



Updated to 2017-19 Syllabus

CIE IGCSE GEOGRAPHY 0460

SUMMARIZED NOTES ON THE EXTENDED SYLLABUS

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1. POPULATION AND SETTLEMENT

1.1 Population Dynamics

• Reasons for population explosion:

- Improved medical care – vaccinations, hospitals, doctors, new drugs and scientific inventions
- Improved sanitation and water supply
- Improvements in food production (quality & quantity)
- Improved transport – moving food, doctors etc.
- Decrease in child mortality

• Under-population: when country has declined too much that it can't support its economic system

• Overpopulation: too much population of an area: overcrowding, depletion of resources

• Consequences of overpopulation and underpopulation:

OVERPOPULATION	UNDERPOPULATION
• Unemployment	• Shortage of workers
• Shortage of hospitals/schools	• Less paying taxes
• Shortage of housing	• Schools, hospitals & transport routes close; few customers
• Congestion	• Less innovation/development
• Inflation (excess demand)	• Hard to defend
• Shortage of water & electricity	• Have to attract migrants
• Noise, air & water pollution	

• Main causes of change in population size:

- Population size is related to the amount of resources available e.g. water, wood and minerals
- **Carrying Capacity:** number of people the environment can support without there being negative effects to the population
- **Optimum Population:** amount of people that a region/country can ecologically support, usually less than carrying capacity
- **Population Density:** number of people living in a given area (km²)
- **Population Distribution:** how a population is spread out around a country or an area

• Factors that contribute to population size:

- **Migration:** movement of people (or animals) from one country or region to another
- **Birth rate:** average number of live births in a year for every 1000 people

- **Death rate:** average number of deaths for every 1000 people
- **Fertility rate:** The average number of children a female is expected to have in their lifetime

• High death rates in LEDCs:

- Poor health care/few hospitals/doctors/nurses/clinics
- Poor sanitation/hygiene/lack of toilets/dirty places
- Poor access to safe/clean water/water borne diseases
- Limited food supplies/malnutrition/starvation
- HIV/AIDS
- Natural disasters/drought/flood
- Lack of vaccinations/medicines/cannot cure diseases
- Lack of education about healthy lifestyles e.g. smoking/diet
- Lack of provision for elderly e.g. pensions/old people's homes

• Low birth rates in MEDCs:

- Availability of contraception/family planning/abortions
- Educated in contraception/family planning
- Can afford contraception/family planning/abortions
- Traditionally small families
- Expense of bringing up children
- Many women have careers/women are educated;
- Availability of pensions
- Low infant mortality rate
- Lack of religious beliefs/don't object to contraception

• Origin and impact of HIV/AIDS:

- HIV-1 – arose in Central Africa
- HIV-2 – arose in West Africa
- HIV mostly occurs in women
- When women give birth, they infect the child as well resulting in low death rate for infants
- Death rate of mothers results in a higher orphan generation
- Due to the countries being poor, there is a lack of state welfare, resulting in poverty and lack of education

1.2 Migration

- **Internal migration** is within a country e.g. rural/urban, regional
- **External** or international is between countries e.g. Negro slaves to America (forced) or Mexicans into the US (voluntary)
- **Emigrant:** A person who leaves a country to migrate to another
- **Immigrant:** A migrant arriving in a new country

• Reasons for population migration:

PUSH FACTORS FROM ORIGIN	PULL FACTORS OF DESTINATION
<ul style="list-style-type: none"> • No job • Low salary • Pollution and congestion • Bad weather • Crime • Poor education and healthcare • Poor housing 	<ul style="list-style-type: none"> • Better job • Better salary • Better schools and hospitals • Peaceful and safe • Friends and family may already live their

- **Involuntary (forced) Migration:** When people move because their life might be in danger
 - **Refugees:** A person who has been forced to leave their home and their country, may be due to a natural disaster, war, religious or political persecution
 - **Persecution:** When someone is attacked for what they believe in e.g. their religion or political belief
 - **Internally displaced person (IDP):** When someone has been forced to leave their home but not their country
 - **Asylum Seekers:** Someone seeking refuge (residency) in a foreign country because their life is in danger in their home country
- **Voluntary Migration:** When people chose to move, usually for economic benefit
 - **Employment:** People may move to another country in search of better jobs and better pay, or for new business opportunities
 - **Education:** Young adults from developing countries typically choose to move away from their home country to study abroad for a better future
 - **Healthcare:** Elderly and medically challenged individuals may opt to travel and then stay for access to better medical facilities
 - **Recreation:** Some people may opt to migrate for their own convenience
- **Impacts of Migration:**

LOSING COUNTRY	
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Reduces pressure on resources • Decline in birth rate • Migrants bring back new skills • Money is sent back 	<ul style="list-style-type: none"> • Loss of people in working age • Loss of educated/skilled people • Division of families • Left with elderly population

GAINING COUNTRY

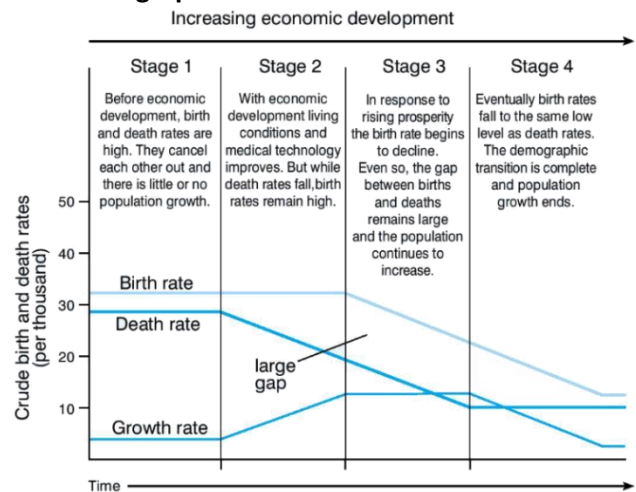
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Overcomes labor shortage • Dirty unskilled jobs done • Will work long hours for low salary • Cultural advantages and links 	<ul style="list-style-type: none"> • Pressure on jobs • Low quality & overcrowded housing • Racism • Language problems • Less healthy • Less religious amenities for immigrants

MIGRANTS THEMSELVES

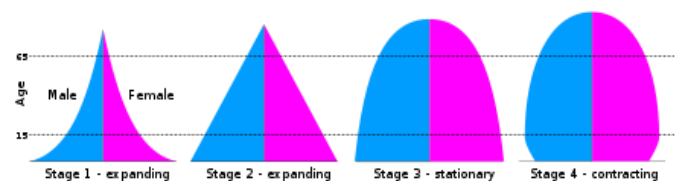
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Better jobs & economy • Better salary & access to wider variety of goods • Better access to education & healthcare • Safer & peaceful; can start a family 	<ul style="list-style-type: none"> • Cost of housing & living may increase • Racism • Language barriers • Different culture may be difficult to integrate • No friends or family to help if necessary

1.3 Population Structure

• **The Demographic Transition Model:**



- This shows that population growth occurs in stages
- The model can be related to population pyramids below
- **Population Pyramid:** a type of graph that shows the age and sex structure of the country



- Stage 1: high birth rate; high death rates; short life expectancy; less dependency (since there are few old people and children must work anyway)
- Stage 2: high birth rate; fall in death rate; slightly longer life expectancy; more dependency due to more elderly
- Stage 3: declining birth rate; declining g death rate; longer life expectancy; more dependency
- Stage 4: low birth rate; low death rate; highest dependency ratio; longest life expectancy
- **Ageing Population:** When proportion of old dependents is increasing
 - Occurs because life expectancy increases, but also because birth rates start to fall
 - This happens in stage 5 of the DTM; in very developed countries
- **Implications of Ageing Populations:**
 - May be a shortage of workers
 - Shortage of workers means less tax payers; government receives less money
 - Old people get sick easier
 - Pressure on hospitals and medical care
 - Pensions can get expensive
 - More care homes needed
- **Young Population:** Refers to young dependents mostly
 - Occurs because infant mortality rates increase, and birth rates are already high
 - Typically occurs in stage 2/3 of DTM, in countries that are beginning to develop more

• **Implications of Young Populations:**

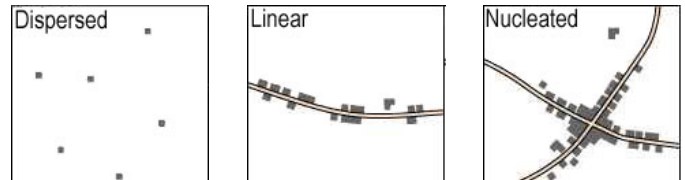
TOO FEW	TOO MANY
<ul style="list-style-type: none"> • Closure of child related services; fewer jobs • Less consumers and taxpayers in the future • An increase in the age of the population • Birth rates fall below minimum because the population declines 	<ul style="list-style-type: none"> • Child care needed so parents can work • Taxes for public schools from government • Increased dependency ratio • Creation of teaching and nursing jobs

1.4 Population Density & Distribution

CAUSES OF SPARSE POPULATION	CAUSES OF DENSE POPULATION
<ul style="list-style-type: none"> • Mountainous area • Very hot or very cold area • A heavily forested area 	<ul style="list-style-type: none"> • Coastal areas • Flat relief; easy to build on

- | | |
|---|--|
| <ul style="list-style-type: none"> • Areas that flood a lot No jobs • Poor supply of electricity, gas and water • Poor communications • Shortage of natural resources • No schools or hospitals • Regular natural disasters | <ul style="list-style-type: none"> • Close to a supply of water • Areas with natural resources • Fertile agricultural land • Developed transport links • Plenty of available jobs • Available electricity and water • Good communications • Good quality schools/hospitals |
|---|--|

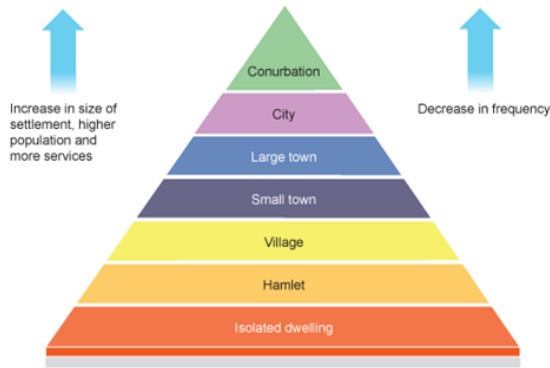
1.5 Settlements & Service Provision



An isolated, building or a group of two or three buildings, separated from the next by 2 or 3 km.	Buildings are strung along a line of communication, for example a main road, a river valley, or canal	Buildings are grouped together, initially for defence, or a common resource.
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- **Site:** describes the physical nature of where a settlement is located – the actual piece of land
- **Situation:** describes settlement in relation to other settlements and physical features around it – this determines whether the situation will grow into a large city or remain a small town or village
- **Factors influencing settlements:**
 - Wet point site: this has a good water supply
 - Dry point site: this has less risk of flooding
 - Building material: availability of stone, wood, clay etc.
 - Defensive site: in a river meander or on a hill with steep sided and commanding views
 - Fuel supply: for heating and cooking
 - Food supplies: land suitable for farming
 - Nodal points: where routes converge
 - Bridging point: river shallow enough to build a bridge
 - Aspect: settlements often on sunny side of a valley
 - Shelter: from cold prevailing winds and rain

• Hierarchy of settlements:



• Determining order of importance:

- The population size
- The range and number of services
- The sphere of influence

• **Sphere of Influence:** The distance or area people travel from to access a service.

