GEOGRAPHY IGCSE 0460 EXAM REVISION NOTES

Theme 1. Population and Settlement

1.1 Population dynamics

1.2 Settlement

Theme 2. The natural environment

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2.3.1 Weather
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Theme 3. Economic development and the use of resources

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Theme 1. Population and Settlement

1.1 Population dynamics

Reasons for recent rapid population growth ('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

Population growth terms:

-**Migration**: the 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

Population growth is related to the amount of resources available for example water, wood and minerals

Carrying Capacity – The number of people the environment can support without there being negative effects to the population.

Optimum Population – This is the amount of people that a region/country can ecologically support, usually less than carrying capacity.

Under-population – This is 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.

HIV/AIDS

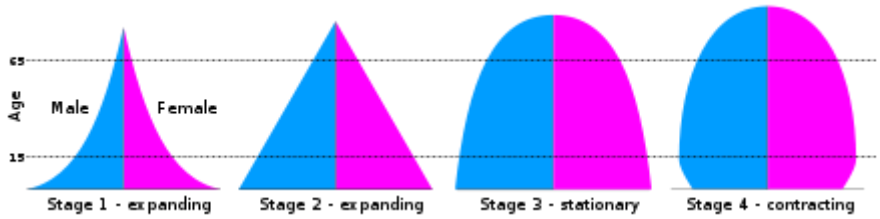
Origins

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. (Year 2000 – 600000 orphans). Due to the countries being poor, there is a lack in state welfare, resulting in poverty and lack of education.

Population pyramid general format:



Stage 1: high birth rate; high death rates; short life expectancy; less dependency (since there are few old people and children have to work anyway)

Stage 2: high birth rate; fall in death rate; slightly longer life expectancy; more dependency as there are more elderly

Stage 3: declining birth rate; declining death rate; longer life expectancy; more dependency

Stage 4: low birth rate; low death rate; highest dependency ratio; longest life expectancy

High death rates in LEDCs are caused by:

poor health care/few hospitals/doctors/nurses/clinics;

poor sanitation/poor hygiene/lack of toilets/dirty places;

poor access to safe/clean water/water borne diseases;

limited food supplies/malnutrition/starvation;

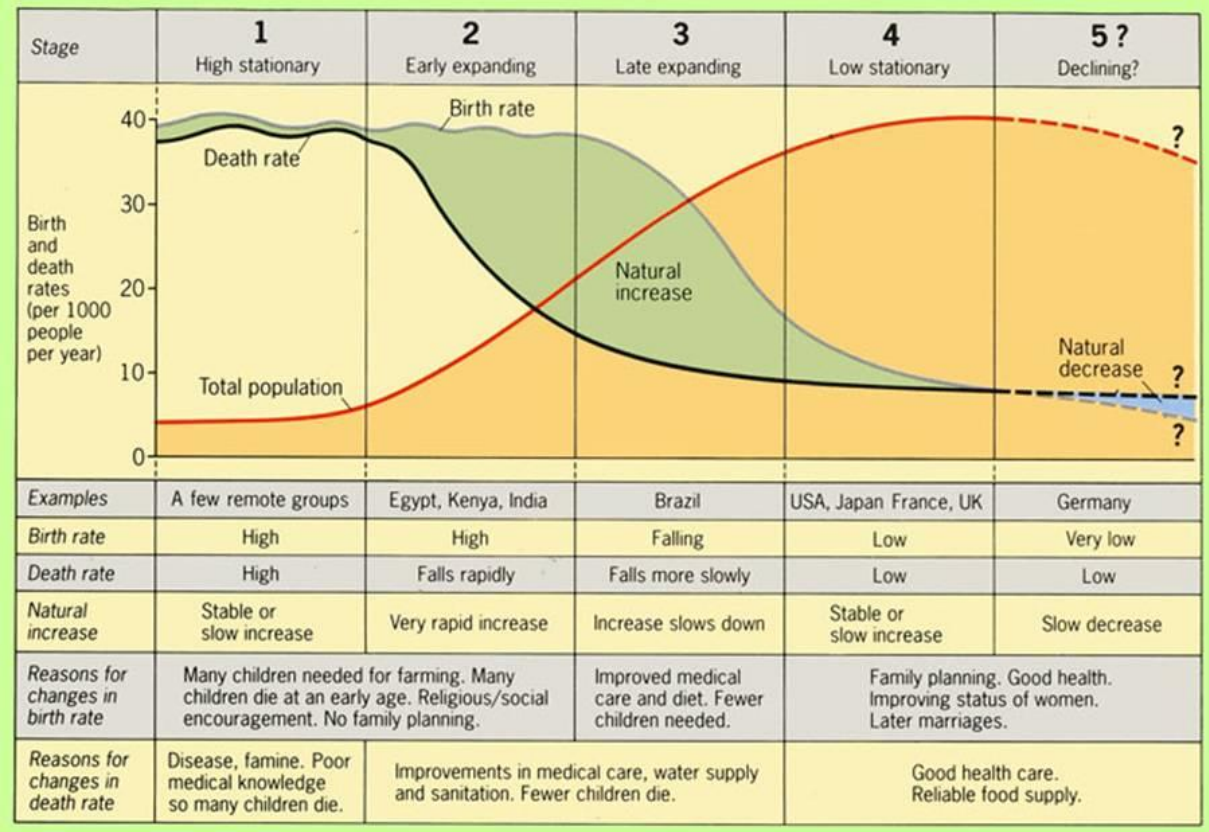
HIV/AIDS;

