consumption
Global energy consumption is rising. There are four main reasons for this:
1.Affluence - **emerging countries** like China are seeing the biggest growth in energy consumption. This is because the **standard of living** in these countries is improving and so more people are buying things like technology for the home and cars. Energy use in **developed country** is high, but stable as populations are steady and new technologies help to conserve energy.
2.Population - global population is increasing. It reached 7 billion people in 2011 and it is estimated to reach 9.5 billion around 2050. Everyone uses energy and so this leads to a greater consumption of energy.
3.Technology - the development of new technologies means that more people are using energy. The use of mobile devices and computers has increased and these all require energy to power them.
4.Economic reasons - factories and offices are run using energy. As countries develop economically, they build more factories and offices for people to work in.



The **energy mix** refers to the different types of energy production used to supply energy to a country.

The **energy mix in the UK** reflects the fact that it has a strong economy and so needs a variety of energy sources for industrial production, electrical production, transport, and domestic use.
The UK uses a mixture of **fossil fuels** (oil, gas and coal), nuclear energy and renewable energy (eg solar, wind and hydroelectric power). Most of the oil and coal the UK uses has to be **imported** from other countries, however the UK secures some of its gas supply from the North Sea. Nuclear power requires uranium which the UK does not have, so this also has to be imported. However, as the UK invests in renewable energy it will be able to be more self-sufficient in its energy supply.

Access to energy is affected by many factors.
Technology – some countries are not able to **exploit** their energy resources as the technology required is **unavailable** or **too expensive**
Geology – **fossil fuels** are found in sedimentary rocks, where impermeable rocks have trapped the oil and gas in the permeable rocks below. Countries on plate boundaries may be able to access **geothermal** energy
Climate – **solar power** requires large amounts of **sunlight** to generate energy. Some countries are able to exploit this resource more easily than others
Landscape – **wind turbines** are most efficient on **higher ground** or on the **coast,** whereas **HEP** requires rivers with steep-sided valleys to use as **reservoirs**

Paper 2 Topic 6a Resource Management - Energy

Renewable and **non-renewable** energy resources can be developed.

Non-renewable – takes millions of years to form and cannot be 'remade' (e.g. coal, oil and gas).
Renewable resources – can be naturally replenished and last forever (e.g. wind, solar and hydro-electric power).

The main **nuclear** fuels are **uranium** and **plutonium**. These are housed in a nuclear reactor.
The nuclear fuel undergoes nuclear fission in the reactor, producing heat - **nuclear to heat energy**. Heat is used to change water into steam in the heat exchanger. The steam drives the turbine - **heat to kinetic energy.** This drives the generator to produce electricity - **kinetic to electrical energy**

Crude oil originates from fossilized sea creatures buried for thousands of years beneath sedimentary deposits. It is pumped from below ground and taken to a r**efinery** where it is refined into **diesel, gasoline**, (petrol), **jet fuel** and **petrochemicals** used as detergents, fertilizers and plastics

Coal is a sedimentary rock formed when dead plant matter decays into **peat** and is converted into coal by the heat and pressure of deep burial over millions of years. Coal is extracted through both deep and surface mining and is often used through burning to heat water to spin a **turbine** to generate electricity

Natural **gas** is formed through the decomposing of plants and animals. Deposits of sediment compress the organic matter and, along with higher temperatures in the Earth's crust, gas is formed. Gas deposits are often found near oil deposits with the gas trapped in impermeable rock. **Hydraulic fracturing**, or **fracking**, is a process that splits open rock formations with high-pressure streams of water, chemicals, and sand. The sand props open the rocks, which allows gas to escape and be stored or transported.

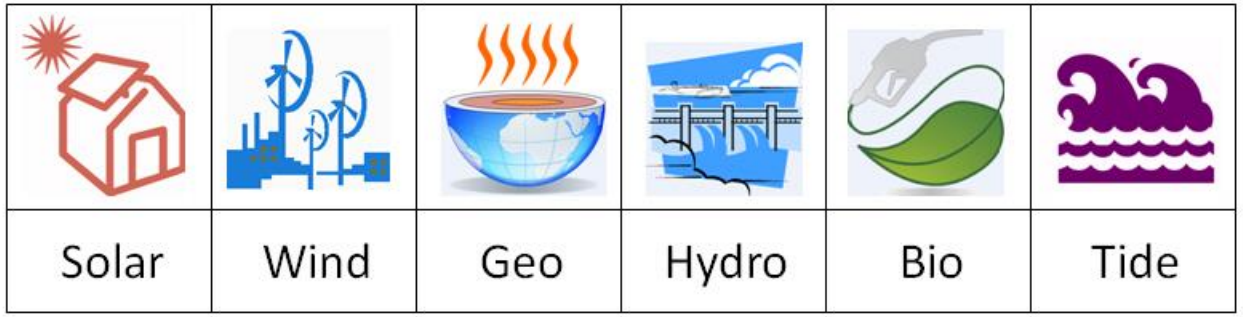
Wind power - wind turbines convert air movements into electricity. In the UK wind speeds are consistent and so this is a good way to generate electricity. The UK generates more wind energy using turbines on the land (onshore). As an island nation, the UK could build more turbines in the sea (offshore) though these are more expensive than onshore turbines.

Geothermal power - this uses heat within the Earth to generate electricity. This is easier where geothermal heat is more accessible, eg Iceland. There are few suitable locations so geothermal energy is rare in many countries.
Ground source heat pumps are a similar idea, but they use the heat from the Sun that is stored within the surface of the Earth.

Hydroelectric power (HEP) - HEP is generated when river water is trapped behind a **dam** and used to turn **turbines**. The UK generates 1.5% of its electricity this way. Most suitable locations for dam building have already been used.

Biomass - this is recently-formed material derived from living things, eg chicken droppings. **'Energy from waste' plants** burn biomass and non-recyclable rubbish to generate electricity. The UK has many 'energy from waste' plants, eg Allington Quarry in Maidstone, Kent.

Solar power - the UK government wants to increase the use of solar power by 2020. **Solar panels** can be fitted onto buildings or within fields. They turn sunlight into electricity. New technology is making solar panels able to generate electricity on cloudy days, which would be good for the UK.