• **Services:** Facilities that are offered to people e.g. supermarket. Services have a threshold population, which helps explain why bigger settlements have more services.

Range: This usually refers to the number of different services e.g. a school, a post office, etc.

• **Threshold Population:** The minimum amount of people required for a service to be offered and remain open.

• **High Order Goods (Comparison):** Goods that people buy less frequently. They tend to be more expensive and people will normally compare quality and price before purchasing e.g. a car

• **Low Order Goods (Convenience):** Goods that people buy every day. They don't usually cost much money and people would not normally travel far to buy them e.g. bread and milk

• Functions of settlements:

- **Rural Areas:** tend to have a lot less functions than urban areas. The main purpose of settlements in rural areas is normally agriculture & low-order services. This is because rural areas have less people, poorer transport, poorer communication, less technology, & the land is better used for other purposes.
- **Urban Areas:** tend to have a lot more functions ranging from shopping functions, to educational functions, to transport functions, to administrative functions and residential functions; more middle and high order services.
- **Urban Sprawl:** The spread or growth of an urban area into the rural-urban fringe; provides mostly middle – order services

1.6 Urban Settlements

• Urban settlements tend to have several land uses

The Central Business District

• The CBD:

- Centre point of the city and has highest land prices
- Most accessible point in the city
- High-rise buildings and skyscrapers

• Functions: retail, entertainment, financial services, and other professional services

• Land uses:

- Leisure and recreation - may include open land
- Residential - High/multi-story buildings.
- Transport - road and rail networks, train stations and airports
- Business and commerce - offices, shops, and banks
- Industry - factories, warehouses, and small production centers

• The CBD is in the centre because it is:

- A central location for road/railways to converge
- The most accessible location for workers
- Accessible to most people for shops and businesses

• Problems that CBD face: congestion, pollution, and lack of space

Residential Areas

• Old inner-city area:

- Typically found next to CBD
- Has mainly terraced houses in a grid like pattern

• Suburbia:

- Urban sprawl and owning cars led to construction of well-planned and spacious houses
- Larger than inner city terraces & most have a garden
- Typically, detached or semidetached
- Roads are arranged in cul-de-sacs and wide avenues
- Land prices cheaper than in CBD and inner city
- Demand can make some areas expensive

• Outer-city estate:

- Located on the fringes of cities with varied housing
- People relocated here when inner city was being redeveloped

• Rural-urban fringe:

- This is found at the edge of a town or city
- Mixture of land uses e.g. housing, golf courses, allotments, businesses, parks and airports.

Industrial Areas

• Factories were built:

- As close as possible to the CBD but with enough space
- Next to canals and railways to transport materials,
- Next to rivers for cooling, power source or waste disposal
- Next to land where lots of workers could live

Urban Growth in Urban Areas

- **Urban Growth/Sprawl:** rapid urbanisation, due to building in the rural-urban fringe and land reclamation
- Problems of urban growth in urban areas:

FOR PEOPLE	FOR ENVIRONMENT
<ul style="list-style-type: none"> • Overcrowded • Unable to obtain jobs/low pay • Pressure on schools/hospitals • Increased crime rates • Difficulties of waste/litter • Traffic congestion • Noise pollution • Lack of sanitation • Poor quality of life • Food shortage 	<ul style="list-style-type: none"> • Loss of vegetation • Loss of habitats • Impacts on food chains • Pollution of rivers • Death of fish/other species • Pollution of ground water • Air/atmospheric pollution • Rivers dry up

1.7 Urbanisation**Urban Growth in Rural Areas**

- Many rural areas seek & experience rapid urban growth for several reasons:
 - Better transport links e.g. road, rail, river
 - Better trading prospects
 - Nearby natural resources e.g. fuel
 - Better job prospects
 - Better schools and hospitals
 - Better supply of electricity, gas and water
 - Varied entertainment

Rural-Urban Migration

- Movement of people from countryside towards cities
- Rural-urban migration is main cause of urbanisation
- It is caused by several push & pull factors:

PUSH FACTORS FROM RURAL AREA	PULL FACTORS FROM URBAN AREAS
<ul style="list-style-type: none"> • No/poorly paid jobs • Mechanisation • Agricultural products have low prices • Poor schools/healthcare • Lack of entertainment • Poor housing quality • Drought/famine • Shortage of resources • Poor transport/comms. 	<ul style="list-style-type: none"> • More jobs • Good schools/healthcare • Good transport/comms. • Reliable supply of resources • Better entertainment • Better quality & quantity of houses

Reducing negative impacts of urbanisation

- **Greenbelts:** area of land around urban areas that is protected from development

- **Greenfield Sites:** sites that are barred from being built on by government policies

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Land never used – not polluted • Often near rural-urban fringe so good transport links • Less congestion • Room to expand 	<ul style="list-style-type: none"> • Conflicts with other land users • The government now protects many sites • Public protests for building on greenfield site

- **Brownfield Sites:** increasing building on brownfield sites allows less pressure to be put on rural areas

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Often cheap to buy • Near the CBD • Closer to transport routes 	<ul style="list-style-type: none"> • Site polluted – expensive to clean • No room to expand • May not be in desirable shape or location

- **Urban Wedges:** urban growth allowed to take place in wedges ensuring some green areas protected throughout city
- **Housing density:** increasing housing density means less land will be destroyed

Characteristics of Squatter Settlements

- **Squatter settlement:** a rural residential area which has developed without legal claims or permission to build on the land
- Extremely high home density
- Extremely high population density
- Houses built from mud for walls, iron for roofs
- No electricity
- No running water or sewage
- Diseases spread easily
- Strong smell of human waste
- No infrastructure or privacy

Urban Regeneration

- Urban areas can often fall into disrepair & become derelict areas
- Governments can invest in these areas & reuse land
- **Regeneration:** improvement of areas through investment & rebranding
- **Gentrification:** people move into an area & start making improvements which slowly regenerates the area

2. THE NATURAL ENVIRONMENT

2.1 Earthquakes and Volcanoes

Earthquakes

- A series of vibrations or movements in the earth's crust
- Caused when two plates 'stick'; pressure builds up; one plate jerks forward sending shock waves to the surface

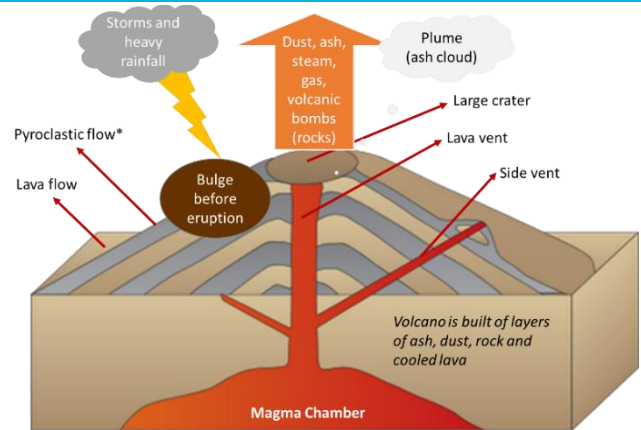
FEATURES	EFFECTS
<ul style="list-style-type: none"> • Focus: point of earthquake • Epicenter: point directly above the focus, on the ground • Seismic waves • Shaking ground • Subduction zone: occurs at destructive margin, one plate goes under the other 	<ul style="list-style-type: none"> • Large number of deaths • Fires breaking out • Water pipes burst • Water contamination, diseases • Corpses: human & animal • Accessibility difficult • Building damaged/destroyed • Tsunami can follow • Reconstruction costs
PREDICTION	PREPARATION
<ul style="list-style-type: none"> • Measure earth tremors, pressure, and release of gas • Use maps and facts to find pattern in time/location • Unusual animal behaviour 	<ul style="list-style-type: none"> • Build earthquake-proof buildings and roads • Train emergency services • Set up warning system • Create evacuation plan • Emergency food supply • Practice drills

• Earthquake proof buildings:

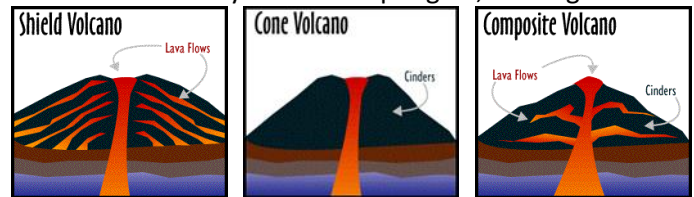
- Automated weights on roof to reduce movement
- Fire-resistant building material
- No bricks or reinforced concrete block
- Rubber shock-absorbers between foundations
- Foundation sunk deep into bedrock avoiding clay
- Roads to provide access by ambulances & fire engines
- Open areas where people can assemble if evacuated
- Automatic shutters come down over the windows
- Interlocking steel frames which can sway during earth movements