Natural disasters/drought/floods;

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

Birth rates are low in MEDCs because:
availability of contraception/family planning/abortions;
educated re. contraception/family planning;
able to afford contraception/family planning/abortions;
traditionally small families/don't need to prove virility/not traditional to have large families;
expense of bringing up children/childcare/don't have to send children to work/can afford
to bring up children;
many women have careers/women are educated;
availability of pensions/do not need children to look after parents in old age;
low infant mortality rate;
Lack of religious beliefs/don't object to contraception
The **Demographic Transition Model**:



Stage	1 High stationary	2 Early expanding	3 Late expanding	4 Low stationary	5 ? Declining?
Examples	A few remote groups	Egypt, Kenya, India	Brazil	USA, Japan France, UK	Germany
Birth rate	High	High	Falling	Low	Very low
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Very rapid increase	Increase slows down	Stable or slow increase	Slow decrease
Reasons for changes in birth rate	Many children needed for farming. Many children die at an early age. Religious/social encouragement. No family planning.		Improved medical care and diet. Fewer children needed.	Family planning. Good health. Improving status of women. Later marriages.	
Reasons for changes in death rate	Disease, famine. Poor medical knowledge so many children die.	Improvements in medical care, water supply and sanitation. Fewer children die.		Good health care. Reliable food supply.	

Population distribution and density factors:
-Human: better housing opportunities, education, health, entertainment, retirement areas,
-Physical: relief (for farming, defence), climate, water supply, resources
-Economic: ports, transport links, industrial areas, tourist areas, money available for high-tech industries
Dependency ratio = non-economically active / economically active × 100 %
Migration: the movement of people (or animals) from one area to another, some types are:
Voluntary migration causes:
-find a job, or a better paid job
-pioneers developing new areas
-trade and economical expansion
-territorial expansion
-better climate
-social amenities

-be with friends/family

Forced migration causes:

-avoid religious/political persecution

-avoid war

-slavery/forced labour as a prisoner of war

-racial discrimination

-famine

-natural disasters

-overpopulation

Problems for international migrants include:

lack of qualifications/skills/education/no experience/they have to do unskilled jobs/work informally;

many are doing low paid jobs;

poor working conditions/dirty jobs/long hours/exploitation by employers;

many cannot speak the language;

some are unable to obtain employment/not enough jobs;

can't afford education/health care/food/housing etc.;

live in poor conditions/overcrowding/lacks sanitation;

some may have to live away from their families;

discrimination may occur/racism;

some may lack documentation/have to hide from authorities;

trouble adapting to culture/religion etc.

Internal migration is within a country e.g. rural/urban depopulation, regional

External or **international** is between countries e.g. Negro slaves to America (forced) or Mexicans into the US (voluntary)

(There are other types: seasonal, daily, permanent, temporary, semi-permanent etc.)