Wave power and **tidal power** - the UK is an island nation, yet it generates very little energy using the sea. Wave energy harnesses the power of small movements on the surface of the sea. The technology is new and currently expensive. Tidal energy harnesses larger movements of the tides. There are plans for **tidal lagoons** to be built in the UK.

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Paper 2 Topic 6a Resource Management - Energy

All types of energy generation have both advantages and disadvantages and positive and negative impacts on people and the environment

Coal

Advantages	Disadvantages
There are still large quantities of coal available in 70 countries worldwide. World coal supplies should last for at least another 200 years.	Burning coal releases harmful greenhouse gases into the atmosphere, causing air pollution.
Mining coal is technically relatively easy and cheap.	Mining of coal is dangerous and has caused many deaths.
Coal is used in power stations in many countries around the world. It is an efficient resource for generating large amounts of electricity.	**Open-cast** mining of coal can have significant impacts on the surrounding environment and wildlife habitats.

Wind

Advantages	Disadvantages
It is a clean fuel and does not pollute or emit greenhouse gases.	Many people feel that wind turbines spoil their view of the landscape.
It is one of the lowest priced renewable energy sources for the consumer.	Energy is only produced when it is sufficiently windy to turn the turbine blades.
Wind farms can be built on agricultural land, providing a source of income for the people who own the land.	It is not possible to store the power produced for use on calm days.
New technology means turbines are more efficient and make less noise.	Offshore wind farms are far from where the resource is needed, requiring expensive transmission lines.

Hydroelectric power (HEP) - impacts

People	Environment
Families were forced to leave their homes and relocate to make way for the new dam.	The construction of the dam has destroyed a large area of forest on the Paraguayan side of the river.
The production of HEP means people from the two countries are less reliant on non-renewable energy resources.	HEP is a reliable, clean source of energy which contributes to the energy needs of Brazil's heavy industries, reducing carbon emissions.

Nuclear - impacts

People	Environment
Nuclear power plants are expensive to build, but once they are operational they produce relatively cheap, reliable and plentiful electricity. They can produce energy when it is needed, day and night, all year round.	Nuclear power generation produces much less CO_2 than burning fossil fuels. This means it has a much lower contribution to global warming than energy produced from oil, gas or coal.
Nuclear power plants are very dangerous if they become damaged because of the potential for leaks of radioactive material into the atmosphere. Damage is rare but can happen as a result of human error, natural disasters or, potentially, terrorist attack.	The waste products of nuclear energy are highly radioactive and very difficult and expensive to manage safely. The risk of environmental pollution from stored waste products remains high for centuries.

Solar - impacts

People	Environment
Large solar farms can take up land that could be used for growing crops – although it is possible for farmers to grow crops alongside solar panels.	Manufacturing **photovoltaic cells** can be harmful to the environment because the panels are made of silicon and other toxic metals such as mercury, lead and cadmium.
Solar energy is a growing industry, creating many hundreds of thousands of jobs around the world.	Deserts are excellent locations for solar farms because of their clear skies and strong sunlight. However, desert habitats are fragile and easily damaged during farm construction.

Wind - impacts

People	Environment
The turbulence created by turbines can lead to temperature changes in the air around them – warming at night and cooling during the daytime.	Although the electricity generated by wind turbines does not produce any CO_2, the construction of the blades and pillars does.
Turbines produce noise – older designs typically produced 40–50 decibels. However, modern designs produce less and 40 decibels is only equivalent to the noise of a 15 km/h wind.	Turbine blades cause on average about four bird deaths per turbine per year. However, this is far fewer than the numbers killed by other energy sources.
The London Array will have a generating capacity of 630 MW of electricity, enough to power 470,000 homes.	It is predicted that the London Array wind farm will save 925,000 tonnes of CO_2 a year.

Fracking- impacts

People	Environment
Fracking has made fuel prices in the USA much cheaper for consumers because the USA has large shale deposits and so the country does not need to import energy from other countries.	Producing and using natural gas releases approximately half the carbon emissions of coal, so it is better for the environment to replace coal-fired power stations with gas-fired ones.
There is evidence that fracking can be linked with subsidence of homes, as rocks are disturbed deep underground. Fracking has also resulted in gas entering people's homes – flammable gas coming through taps, for example!	The chemicals used to release the shale gas may leak into and contaminate **groundwater** supplies. This could damage ecosystems that rely on the groundwater (and could affect humans who use the water, too).

Paper 2 Topic 6a Resource Management - Energy

Meeting the demands for energy resources can involve interventions by different interest groups.

Different attitudes:

- An example is fracking in the UK. Individuals protest against the exploitation of shale gas due to the impacts on the environment.
- However, the UK government and businesses see fracking as a financial benefit, generating money for industry and services.
- Environmental pressure groups such as Greenpeace are against the burning of fossil fuels, fracking and nuclear energy, preferring the use of renewables.

Sustainable management is ensuring present needs are met without compromising resources in the future.

According to scientists, **dependency** on fossils fuels could have permanent impacts from **climate change.** Growing populations and rapid economic development must encourage governments to increase the use of renewable energy sources.
There are different views on meeting energy demands:

Individuals – more people are using energy efficient products and solar panels, but many people believe they are still too expensive and look ugly.

Organisations – businesses see using renewables are good for public relations, but they are expensive for smaller companies. McDonald's reuse cooking oil for their lorries and use LED bulbs in their restaurants.

Governments – shared targets by world leaders' and pledges to reduce global warming (UN Climate Change Summit), such as adoption of sustainable transport, bicycle schemes and congestion charges.