Volcanoes

- A vent in the earth's surface where magma, gas or ash escapes onto the earth's surface or into the atmosphere.
- **Causes:**
 - At constructive margin: plates move away from each other; magma rises to fill the gap;
 - At destructive margin: oceanic crust melts from friction and heat from mantle; newly formed magma is lighter so it rises to surface



- Volcanic plug: lava shoots up, falls into vent & solidifies
- **Different types of volcanoes:**
 - **Active:** has erupted recently
 - **Dormant:** has not erupted recently but may in future
 - **Extinct:** unlikely to ever erupt again; no magma inside



Gentle slopes, slow flowing lava	Steep slopes, violent eruption	Mix of cone and shield, eruption varies in strength, made of layers of ash and lava (unstable)
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ADVANTAGES

- Tourist attraction: income and employment
- Creates fertile soil: good agricultural land to grow crops
- Geothermal heating:
 - Renewable resource
 - Heating (hot water)
 - Geyser & mud baths

DISADVANTAGES

- Destruction of land, property, jobs, homes, transport
- Rebuilding costs
- Unemployment
- Fires breakout
- Diseases from poor sanitation
- Gas from eruption suffocates
- Pyroclastic flow

PREDICTION

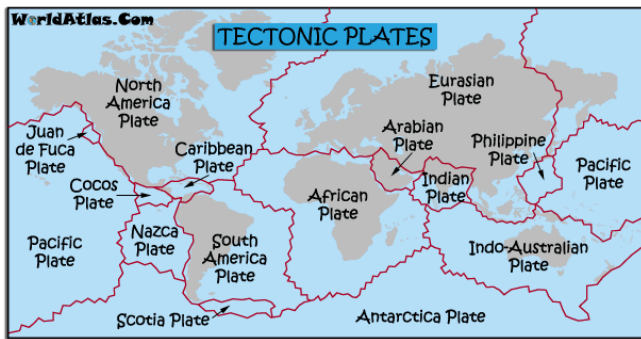
- Tremors within volcano
- Ground temps. rise
- Volcano swells & bulges
- Emits gas & steam
- Animal behaviour changes

PREPARATION

- Set up warning system
- Create evacuation plan
- Train emergency services
- Organize post-eruption plan
- Emergency food supply

Distribution of Earthquakes and Volcanoes

- Where earthquakes occur and volcanoes form is governed by plate tectonics
- **Oceanic crust:** younger, heavier, can sink and is constantly being destroyed and replaced
- **Continental crust:** older, lighter, cannot sink and is permanent
- Plate movement is caused by convection currents in the mantle



• Earthquake:

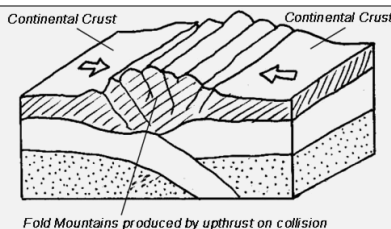
- Encircle the whole of the Pacific Ocean
- Extend down entire length of the mid-Atlantic Ocean
- Stretch across southern Europe and Asia

• Volcanoes:

- Encircle the whole of the Pacific Ocean
- Extend down entire length of the mid-Atlantic Ocean
- Some in southern Europe, the Caribbean & east Africa

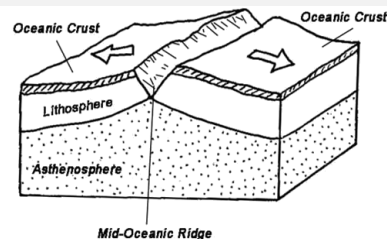
Plate Boundaries

DIAGRAM

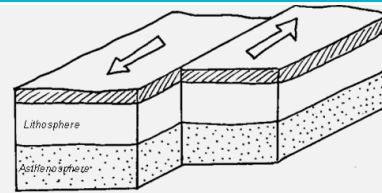


DESCRIPTION

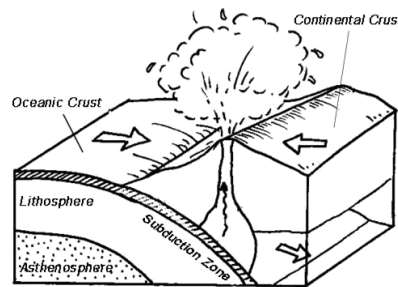
- **Collision:** occur when two continental plates move towards each other.
- Example: Indo-Australian and the Eurasian Plate



- **Constructive:** occur when two plates move away from each other.
- Example: North American and Eurasian Plate



- **Conservative:** occur when two plates slide past each other.
- Example: North American Plate and the Pacific Plate

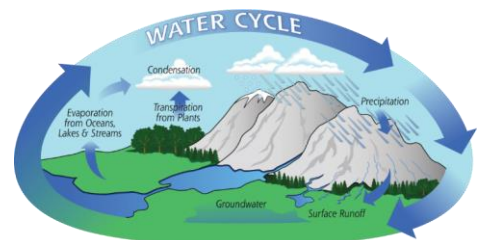


- **Destructive:** occur when oceanic plate is subducted by a continental plate.
- Example: Pacific plate and the Eurasian plate

PLATE BOUNDARY	VOLCANOES	EARTH-QUAKE	FOLD MOUNTAINS
Constructive	Gentle	Gentle	No
Destructive	Violent	Violent	Yes
Collision	None	Violent	Yes
Conservative	None	Violent	No

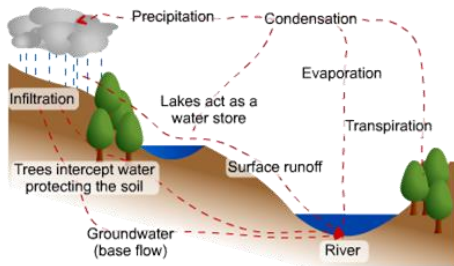
2.2 Rivers

The Hydrological Cycle



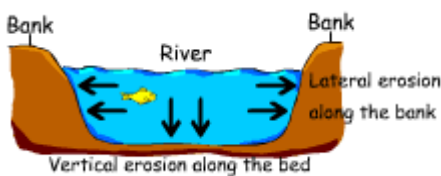
- **Drainage basin:** the area of land drained by a river
- **Watershed:** the edge of highland surrounding a drainage basin, marking the boundary between two drainage basins
- **Source:** the beginning or start of a river
- **Confluence:** the point at which two rivers or streams join
- **Tributary:** a stream/smaller river which joins a larger stream or river
- **Mouth:** point where river comes to end, usually when entering sea

River Processes



- Drainage basins act as a system with:
 - Inputs: precipitation
 - Transfers: infiltration, percolation, surface runoff, throughflow & groundwater flow
 - Stores: interception, surface storage, soil moisture storage & groundwater storage
 - Outputs: evaporation & transpiration or evapotranspiration

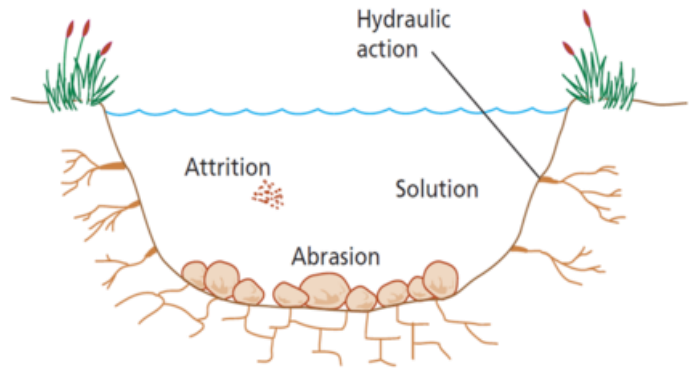
Characteristics of rivers



- **Bed:** The bottom of the river channel
- **Bank:** The sides of the river channel
 - A river has two banks
- **Width:** The distance between the two banks of a river
- **Depth:** The distance from the water surface to the bed of a river
- **Speed of flow:** how fast the water in a river is moving; different speeds arise at different parts of the river
- **Wetted perimeter:** length of bed and banks in contact with river
- **Channel:** The route course (between bed and banks) that a river flows. The flow of the river is often described as channel flow.
- **Thalweg:** The fastest part of the river, always near the middle of the river channel, where there is least friction

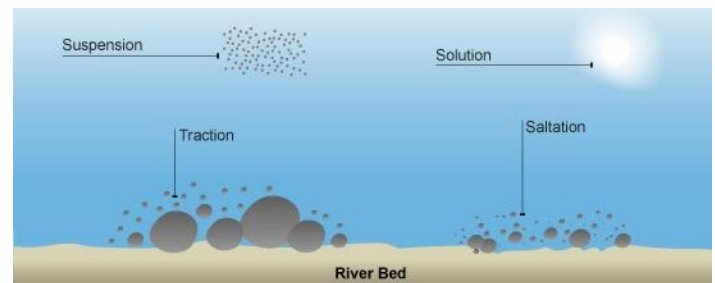
Erosion

- **Attrition:** large particles such as boulders collide and break into smaller pieces; occurs at higher part of river
- **Hydraulic action:** the sheer force of the river dislodges particles from its banks and bed
- **Abrasion:** smaller particles rub against the river banks and bed like sand-paper; occurs at low part of river
- **Solution:** acid in rivers dissolve rocks; occurs at any part of river



Transportation

- **Traction:** rolling stones along the bed
- **Saltation:** small particles bounce along bed in a leapfrog motion
- **Suspension:** silt and clay-sized are carried within the water flow
- **Solution:** minerals dissolve in the water

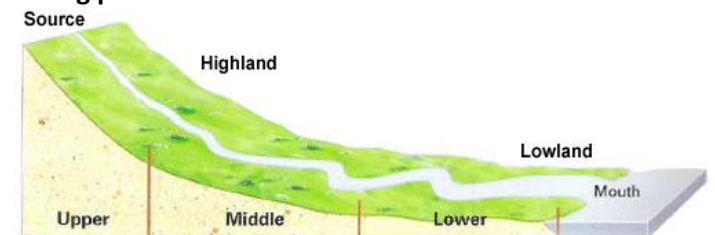


Deposition

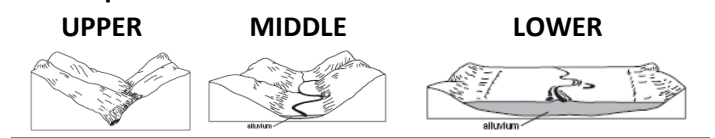
- When a river lacks the energy to carry its load; it begins depositing the heaviest particles
- Happens when there is less water or where the current slows down
- Large boulders are deposited at the top, and very small particles are deposited at the end, resulting in sorting

River Profiles

- **Long profile:**



- **Cross profile:**

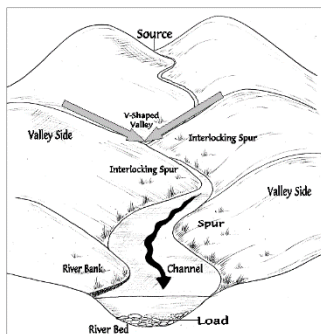


COURSE	LONG PROFILE	CROSS PROFILE
Upper	Steeply sloping towards the lower sections of the river	Steep sided v-shaped valley, thin river channel, deep in places
Middle	Shallow slopes towards the mouth of the river	V-shaped valley remains with a wider valley floor, river begins to meander, channel is wider & deeper
Lower	Almost at sea level, gently sloping to its mouth	Wide, shallow valley, with large flood plains & meanders; channel is wide deep & smooth sided

Landforms

• V-shaped valley:

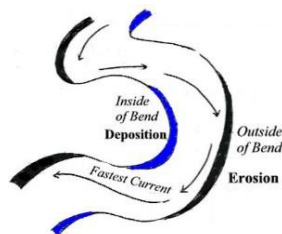
- Is narrow with a narrow, shallow river channel
- Has steep sides
- Channel has a steep gradient
- Water is mainly slow flowing
- Load is mainly large, angular and rough



• Potholes: Can be found in the upper & middle valley where a river flows over solid rock

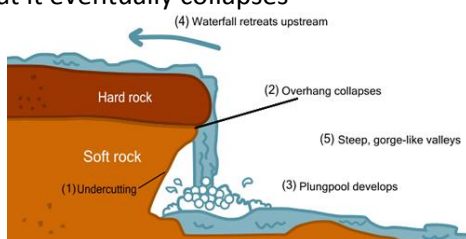
• Meanders:

- Wide sweeping bends found in the lower part of the river
- They are formed by a combination of lateral erosion & deposition



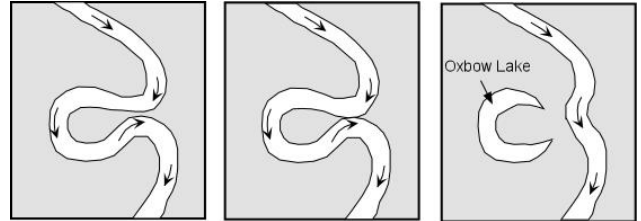
• Waterfalls:

- They occur because the river flows over hard rock which erodes slowly
- Beneath is softer rock which is eroded faster to form a "step"
- The force of the water erodes the bottom of the waterfall to form a plunge pool
- The hard rock gets undercut as the soft rock erodes so that it eventually collapses

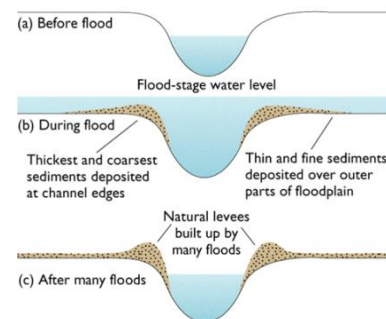


• Ox-bow Lakes:

- Form when neck of a meander becomes very narrow
- During high flow or floods the river cuts through the neck & straightens its course
- Deposition occurs on the bank of the river
- The cut-off meander is an ox-bow lake



• Levees: when a river floods, the coarsest material is deposited first, on the edges of the river, forming a natural embankment called a levee



• Deltas:

- Deltas occur where a river that carries a large amount of sediment meets a lake or the sea
- This meeting causes the river to lose energy and drop the sediment it is carrying
- Deltas form where river mouths become choked with sediment, causing the main river channel to split into hundreds of smaller channels or distributaries

Three types of delta

► Arcuate or fan-shaped
e.g. the Niger (Nigeria)

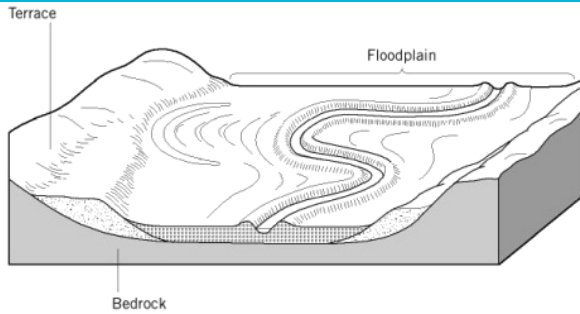
► Cuspate
e.g. the Ebro (Spain)

► Bird's foot
e.g. the Mississippi (USA)



• Flood plain:

- Area of alluvial deposits found beside the river in its lower course
- As meanders move slowly down the course of the river they erode the valley to create a wide valley floor
- Deposits layers of alluvial material on the slip off slopes building up into a large flood plain



Causes of River Flooding

- **Steep-sided channel:** a river channel surrounded by steep slopes causes fast surface run-off.
- **Lack of vegetation or woodland:** surface run-off will be high as trees and plants won't intercept precipitation.
- **Drainage basin, consisting of mainly impermeable rock:** water cannot percolate through rock layer, and will runoff surface
- **Drainage basin in an urban area:** these consist largely of impermeable concrete, which encourages overland flow.
- **Deforestation, overgrazing and overcultivation, and population pressures** cause soil erosion causes sediment to go into rivers decreasing the cross-sectional area

FLOODS

PROS

- Recharges groundwater stores
- Alluvium is deposited on floodplain, good for farming
- Deposition from increased river discharge can make new land
- Pollutants washed off of land

CONS

- People can be killed
- Homes can be destroyed
- Spread of water borne diseases
- Shortage of clean water and food
- Infrastructure damaged
- Businesses can be destroyed
- Fires can occur due to electricity & water

Flood Management Techniques

• Dams:

- Built across a river to control the amount of discharge
- Water is held back by the dam in a reservoir
- Released in a controlled way to control flooding
- Is expensive to build, can affect farmers & cause erosion downstream

• Afforestation:

- Trees planted near to the river
- Greater interception of rainwater
- Lower river discharge
- Relatively low cost option, enhances environmental quality of the drainage basin

• River engineering:

- Channel widened/deepened to carry more water
- Channel straightened so water travels faster
- Course altered to divert floodwater away from homes
- Alterations may lead to a greater risk of flooding downstream, as the water is carried there faster

• Managed flooding: Allow river to flood naturally in places, to prevent flooding in other areas

• Planning:

- Authorities & government introduce policies to control urban development near/on floodplain reducing risk of flooding & damage to property
- Enforcing regulations may be difficult in LEDCs

2.3 Coasts

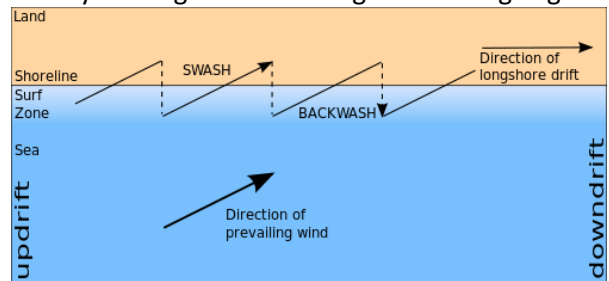
- Coasts are formed by the sea and wind working together in 3 key tasks: erosion, transportation and deposition

Erosion

- **Corrasion:** large waves hurl beach material at the cliff
- **Corrosion:** salts and acids slowly dissolve a cliff
- **Attrition:** waves cause stones to collide and disintegrate
- **Hydraulic action:** force of waves compresses air in cliffs

Transportation – Longshore Drift

- Waves approach coast at an angle
- Swash moves up the beach at an angle
- Backwash drains straight back down the beach
- Gradually moving material along beach in zig-zag motion



Deposition

• Components of a wave:

- **Swash:** when a wave breaks & washes up the beach
- **Backwash:** when the water drains back into the sea

TYPES OF WAVES

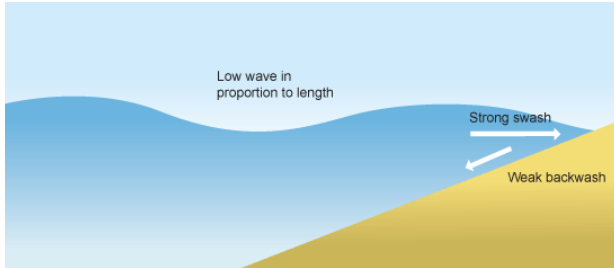
CONSTRUCTIVE

- Low wave height
- Beach gradient is gentle
- Spill forward gently
- Creates a strong swash
- Water drains through beach material
- Backwash is weak
- Deposits material
- Builds up beaches

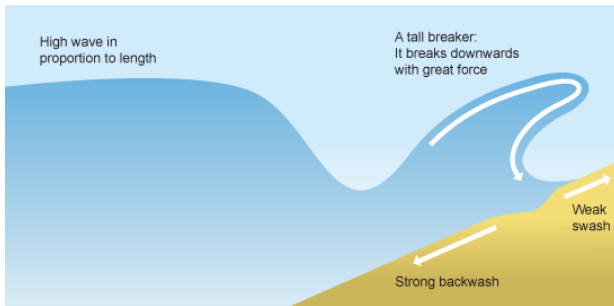
DESTRUCTIVE

- High wave height
- Beach gradient is steep
- Plunge forward
- Swash is weak
- Rotation of water causes a strong backwash
- Erodes beaches