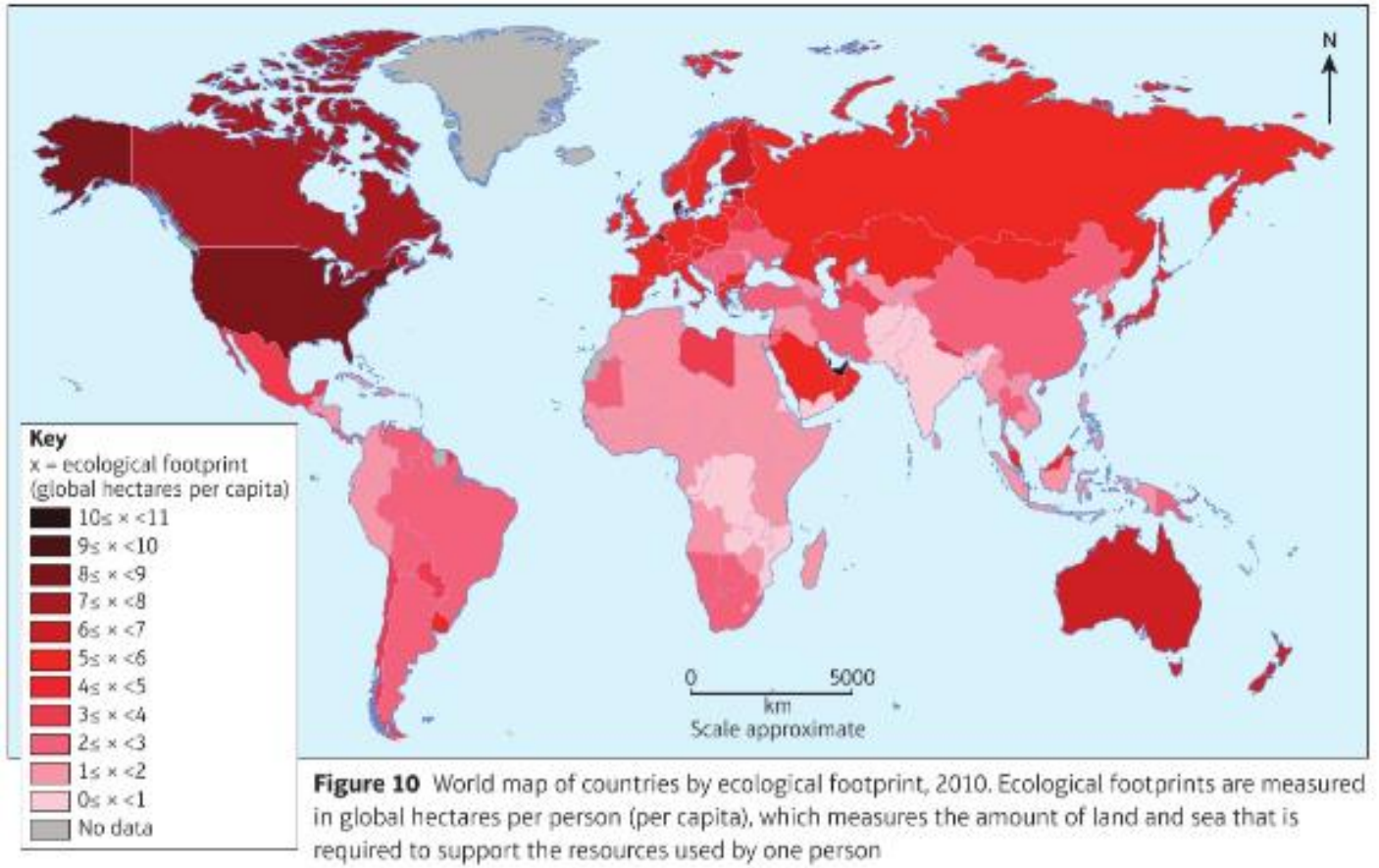


Figure 10 World map of countries by ecological footprint, 2010. Ecological footprints are measured in global hectares per person (per capita), which measures the amount of land and sea that is required to support the resources used by one person

A **carbon footprint** is a measure of the amount of greenhouse gases generated by the activities of an individual or organisation, or by a product over its lifetime
An **ecological footprint** is a measure of how much land is needed to support an individual's, city's, country's or world population's lifestyle
Both are calculated from key areas : **Food** – the amount of meat eaten, **Home** – the size of your house and how many people live in it and how much energy is consumed, **Travel** – types of quantities of transport and travel, **Lifestyle** – how much is spent on clothes and electrical devices in a year and how much recycling is carried out

Paper 2 Topic 6a Resource Management – Energy – Case Studies

Sustainable Germany

One third of Germany's electricity comes from renewable resources. People are paid for the renewable energy they produce for electricity. Further strategies include:

Massive solar parks and offshore wind farms that will reduce CO_2 emissions further, reducing the impact of global warming.

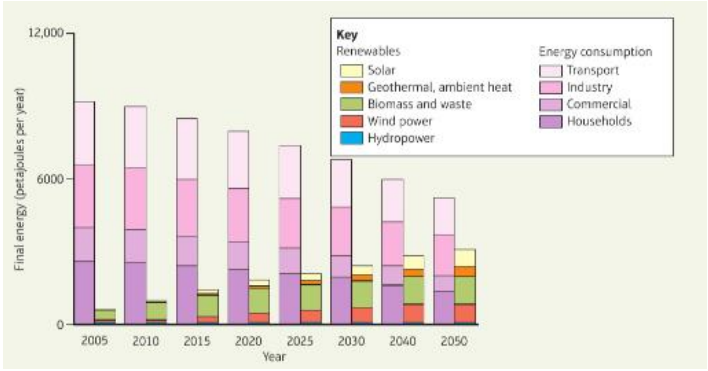
Solar power

A combination of large solar farms, such as the Bavaria Solar Park and incentives for individuals and organisation to install solar panels on homes and businesses are two ways Germany is trying to reduce it's reliance on importing fossil fuels, especially gas. The Bavaria Solar Park is expected to reduce CO_2 emissions by more than 1000,000 tonnes over the next 30 years and produce 215 million kWh of clean power over the next 20 years

Wind power

Germany was producing about 8% of its electricity from onshore wind turbines. Many of these turbines are now old an les efficient and so Germany is replacing them with newer, more efficient turbines to increase power production. This new technology has meant less opposition as people see the advantages of wind over using dirty coal, potentially dangerous nuclear power and being reliant on Russia, which currently supplies more than half of Germany's natural gas and about a third of the oil used to heat homes, power factories and fuel vehicles

Germany's energy plan

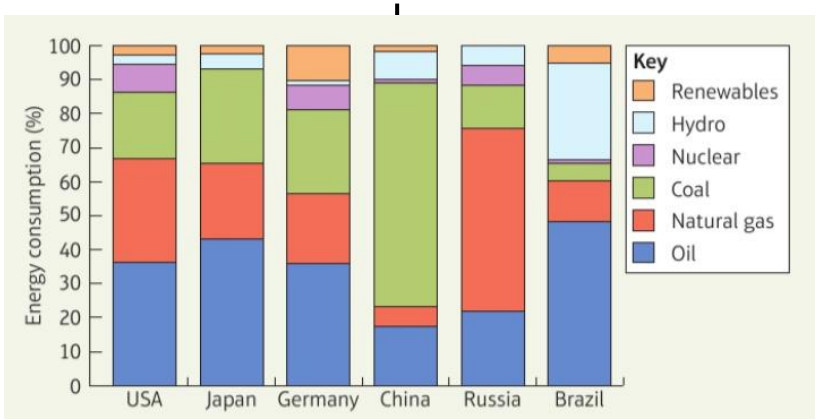


Sustainable China

China burns more **coal** than the USA, Europe and Japan combined, producing 29% of global carbon emissions. Strategies to manage energy resources include:

- HEP – the Three Gorges Dam.
- Solar power – the leading solar power producer.
- Coal restrictions – laws restricting the use of coal.

Selected country's energy mix



Hydro-electric power (HEP) – The Three Gorges Dam

The Three Gorges Dam became the worlds' biggest HEP producer in 2012, generating 98.9 billion (kWh) of electricity, equivalent to burning 49 million tonnes of coal, preventing 100 million tonnes of CO_2 emissions.

However, negatives include:

- **Economic** costs of US$30 billion
- **Relocation** of 1.4 million people from their homes, with some still living in temporary accommodation
- F**looding** of 632 km² of habitat and the extinction of the Yangtze River dolphin
- **Landslides**, build of silt and sewerage and damaging pollution has affected **biodiversity** in the area and **crop yields** for farmers downstream

China has also become one of the world leaders in generating solar energy through a giant solar power station in the Gobi Desert, which could potentially produce enough energy to supply on million homes

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Paper 3 Topic 7a Investigating physical environments - river landscapes

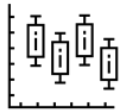
Stage 1
Formulating questions

Stage 2a
Primary data

Stage 2b
Secondary data

Stage 3
Data presentation

Sampling



Qualitative data

Quantitative data

Suitability

Accessibility

Location

Safety

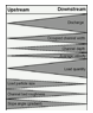
Appropriateness

Formulating questions

Theories

Models

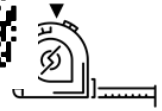
Hypothesis



ry data

Reli

Accuracy

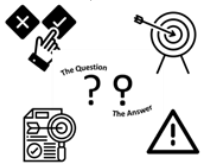


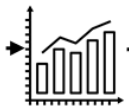
Secondary data

Research

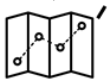
Measurements & Methodology

Equipment





Data presentation



Rivers fieldwork overview

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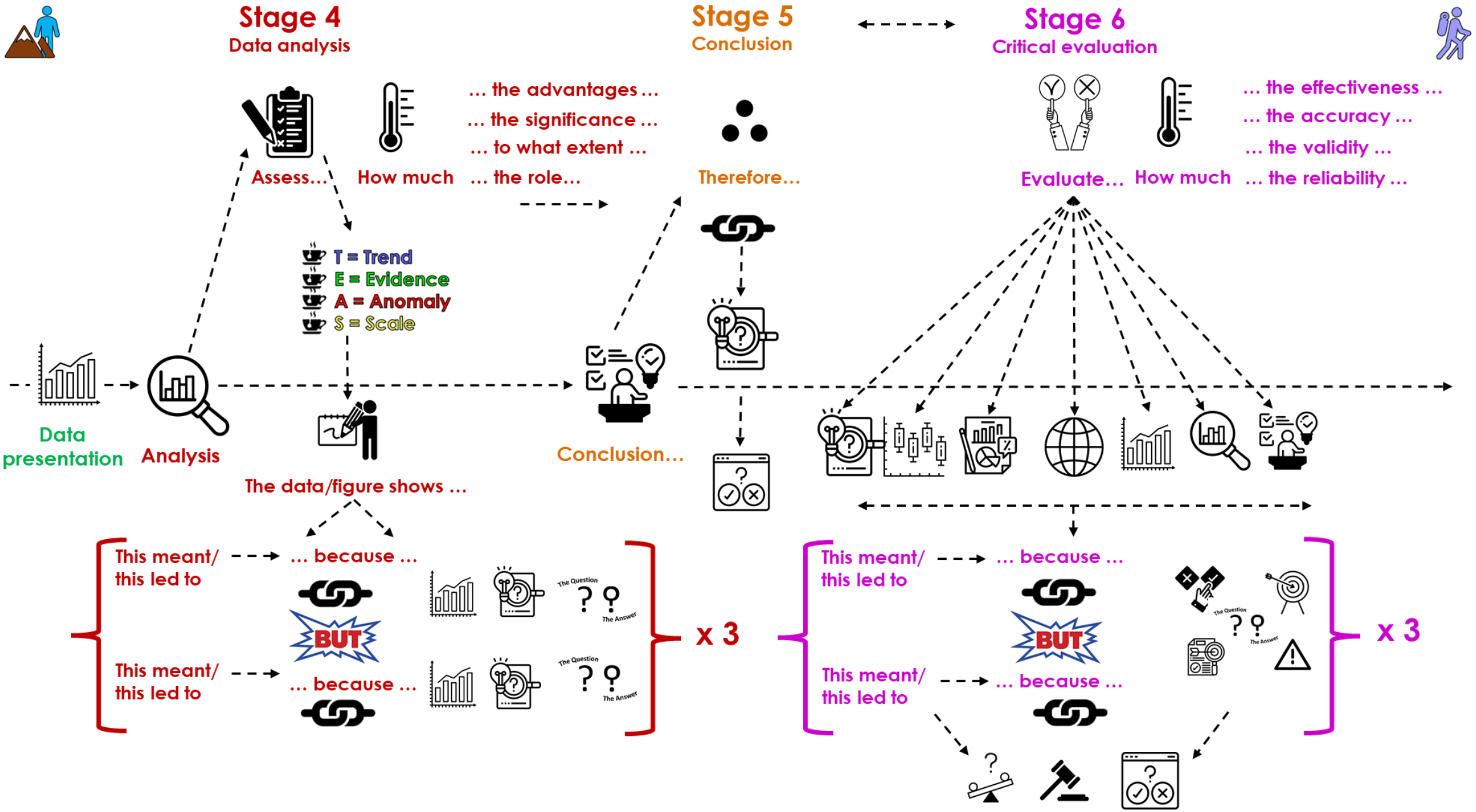
Paper 3 Topic 7a Investigating physical environments - river landscapes