Constructive:

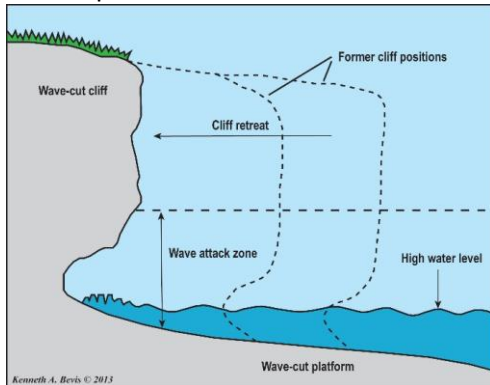


Destructive:



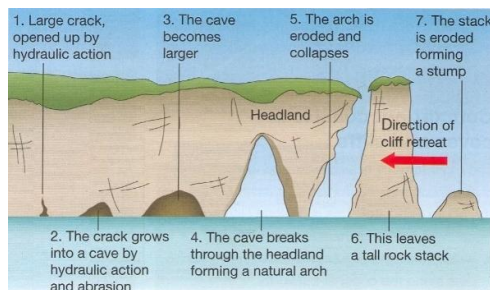
Cliffs & Wave-cut platforms

- Wave erosion is concentrated at the foot of the cliff
- A wave-cut notch is formed
- Cliff is undercut & collapses
- Repeated collapse causes retreat of the cliff



Caves, Arches & Stacks

- A band of weaker rock extends through a headland
- Erosion produces caves on both sides of headland
- More erosion produces an arch through the headland
- Eventually the roof is weak & collapses forming a stack

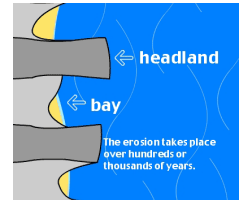


Beaches

- In bays, the waves diverge outwards
- The wave energy is dissipated creating a low energy environment hence deposition to form beaches

Bays and Headlands

- Bays are formed due to softer rock getting eroded easily
- Headlands are usually formed since they are made of resistant rock and so is eroded more difficultly



Spits

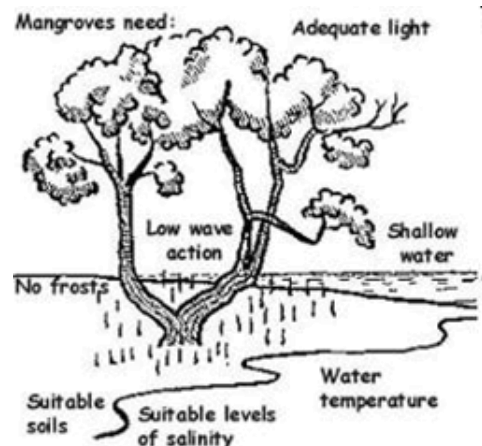
- Spits:
 - Spits form when the coastline changes direction
 - Longshore drift carries material in same direction
 - Sand & shingle is built up to form a spit
 - End of spit curves due to wave refraction or wind

Sand Dunes

- Sand dunes form behind wide sandy beaches
- Onshore winds pick up the dry sand from above the high-water mark & carry it landward by saltation
- If they encounter an obstacle the wind loses energy & deposits sand in the lee of the obstacle
- Eventually a dune is formed
- Plants grow on it which stabilizes it & traps more sand

Mangrove Swamps

- Mangrove swamps are trees and shrubs that grow in saline coastal habitats in the tropics and subtropics
- Provide a habitat and protection for many fish & other sea animals, especially when young
- They slow water flow encouraging any sediment to be deposited, keeping sea water clear
- Protect the coast from erosion, storm surges, hurricanes, and tsunamis
- They are a source of food and material
- Conditions required for formation of mangrove swamps:



Coral Reef

- Coral reefs support a great diversity of life
- Built from the limestone remains of coral skeletons & coralline algae
- Conditions required for growth of coral reef:
 - Warm water/seas; temperatures above 20°C
 - Shallow water; not more than 60 meters deep
 - Water free from sediment/clear/availability of light
 - Plentiful supply of oxygen in water/unpolluted
 - Plentiful supply of plankton
 - Lack of strong current

TYPES OF CORAL REEFS

FRINGING REEF	BARRIER REEF	CORAL ATOLL
<ul style="list-style-type: none"> • Coral reefs grow in the shallow water of the coast in tropical areas 	<ul style="list-style-type: none"> • Due to plate tectonics island starts to sink • Reef grows to keep up with the sinking, but a lagoon develops between reef & land 	<ul style="list-style-type: none"> • These form around islands that are sinking. • Coral growth keeps up with this & island keeps sinking • Eventually island sinks below sea level forming a ring of coral with a lagoon in the centre.

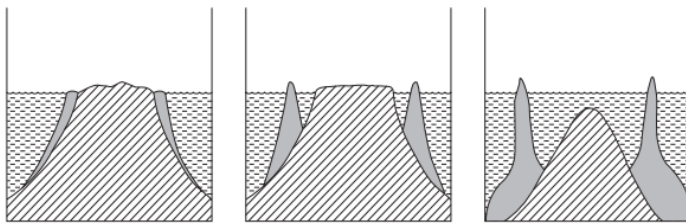
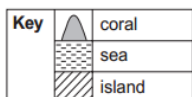


Fig. 4A

Fig. 4B

Fig. 4C

**Coastal Opportunities**

- **Tourism:** Resorts along coasts; tourists enjoy using coast e.g. swimming and sunbathing
- **Sport:** Many sports use coasts e.g. sailing, surfing, diving
- **Fishing:** Many people make their living from catching & selling fish on coasts
- **Oil & Gas:** Reserves are found under oceans near coasts
- **Housing:** Many people live along coasts because of its beauty and relaxing lifestyle

- **Industry:** Many industries locate near coasts for easy of trade
- **Transport:** Many ports are found in coastal areas & help trading & travelling between countries

Coastal Hazards

- **Sea level rises:** Caused by global warming, low lying countries become vulnerable to flooding
- **Pollution:** Sewage discharge, oil spills, litter thrown into the sea can harm coastal ecosystems and environment
- **Overfishing:** Many fish stocks around the world are being over fished to dangerous levels
- **Erosion:** Many coastlines are being eroded by stronger storms & raising sea levels
- **Tropical storms:** Frequency of storms & magnitude increase causing floods, storm surges & wind damage

Coastal Management**Hard Engineering:**

- **Rip-rap:** giant boulders placed at foot of cliffs, designed to absorb waves energy and protect cliffs behind. Effective, looks bad, reduces beach access, is expensive
- **Gabion:** large boulders placed in cages which means can be installed quickly & is fairly effective. Looks bad, reduces beach access, is expensive
- **Groynes:** designed to stop longshore drift transporting beach material away. Effective, needs regular replacing, looks bad
- **Sea wall:** made out of concrete & aims to absorb waves' energy, often curved to direct waves energy back to sea. Very effective, expensive, looks bad
- **Breakwater:** are built out into the sea; instead of breaking on coast, waves break on breakwater. Expensive, disrupts shipping & animals
- **Revetments:** similar to sea walls, but often built out of wood & are designed to absorb the waves' energy. Needs regular replacing & doesn't protect against storms

Soft Engineering:

- **Dune Stabilisation:** planting vegetation on beach or on dunes, increasing stability by reducing moisture content
- **Cliff Regrading:** make cliffs less steep; reducing angle reduces undercutting & risk of cliff collapsing
- **Beach Nourishment:** adding more sand to the beach creating a better natural defence
- **Beach Drainage:** removing some of the excess water reduces stress on the cliff
- **Managed Retreat:** allow flooding of low value land

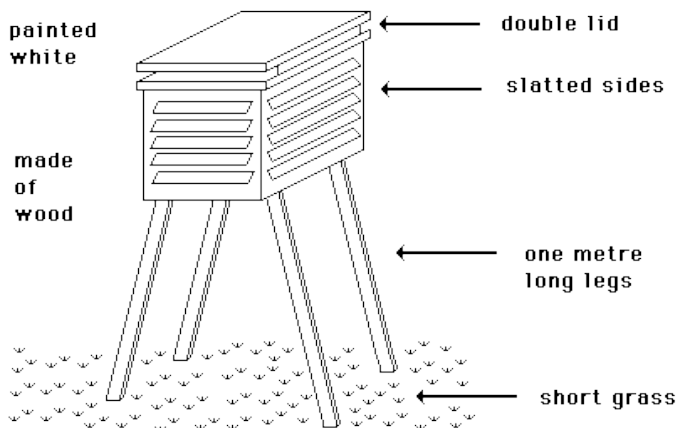
2.4 Weather

• Weather:

- The mix of events that occur in our atmosphere, including changes in temp., rainfall and humidity
- Can vary from day to day and from place to place

Stevenson's Screen: contains the thermometers

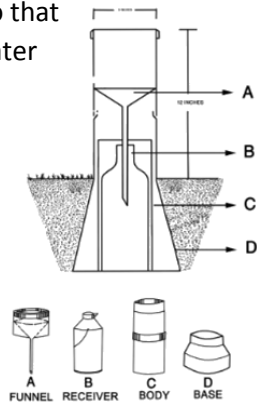
- Painted white to reflect sun with double lid for insulation
- Slatted sides to let the air circulate, but slanted downwards to prevent light getting in
- Legs 1m long to prevent heating from ground
- On short grass for same amount of reflection



Rain Gauge: has a fixed diameter so that they collect the same amount of water & so comparisons can be made

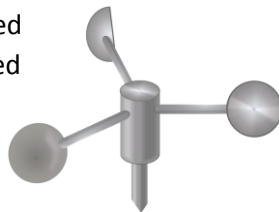
- Made of a hollow cylinder (C) containing:

- Funnel (A) to collect the water.
- Container to collect water which may be graduated
- Emptied once every 24hrs
- Rain is measured in millimeters.
- Sunk into ground, but not level so splashes or surface water can't get in