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Rivers Fieldwork - Primary Data Collection

Hypothesis

Location - Evaluation

Risk - Evaluation

Methods used - Channel Characteristics

Width – water level

Width – bankfull level

Depth – water level

Depth – bankfull level

Pebble size

Pebble shape

Methods used - Velocity

Flow meter

Stopwatch

Method Evaluation – Velocity

Methods used - Flood Risk

Field sketch

Photographs

Land Use

GIS

Method Evaluation – Flood risk

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Rivers Fieldwork – Data Presentation Methods, Evaluation and Secondary Data

Hypothesis

Data Presentation Methods

Channel Characteristics

Cross-section

Pebble size and shape

Velocity

Flood Risk

Data Presentation Evaluation

Channel Characteristics

Cross-section

Pebble size and shape

Velocity

Flood Risk

Secondary Data Collection

Environment Agency Flood Risk Map Evaluation

Ordnance Survey Map Evaluation

River Levels UK Website Evaluation

EA Drainage Basin Map Evaluation

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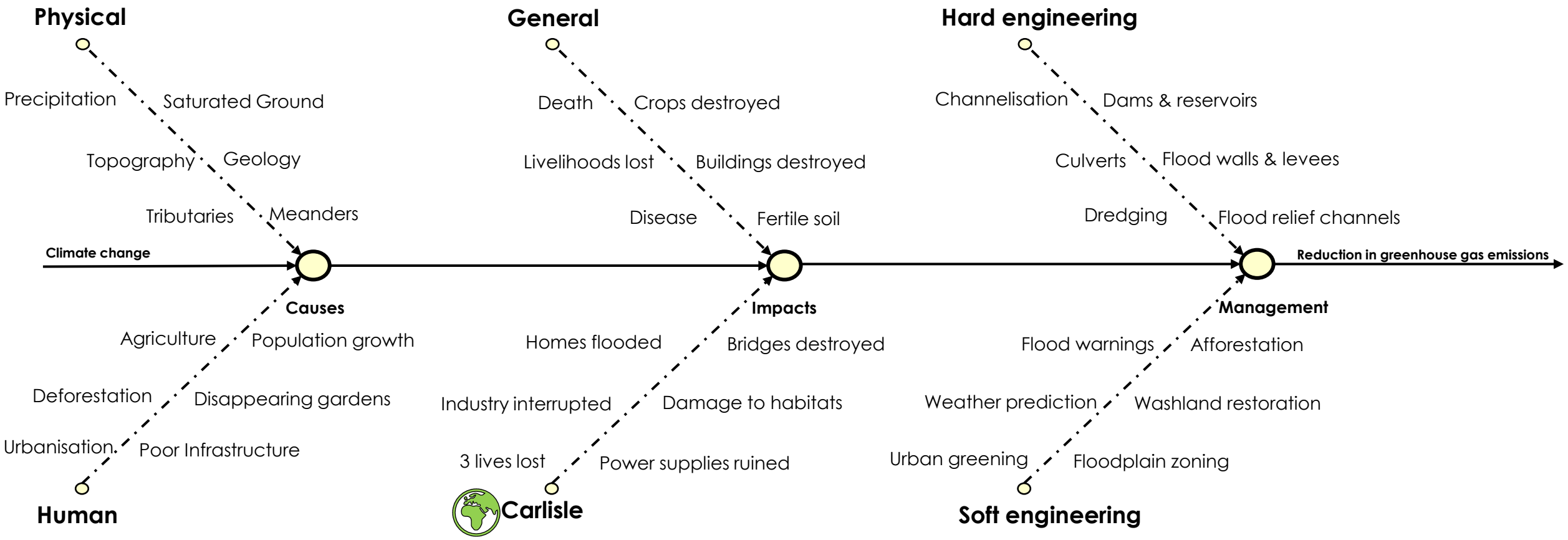
River Flooding



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Paper 3 Topic 7b Investigating human environments - urban areas

Stage 1
Formulating questions

Stage 2a
Primary data

Stage 2b
Secondary data

Stage 3
Data presentation

Random
Stratified
Systematic
Sampling
Qualitative data
Quantitative data
Suitability
Accessibility
Location
Safety
Appropriateness
The Question
The Answer
Formulating questions
Theories
Models
Hypothesis
A — CBD (Central Business District)
B — Zone of Transition
C — Residential (lower class)
D — Residential (middle class)
E — Residential (upper class)
Primary data
Reliability
Accuracy
Measurements & Methodology
Equipment
Secondary data
Environment Agency
Office for National Statistics
Research
Data presentation

Urban fieldwork overview

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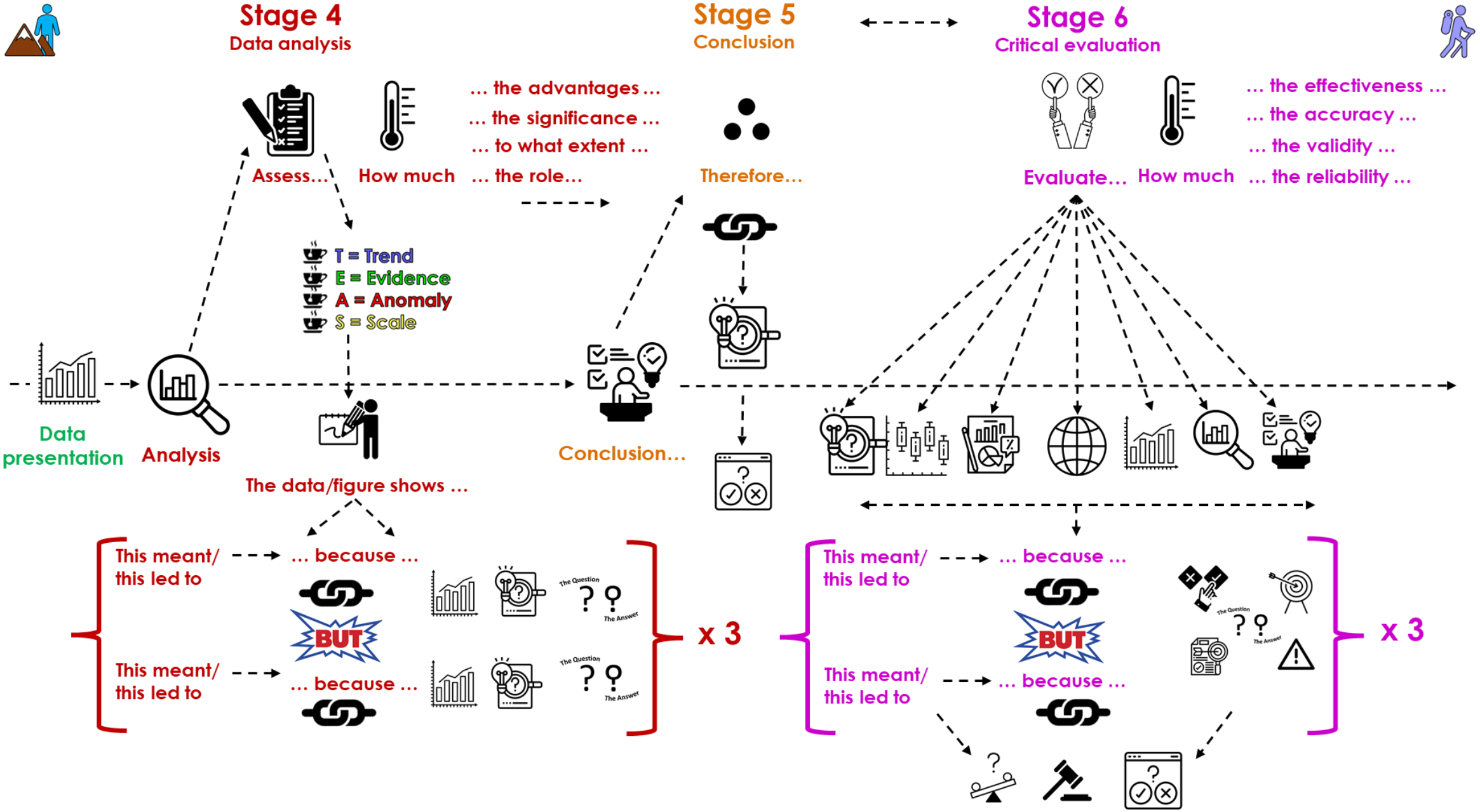
Paper 3 Topic 7b Investigating human environments - urban areas



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Urban Fieldwork - Primary Data Collection

Hypothesis

Location - Evaluation

Risk - Evaluation

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Urban Fieldwork – Data Presentation Methods, Evaluation and Secondary Data

Hypothesis

Data Presentation Methods

Observation data

Questionnaire data

Fieldsketch

Qualitative Data

Quantitative Data

Data Presentation Evaluation

Observation data

+

−

Questionnaire data

+

−

Fieldsketch

+

−

Qualitative Data

+

−

Quantitative Data

+

−

Secondary Data Collection

Social indicators

DataShine Census

+

−

Newham's Legacy Story

Newham London

+

−

Office of National Statistics

Office for National Statistics

+

−

Met Police Crime Statistics

METROPOLITAN POLICE

+

−

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Urban Fieldwork – Data Analysis, Conclusion and Overall Evaluation

Hypothesis

Analysis – what does our data show?

Social quality of life

Economic quality of life

Environmental quality of life

Analysis – how and why does our data show this?

Social quality of life

Economic quality of life

Environmental quality of life

Conclusion

Does quality of life vary in urban areas? How do you know?

Overall Evaluation of your fieldwork

How could the data collection be improved?

How could your study be extended?

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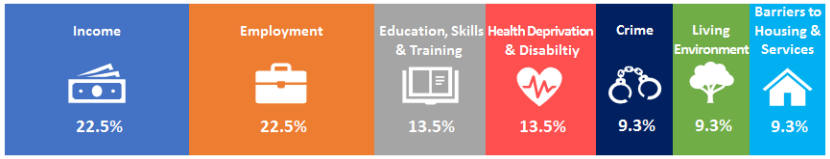
Urban change – Stratford, East London