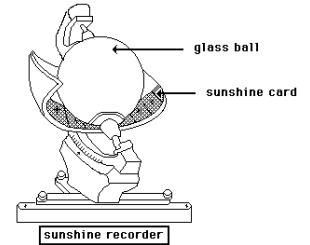
Anemometer: Measures wind speed

- Three light rotating cups (mounted on a high pole) are blown around by the wind the revolutions are counted & converted into m/s, km/h or knots



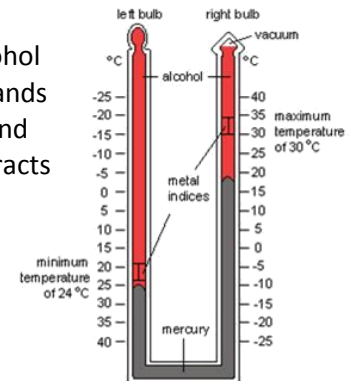
Sunshine Recorder (Heliograph): records the amount of sunshine at a given location

- Burns a timeline
- Traces sun shine not the hours of daylight
- The glass ball focus the light
- This burns a line onto the card



Max-min thermometer: record max. & min. temp. over 24hr period

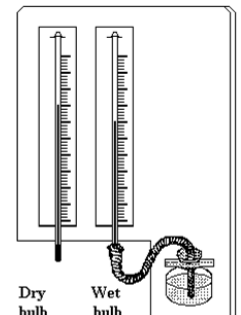
- Max thermometer contains mercury & min contains alcohol
- As temp. rises, mercury expands & pushes up a metal index and when it cools, mercury contracts and index is left in place at highest temp
- As temp. falls, alcohol contracts & pulls metal index with it; but as alcohol expands, it flows past index, leaving it at lowest temp



- Both indexes read from bottom once every 24hrs

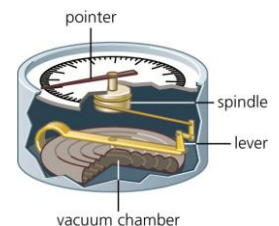
Wet & dry bulb thermometer (hygrometer):

- Dry bulb is a normal mercury thermometer and it measures actual air temperature
- Wet bulb is same but bulb is covered with a fine cloth which is connected to a reservoir of water.
- Water evaporates from the cloth & cools temperature so it reads a few degrees lower than air temp.
- Both wet & dry bulb temperatures read



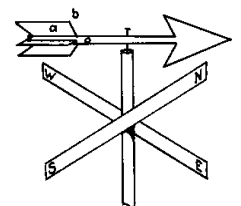
Barometer: Measure air pressure

- An aneroid barometer has a vacuum chamber
- As air pressure rises & falls, the chamber contracts & expands
- Levers conduct this movement to a spindle which moves pointer on the dial which records the air pressure in mmHg



Wind vane: Records wind direction

- The fletching is blown by the wind so that the arrow head points into the wind.
- Mounted on a high pole.



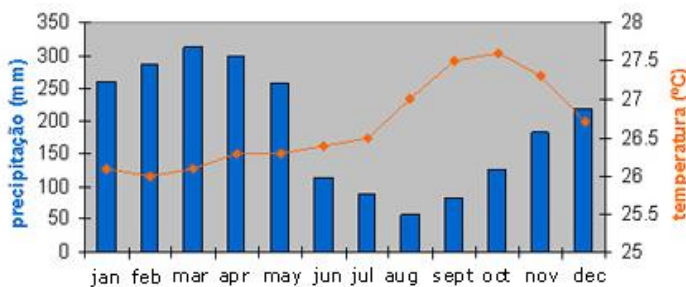
2.5 Climate & Natural Vegetation

• Climate:

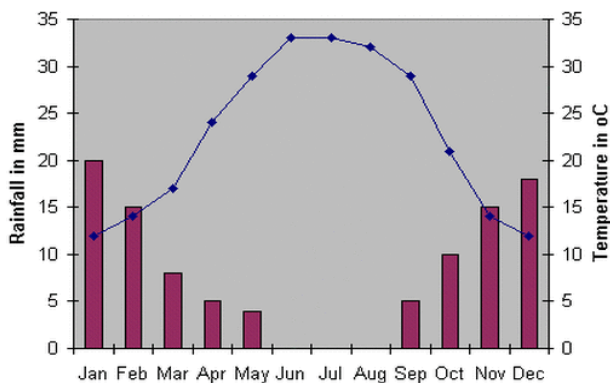
- This is the average conditions over a longer period of time, usually a few years

	EQUATORIAL	HOT DESERT
LOCATION	Close to the equator	Between 5° and 30° north and south of the equator
MEAN TEMP. OF HOTTEST MONTH	≈25°C	≈30°C
MEAN TEMP. OF COLDEST MONTH	≈25°C	>18°C
ANNUAL TEMP. RANGE	<5°C	<5°C
RAINFALL AMOUNT	>200mm	<250mm
RAINFALL DISTRIBUTION	Same throughout year	Irregular
WIND	Low	Strong
CLOUD	Heavy	Almost none
HUMIDITY	High	Low
PRESSURE	Low	High

Equatorial Climate Graph



Hot Desert Climate Graph



Factors Influencing Climate Characteristics:

- **Latitude:** closer to the equator = higher temperature
- **Distance from the sea:** coastal area = warmer winters and cooler summers
- **Prevailing winds:** seasonal difference in heating between land and sea affects temperature of prevailing wind. Warm prevailing wind = rise in temperature
- **Ocean currents:** warm currents raise winter temperatures in coastal areas; cold currents cool them down in summer
- **Altitude:** higher altitude = lower temperature (1° per 100m)

Tropical Rainforest Ecosystem

Distribution:



Vegetation & Adaptation:

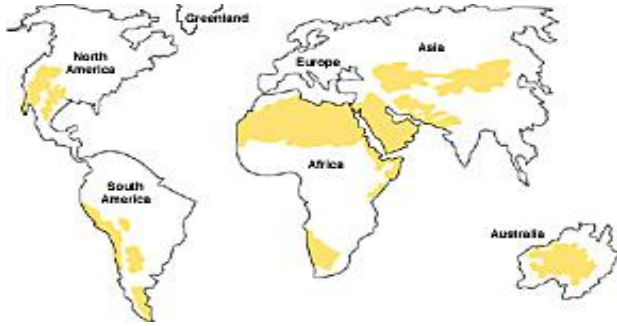
- **Emergent:** tall trees up to 50m, few lower branches, grows above others to get full sunlight
- **Canopy:** trees 20-40m forming a continuous canopy, few lower branches, makes up 50% of vegetation
- **Shrub:** low shrubs & saplings, plants that adapt because they are extremely close to the forest floor
- **Lianas:** use large trees as support to reach sunlight
- **Fan Palms:** wide leaved plants that capture as much sunlight & rainfall as possible
- **Humus Layer:** decaying biological matter; rainforest soil fertility is dependent on this
- **Buttress Roots:** very long roots that support tall trees & suck up maximum amount of nutrients in poor soil
- **Drip tip leaves:** leaves that let rainfall travel over them & drip to the ground, causing less damage by excess water

Wildlife & Adaptation:

- Home to many mammals
 - Tigers in SE Asia
 - Jaguars in Central & South America
 - Leopards in Africa
 - Sloths
 - Primates
 - Lemurs
- Home to birds, amphibians, reptiles & insects too
- Animals adapt in differently to survive e.g. camouflage

Climate:

- Are close to the equator so they have very similar climates all year around
- Temp. is constant between 25-30°C
- Rainfall all year around, monthly amounts vary slightly
- Days start of warm & then temp. and humidity build up
- Hot air rises causing low pressure

Hot Desert Ecosystem**Distribution:****Vegetation & Adaptation:**

- **Succulents:** fat fleshy plants that store water in leaves, trunks and roots e.g. cacti
- **Ephemeral:** plants with very short life cycles - typically 6-8 weeks; use very short wet seasons to pollinate
- **Long & wide roots:** can absorb the maximum amount of rainfall, also aids stability in very loose soil
- **Spiky & waxy surface:** protect themselves with spikes & wax so they are not eaten/damaged by animals

Wildlife & Adaptation:

- Don't have same variety as tropical rainforests
- Many insects, reptiles and mammals adapt to survive
- **Nocturnal:** animals hide in burrows or rocks & plants during hot daylight hours & only emerge at night
- **Camels:** store fatty tissue in their humps which is later metabolised, releasing water & fat to survive in deserts

Climate:

- Deserts are extremely dry (arid) places
- Have less than 250mm of rainfall per year
- Air is dry because:
 - Most of the moisture has precipitated over equator
 - air travelling to desert travels over land, not the sea
- No moisture leads to very few clouds, exposing them to high levels of incoming radiation from the sun
- Causes day-time temps. to be very high
- Lack of cloud cover allows outgoing radiation to escape
- Causes night-time temps to be low
- **Annual** temperature range is very low
- **Daily** temperature range is very high

Deforestation of Tropical Rainforests**REASONS**

- **Farming:** demand for food increases with population - need to clear more ground
- **Hydro-Electric Power:** land may need to be removed to build dam
- **Mining:** demand for resources increase – rainforests hold plenty
- **Road building:** increased traffic requires roads – rainforests in the way
- **Settlements:** cities are bigger with population – requires more land
- **Timber:** self-explanatory

PROBLEMS

- **Flooding:** less interception by plants thus more flash floods
- **Landslides:** removal of vegetation causes soil to become unstable
- **Biodiversity Loss:** kills off unknown species, since they have no home
- **Less Photosynthesis:** causes imbalance of O₂ & CO₂ in atmosphere
- **Silting:** rivers & oceans are difficult to navigate due to reduced depth
- **Desertification:** soil loses components vital to survival of plants
- **Indigenous:** people lose their homes & impacts their society

3. ECONOMIC DEVELOPMENT**3.1 Development**

- **Affluence:** general level of prosperity enjoyed by population
- **Appropriate Aid:** resources suited to basic conditions prevailing in receiving country
- **Development:** progress in terms of economic growth, use of technology and human welfare
- **Development Gap:** difference in standards of living between richest and poorest countries
- **Free Trade:** trade between countries is not restricted by laws and formalities

Main Indicators

- **Birth Rate:** number of births in a year per 1000 of total population
- **Death Rate:** number of deaths in a year per 1000 of total population
- **Gross National Product (GNP):** total value of goods and services produced annually
- **GNP per Capita:** GNP per head of population
- **Human Welfare:** condition of population i.e. diet, housing, healthcare, education, etc.
- **Infant Mortality:** avg. number of deaths of infants under 1, per 1000 live births, per year

- **Life expectancy:** average number of years a person might be expected to live
- **Intermediate Technology:** simple, easily learned technology used in economic activities
- **Human Development Index (HDI):** measures and compares international development

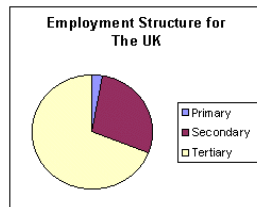
Sectors of Production

- **Primary:** e.g. farming, fishing, forestry, mining; extracts raw materials directly from the land/sea
- **Secondary:** processes/manufactures raw materials; assembles parts made by other industries; construction
- **Tertiary:** e.g. health, education, transport, retailing; provides a special service to people
- **Quaternary:** e.g. medical research or computer design; generating and/or sharing of hi-tech knowledge

Comparing Nations

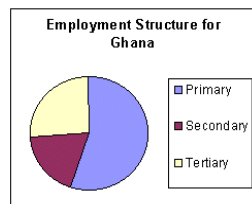
An MEDC e.g. UK

- Low proportion in primary sector:
 - Mechanizations of jobs in primary
 - Primary resources exhausted
 - Resources are now imported
- Numbers falling in secondary sector:
 - Mechanization - as machines are taking over jobs in factories.
- Tertiary sector is main growth area:
 - Most work in hospitals, schools, offices & financial services
 - Greater demand for leisure services as people have more free time and become wealthier.
 - More jobs become available in the tertiary sector.



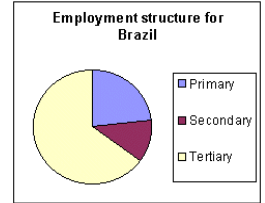
An LEDC e.g. Ghana

- Majority in primary sector:
 - Lack of machinery available in farming, forestry and mining
 - Farming very important because most eat what they grow
- Few in secondary sector:
 - Lack of factories because machinery is too expensive
 - MNCS manufacture instead
- Tertiary may be larger than secondary:
 - Most informal work is in the tertiary sector
 - Growth of jobs in tourism



An NIC e.g. Brazil

- While Brazil's economic base is developing, there are still a large number of people employed in primary industries such as farming.
- There are a large proportion of people employed in tertiary industries.
- One reason may be growth of Brazil as a tourist destination.
- Also, there have been significant improvements in the provision of health care, education and transport



Globalization

- Process in which the world is becoming increasingly interconnected
- **Causes of globalization:**
 - Improvements in transportation
 - Freedom of trade
 - Improvements of communications
 - Labour availability and skills

Impacts of Globalization

PROS	CONS
<ul style="list-style-type: none"> • Economies of scale, cost per item reduced when operating on larger scale • TNCs helps countries; provide new jobs & skills for local people • TNCs bring money and foreign currency to local economies • Allows sharing of ideas, cultures, experiences & lifestyles of people • Increases awareness of events in far-away parts of the world 	<ul style="list-style-type: none"> • Globalisation operates mostly in interests of richest countries • No guarantees that inward investment will benefit local community • Profits are sent back to the MEDC where the TNC is based • TNCs may drive local companies out of business • If cheaper elsewhere TNC may shut down factory; locals redundant • Lack of laws may allow TNCs to operate carefree in LEDCs • Threat to the world's cultural diversity

3.2 Food Production

Agricultural Systems

HUMAN INPUTS	PHYSICAL INPUTS	PROCESS	OUTPUTS
<i>Things that are built or made by humans and added on to a farm</i>	<i>Natural things that are found on a farm or added to a farm</i>	<i>The events that take place on a farm to turn inputs into outputs</i>	<i>Things that are produced on a farm that are often sold</i>
<ul style="list-style-type: none"> • Labor/rent • Machinery • Building • Animal feed • Fertilizers • Pesticide • Market demand • Government controls • Seeds 	<ul style="list-style-type: none"> • Soil • Precipitation • Temp. • Length of Season • Alluvium • Floods • Relief • Drainage 	<ul style="list-style-type: none"> • Rearing • Shearing • Ploughing • Fertilizing • Weeding • Irrigating • Cultivating • Harvesting • Slaughtering • Planting 	<ul style="list-style-type: none"> • Profits • Meat products • Wool • Milk • Waste • Crops • Pollution • Erosion

Classification of Farming Types

1. SPECIALISATION

Arable (Crops)	Pastoral (animals)	Mixed (both)
-------------------	-----------------------	-----------------

2. ECONOMIC STATUS

Commercial (For profit)	Subsistence (to survive)
----------------------------	-----------------------------

3. INTENSITY OF LAND USE

Extensive	Intensive
<ul style="list-style-type: none"> • Normally a larger farm • Few inputs per hectare • Few workers per hectare • Low yields per hectare 	<ul style="list-style-type: none"> • Normally a smaller farm • High inputs per hectare • Lots of workers per hectare • High yields per hectare

4. LAND TENURE

Shifting & Nomadic (where farmers move from one area to another)	Sedentary (farm location is permanent)
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Food Shortages & Famine

- When demand for food exceeds supply of food leading to undernourishment
- Prolonged undernourishment can damage people's health and eventually lead to starvation

HUMAN CAUSES

- Increasing population; supply cannot keep up with demand
- Overgrazing reduces integrity of soil and can cause topsoil erosion and soil degradation.
- Overcultivating causes soil degradation, using up and not giving nutrients recovery time
- Deforestation of woodland, damages integrity of soil as well as its source of nutrients.
- Farming and industrial pollution can both degrade land and reduce crop yields
- Corruption of government

Effects:

- Hunger
- Susceptible to infectious diseases
- Impair physical and mental development
- Reduce labour productivity

- There are several solutions to increase food output

GM Crops and Farming

- Genetically modified crops are crops that have their genes altered to improve quality and/or quantity

ADVANTAGES

- Uniform in shape – easy to transport/ appeal consumers
- Growing season shorter
- Drought resistant – less water
- Higher yields

DISADVANTAGES

- Natural species may die
- Taste often not as good
- Lead to development of super weeds – stronger than GM
- No one knows long term effect on humans

Monoculture

- Growing of only one type of crop
- **Cash crops:** crops grown in large plantations for selling and making a profit

ADVANTAGES

- Become more efficient
- Profitable
- Can have high yields
- Easily controllable
- Low training required

DISADVANTAGES

- If demand falls, no profit
- Less variety
- Bad season, no profit
- Labor becomes deskilled
- Only source of income

Green Revolution

- The introduction of modern western style farming techniques in LEDCs during the late 1960's and 1970's.
- **High Yield Varieties:**
 - Developed to try and end food shortages by increasing yields.
 - Were first developed by cross pollinating different varieties
 - This is now being done through genetic modification

SUCSESSES

- Hiv did increase food production and made countries more self-sufficient
- Food prices began to fall making; affordable for poor
- Shorter growing season, more crops could be grown
- The yields were more reliable
- Different crops were grown adding variety to local diet
- There were surpluses so crops could be traded commercially
- Farmers became wealthier

FAILURES

- Required fertilisers & pesticides polluted water
- The HYV were more prone to disease and drought
- More water had to be diverted to growing crops
- Many poorer farmers couldn't afford to buy expensive HYV
- Mechanisation led to unemployment
- Many natural varieties lost
- Countries & farmers became dependent on foreigners

3.3 Industry

- **Input:** resources, can be physical e.g. ore or human e.g. labour
- **Processes:** turning raw materials into usable things e.g. steelmaking; turning usable things into other things e.g. assembling cars
- **Outputs:** product + profit or loss + waste materials
- **Types of Industry:**
 - **Manufacturing:** produces goods that are physically used by consumers e.g. toys
 - **Processing:** turns raw materials into other materials used in manufacturing e.g. metal production
 - **Assembly:** using materials and a design scheme to put together a finished product e.g. electronics
 - **Hi-Tech:** specialised industries that mostly do research but often have small sections dedicated to each of the 3 normal types of industry

Factors influencing location of an Industry**PHYSICAL**

- **Power/energy:** industry should be near source of raw materials
- **Natural routes:** river valleys/flat land is good for transport
- **Site/land:** availability/price

HUMAN

- **Labour:** quantity/quality
- **Markets:** size & location
- **Transport:** cost increases when items are bulky, fragile, perishable
- **Government policies**
- **Leisure facilities**
- **Capital**

3.4 Tourism

- **Tourism:** the occupation of providing information, accommodation, transportation and other services to tourists

Growth of Tourism

- **Greater affluence:** higher salary + holiday with pay
- **Greater mobility:** increased cars + more aircraft
- **Improved accessibility & transport facilities:**
 - Better roads
 - Larger airports, online reservation, package holidays
- **More leisure time:**
 - Longer vacations
 - Shorter working hours; people work from home
 - More elderly
- **Changing lifestyles:** changing fashions, earlier retirement
- **Increase in recreational activities**
- **Advertising holiday destinations:** TV + Internet

Factors that Change Tourist Patterns

- **Transport & accessibility:** access to various means of transportation e.g. trains, cars, planes, ships
- **Scenery:** landscape & visual appearance of places
- **Weather:** climate is important e.g. cold place for ski trip
- **Accommodation:** quality/price of hotels, camps, resorts
- **Amenities:** variety of recreational, historical, leisure facilities & sites offered

TOURISM**ADVANTAGES**

- Improve and increase GDP per capita
- Brings foreign money, culture, diversity
- Jobs for the unemployed
- More business & trade
- Increased publicity
- New Infrastructure