Pre-2012

- Representation
- Language barriers
- Crime
- Culture & religion

Political

- Population pyramid
- Ethnic diversity
- Education
- Health

Social

Technological

- Transport
- Internet access
- Heating types
- Infrastructure

Economic

- Income levels
- Employment types
- Deprivation
- Disposable income

Environmental

- Accessible open spaces
- Air quality
- Housing quality
- Sustainability

2012

- Representation
- Language barriers
- Crime
- Culture & religion

Political

- Population pyramid
- Ethnic diversity
- Education
- Health

Social

Technological

- Transport
- Internet access
- Heating types
- Infrastructure

Economic

- Income levels
- Employment types
- Deprivation
- Disposable income

Environmental

- Accessible open spaces
- Air quality
- Housing quality
- Sustainability

Post-2012

- Representation
- Language barriers
- Crime
- Culture & religion

Political

- Population pyramid
- Ethnic diversity
- Education
- Health

Social

Technological

- Transport
- Internet access
- Heating types
- Infrastructure

Economic

- Income levels
- Employment types
- Deprivation
- Disposable income

Environmental

- Accessible open spaces
- Air quality
- Housing quality
- Sustainability

East London fieldwork details

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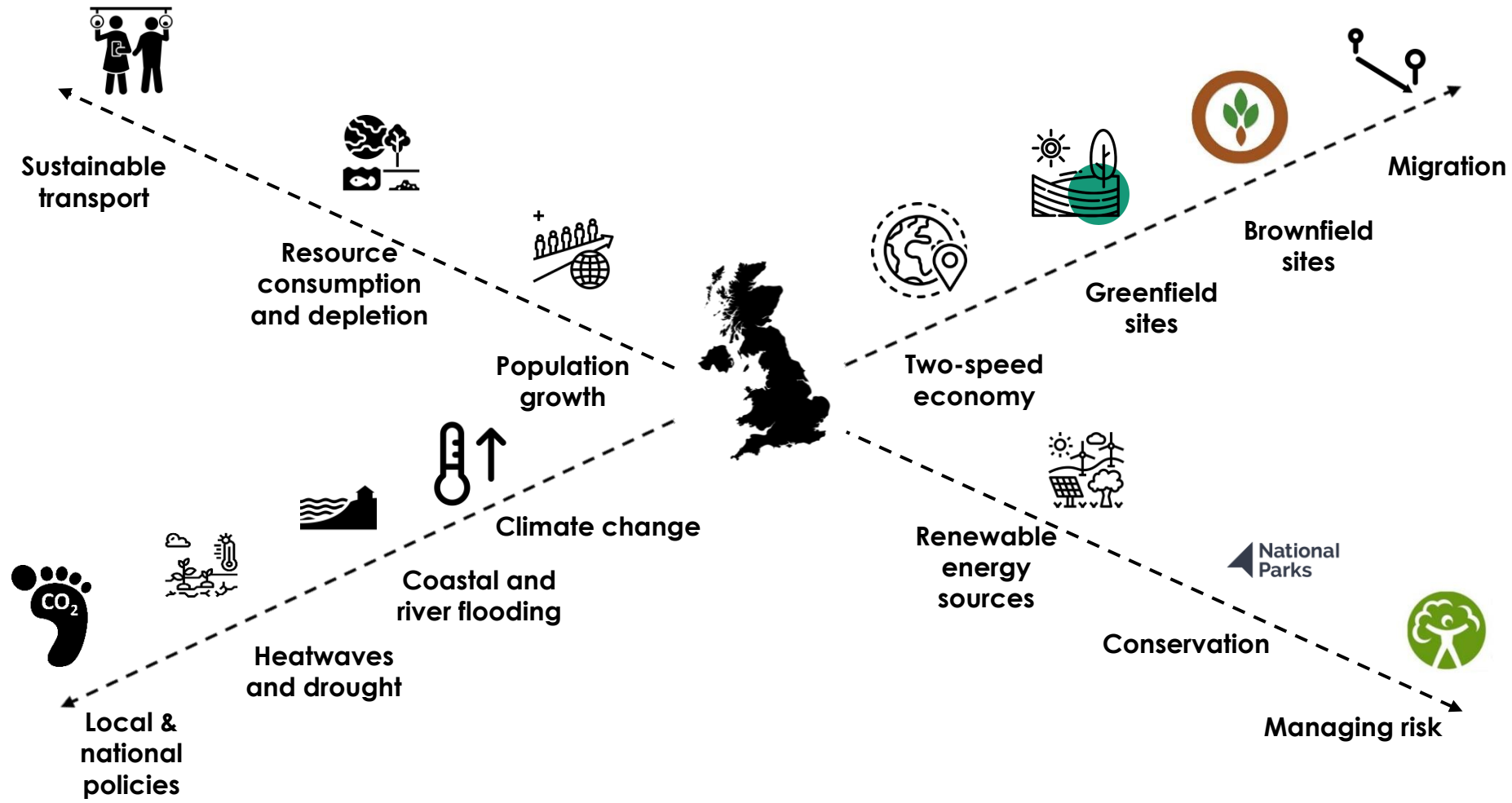
Paper 3 Topic 8 UK Challenges



Paper 3 Topic 8 UK Challenges

Population, consumption & resource challenges

Table 1 Projected population for the UK (millions)

	2010	2015	2020	2025	2030	2035	2050
*UK	62.3	64.8	67.2	69.4	71.4	73.2	77.0
England	52.2	54.5	56.6	58.6	60.4	62.1	
Wales	3.0	3.1	3.2	3.2	3.3	3.4	
Scotland	5.2	5.4	5.5	5.6	5.7	5.8	
Northern Ireland	1.8	1.9	1.9	2.0	2.0	2.0	

*The figures for England, Wales, Scotland and Northern Ireland may not add up to the total for the UK. This is because the numbers have been rounded up.