DISADVANTAGES

- More congestion & pollution
- Damage to landscape
- Hinders local businesses
- Traditional culture lost
- Inflation affecting locals
- Seasonal unemployment
- Social/cultural problems
- Shortage of supplies

Managing Tourism

- **Ecotourism:** holidays that involve eco-related activities & are sustainable e.g. hiking, bird-watching, horse riding
- **Sustainable tourism:** tourist activities that are socially, environmentally & economically sustainable

TYPICAL ECOTOURISM ACTIVITIES	HOW ECOTOURIST RESORTS CAN BE ECO-FRIENDLY
<ul style="list-style-type: none"> • Hiking • Kayaking • Bird watching • Safari • Cycling • Beach cleaning • Tree planting • Completing bird & animal surveys 	<ul style="list-style-type: none"> • Use renewable energy sources • Build using only local products • Serve only local food • Employ only local staff • Recycle all waste • Treat and clean all water • Promote local culture • Educate guests about the importance of protecting the environment

3.5 Energy• **Non-renewable resources:**

- Are finite
- Fossil fuels were produced by photosynthesis
- Takes millions of years for them to form
- Examples: coal, oil, gas
- Fossil fuels used mainly by MEDCs
- Uranium for nuclear energy
- Fuel-wood is a non-commercial source of energy in MEDCs but important in LEDCs

	ADVANTAGES	DISADVANTAGES
COAL	Lasts 300yrs, now become more efficient, needed to make coke	Cost of production high, produces lot of GH gases, dangerous, open cast = visual pollution, costly to transport, acid rain
OIL	More efficient than coal, easier to transport, diversity of uses, petro-chemicals	Lasts only 50-70yrs, oil spills, releases GH gases, prices fluctuate, refineries use lot of space, acid rain
GAS	Cleanest of fossil fuels, cheaper than oil, easy to distribute	Releases methane, explosive, prices fluctuate, acid rain, GH gases.

• **Renewable resources:**

- Are continuous
- Are, by definition, sustainable

• **Types:**

- Geothermal
- Wind
- Solar
- Bio fuel
- Hydroelectric
- Tidal
- Wave

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Reduce dependence upon fossil fuels • Alleviate the world's energy crisis • Development of alternative energy • No pollution • Source lasts forever 	<ul style="list-style-type: none"> • Difficult to produce required energy quantity • Energy produced much less than fossil fuels • Unreliable supply of constant energy • Some countries lack the conditions for these • Cost of technology high compared to fossil fuel

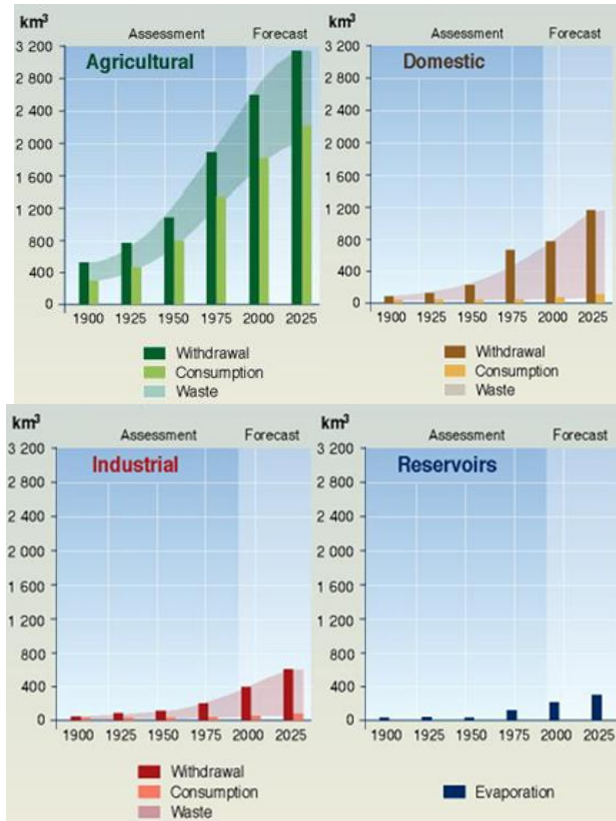
NUCLEAR POWER

BENEFITS	DRAWBACKS
<ul style="list-style-type: none"> • Technology for nuclear power exists • Plenty of radioactive supply as fuel • Very low amounts of greenhouse gases made • Reduces dependency on fossil fuel countries • Nuclear waste stored safely underground • Electric supply altered easily based on demand 	<ul style="list-style-type: none"> • Risk of nuclear accidents • Risk of nuclear plants as terrorist targets • Nuclear technology can be used to make WMDs • Risky to transport material & expensive • Risk of nuclear radiation related to cancer • Uranium mining dangerous and polluting • Remains radioactive for long time & expensive

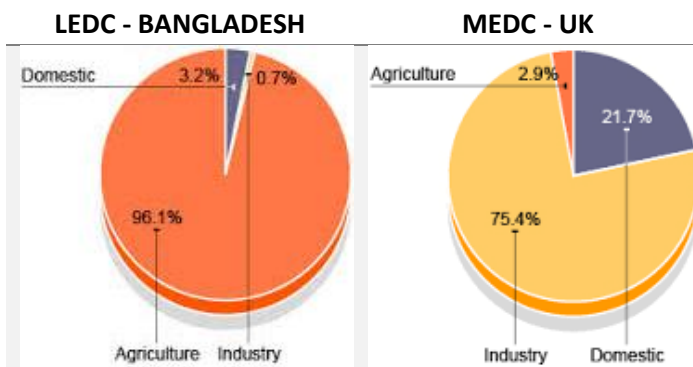
3.6 Water**Uses of Water**

- **Agriculture:** to water plants
- **Industrial:**
 - Heated to make steam to turn turbines
 - Cooling down reactors
- **Domestic:**
 - Household e.g. cooking, cleaning, drinking
 - Recreational e.g. swimming, sports
- **Environmental:** preserving water in a dam

Evolution of Global Water Use



Water Use in Different Economies



Methods of Water Supply

- **Dams:** barrier placed across a river made from concrete
- **Reservoirs:** artificial lake that develops behind a dam
- **Wells:** a shaft sunk into the ground to obtain water
- **Desalination:**
 - **Thermal:** evaporation of water to remove salt
 - **Reverse Osmosis:** forces water through semi-permeable membrane to remove salt
- **Sewage Treatment:**
 - Removal of contaminants from waste water & household sewage
 - Requires physical, chemical & biological processes to remove all the contaminants and make safe

Causes of Water Shortages

- **Population Growth:** increased pressure on water sources as world's population grows
- **Pollution:** water sources are being polluted by industries
- **Demand:** as development increases globally so does amount of water needed
- **Sewage:** lack of proper sewage treatment means that waste is often pumped directly into water sources
- **Climate Change:** global warming may be releasing freshwater from glaciers & ice shelves, but much of it is running directly into oceans; inaccessible
- **Political:** water sources are often shared; some people control large percentages of the shared resource, leading to shortages for others
- **Mismanagement:** water is used inappropriately causing water shortages

Impact of Water Shortages

- **Drought:** below average supply of water over a prolonged period
- **Famine:** crops fail/livestock die due to water shortage
- Conflict arise when sharing a limited supply of water
- People may be forced to relocate due to famine/drought
- Stagnant dirty water = increased risk of diseases
- Eutrophication due to run-off
- Dirty water/eutrophication causes loss of biodiversity
- **Eutrophication:**
 - Run-off from farms containing fertiliser causes excess growth of algae in water
 - Water does not oxygenate properly/receive light
 - Causes plants & animals to suffocate & die

Solutions to Water Shortages

- **Desalination:** governments should invest more in desalination plants
- **Sewage Treatment:** governments should enforce better policies regarding disposal and reuse of waste water
- **Conservation:**
 - Half flush toilets & showering instead of bathing
 - Watering the garden at dusk to prevent evaporation
 - Collecting rainwater to use on garden
 - Using appropriate plants for the climate
 - Using drip irrigation rather than sprinklers
- **Water Charities:**
 - Building wells to access groundwater
 - Building toilets to reduce sewage & pollution
 - Teaching appropriate farming techniques
 - Low cost schemes to filter and clean water
- **Irrigation Projects:** use irrigation systems to redistribute water & water the land

3.7 Environmental Risks of Economic

Development

Soil erosion:

- Occurs in farms, where rainforest is cleared – soil is washed away by rain because no tree roots to retain it
- In the Amazon rainforest, eroded soil goes into rivers & pollutes drinking water

Global warming:

- Greenhouse effect is when infrared radiation passes through atmosphere, & some is absorbed and re-emitted in all directions by greenhouse gas molecules
- This warms the surface & lower atmosphere
- Global warming occurs due to too much greenhouse gas
- Effects:
 - Melting poles = rising sea levels = increase in storms
 - Change in the distribution of precipitation
 - Plants and wildlife might not have time to adjust
 - Lower crop yields in Africa, Asia & Latin America
 - More people at risk from insect/water-borne diseases
- Greenhouses gases are:
 - CO₂ from burning fossil fuels or wood
 - Methane from decomposing organic matter & waste
 - CFCs from aerosols, air conditioners, & refrigerators
 - Nitrogen Oxides from car exhausts & power stations

Air pollution:

- Carbon monoxide: incomplete combustion of carbon-containing substances causes oxygen starvation
- Sulphur dioxide: combustion of fossil fuels causes respiratory problems and acid rain
- Nitrogen oxides: N₂ & O₂ from air combine due to heat (furnace/engine); same effect as sulphur dioxide
- Lead oxide: burning leaded petrol; damages nervous system

Water Pollution:

- Chemicals in fertilizers cause eutrophication
- Oil spilling into the sea
- Acid rain; destroys lakes and kills animals/plants
- Health hazards for humans
- Damages limestone buildings and sculptures
- Fewer crops can be grown on an acidic field

Noise pollution:

- Vehicles
- Machinery in industries and farms
- Noisy humans

Visual pollution: all man-made things are ugly compared to unspoiled nature

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