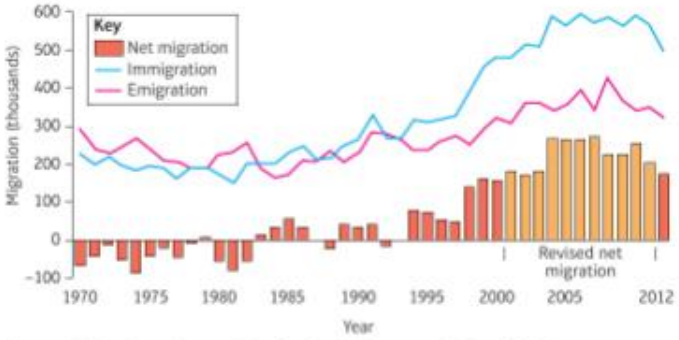


Figure 4 Net migration statistics for the UK between 1970 and 2012

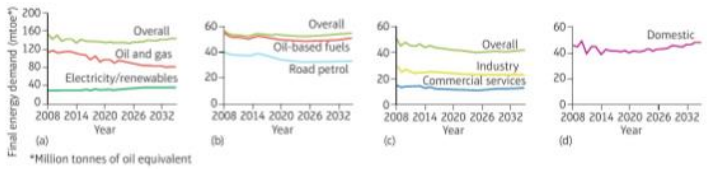
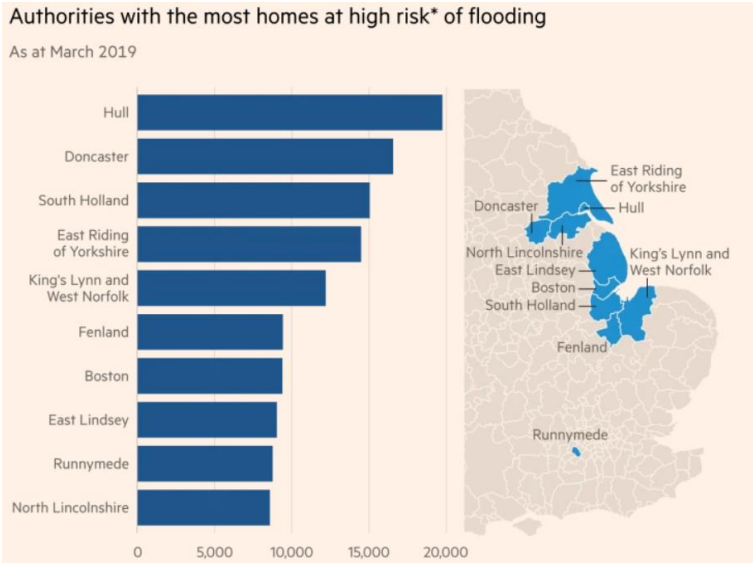


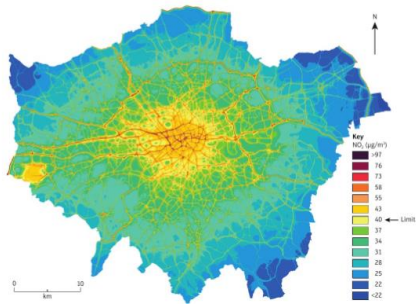
Figure 1 Projected energy requirements by sector. (a) Summary of demand by fuel type. (b) Final energy demand by transport. (c) Final energy demand by industry and services. (d) Domestic final energy demand

The UK is becoming **overpopulated**. By 2030, the UK's population is expected to exceed 70 million owing to natural increase and migration. This will put further strain on natural resources and ecosystems

Settlement & environmental challenges

Figure 3 House price map of England and Wales, January 2014





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A '**two-speed economy**' refers to the uneven growth of the UK economy, with the south-east developing fastest. A possible solution to help close the gap between the south-east and the rest of the UK is to improve transportation links e.g. HS2.

Pressures of a growing population and increased land and house prices means developers are looking to build on both **greenfield** and **brownfield** sites and on land that is at high risk from flooding

Awareness of **transport impacts** has lead to many urban areas implementing charges for travelling within the city and an increase in public transport options

Paper 3 Topic 8 UK Challenges

Landscape challenges

Figure 5 Locations of UK National Parks

	Advantages	Disadvantages
Greenfield sites	1 Relatively cheap and rates of house building faster 2 The layout is not hampered by previous development so can easily be made efficient and pleasant 3 Healthier environment	1 Valuable farm or recreational land lost 2 Wildlife and their habitats lost or disturbed, partly due to more noise and light pollution 3 Often far from work and services, generating more traffic 4 Encourages **suburban sprawl**
Brownfield sites	1 Reduces the loss of countryside and land that might be put to agricultural or recreational use 2 Helps revive old and disused urban areas 3 Services such as water, electricity, gas and sewerage already in place 4 Located nearer to main areas of employment, so commuting reduced	1 Often more expensive because old buildings have to be cleared and land cleaned of pollutants 2 Sometimes surrounded by rundown areas so does not always appeal to more wealthy people as a residential location 3 Higher levels of pollution; less healthy

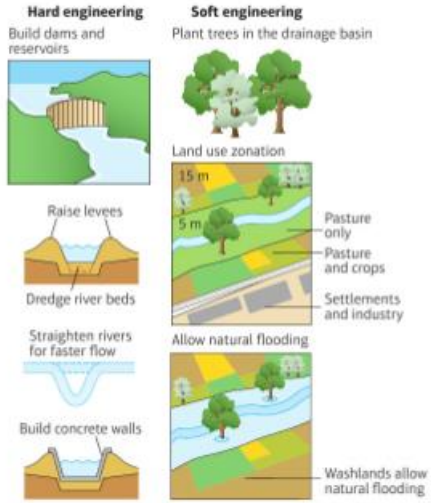

Figure 6 Dealing with floods: what are the options?

National Parks, first established in 1951, aim for sustainable development, balancing the needs of visitors and residents whilst conserving landscapes and habitats through working with local businesses and landowners.

By creating jobs in **conservation**, education and land management this goes someway in reducing rural to urban migration and reduces the North-South divide.

The Environment Agency is responsible for protecting and maintaining all waterways and coastal landscapes and reducing flood risk

Climate change challenges

The long-term impacts of **climate change** are still uncertain but Changes to the UK's climate is already being felt. Warmer, drier winters and warmer, wetter summers have resulted in changes to the growing seasons of plants and crops and the changes to the intensity and frequency of extreme weather events such as storms and droughts has meant more people, animals and plants are at risk.

Water insecurity has meant more freshwater is being transported from the north and west of the UK to the densely populated south and east.

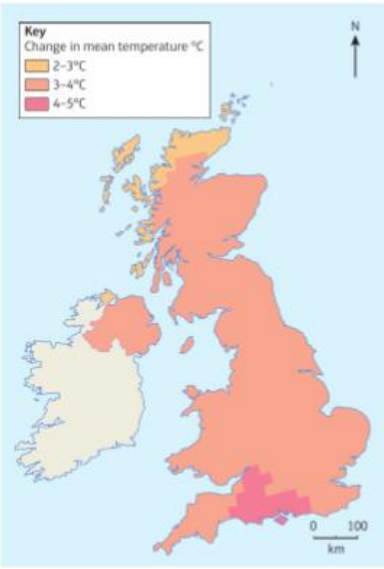

Figure 8 Change in mean temperatures in the UK in 2080, middle range prediction

Changes to individual lifestyles and government policies could have a positive impact.

Increased use of **renewable energy sources**, such as wind and tidal power to generate electricity, changes to transport and car legislation and new household hearting boilers are also designed to reduce the country's carbon footprint and CO_2 emissions.

International agreements to reduce global emissions and keep global warming at 1.5° C are in place but as seen as the recent COP26 conference in Glasgow, conflicts can arise between those who will be impacted the economically and those who will be impacted physically.

Figure 10 Satellite photo showing energy usage at night in Europe, the Middle East and North Africa