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Advantages	Disadvantages
Losing country	
Reduces pressure on resources	Loss of people in working age group
Decline in birth rate	Loss of the educated and skilled people
Migrants can bring back new skills	Division of families
Money is sent back	Left with an elderly population – high death rate
Receiving country	
Overcomes labour shortage	Pressure on jobs
Dirty unskilled jobs are done	Low quality& overcrowded housing = ugly
Will work long hours & low salary	racism
Cultural advantages and links	Language problems
	Less healthy
	Less religious amenities for immigrants (but more are built, this is a problem in Switzerland as the Swiss don't like when Arabs build their religious place thingy)

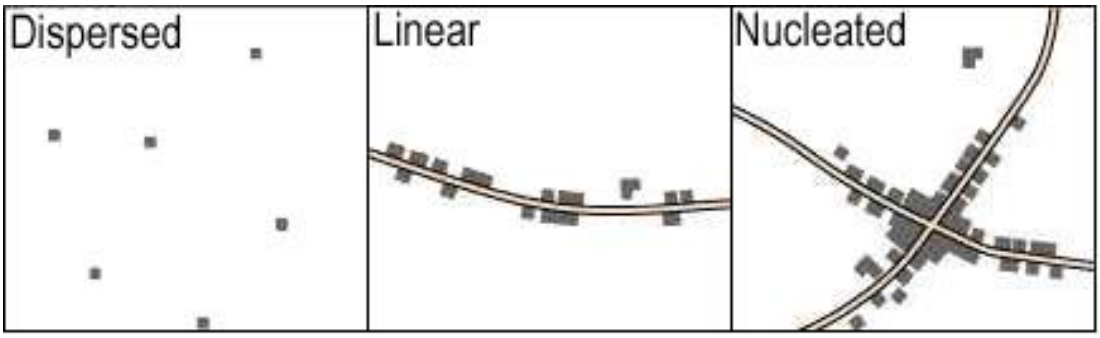
1.2 Settlement

Settlement patterns:

Dispersed – an isolated, individual building or a group of two or three buildings, perhaps forming a hamlet, and separated from the next by 2 or 3 km.

Nucleated – Buildings are grouped together, initially for defence, or a common resource.

Linear – buildings are strung along a line of communication, for example a main road, a river valley, or canal or dyke



Factors that affect the position, size, growth and function of a settlement:

-fuel supply: for heating and cooking

-food supplies

-nodal points: where routes converge

- **Wet point sites** - these have a good water supply. Many settlements grew around wet point sites, eg villages in the South Downs.
- **Dry point sites** - these are away from the risk of flooding, eg Ely in Cambridgeshire.
- **Defensive sites** - often found on higher ground so that in the past enemies could be seen from a distance, eg Corfe Castle, Dorset, or in the loop of a meander, eg Durham.
- **Aspect** - settlements are often found on the sunny side of a deep valley. This is common in settlements in the Alps.
- **Shelter** - from cold prevailing winds and rain.
- **Gap towns** - Lincoln is found in a gap between two areas of higher ground.
- **Resources** - important for industry, eg villages such as Aberfan in the Welsh valleys is close to coal reserves.
- **Bridging point** - settlements with 'ford' in their name often grew around a fording point or bridging point, eg Watford is found on the River Colne.
- **Trading centres** - often settlements grow where natural route ways and rivers meet, which helps the development of roads, railways and canals.

Hierarchy:

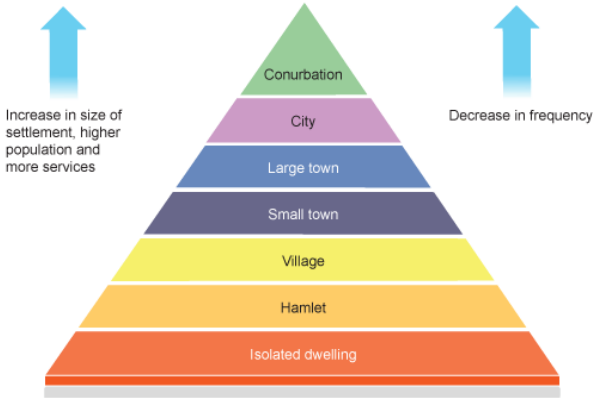
Determining order of importance:

1) the population size

2) the range and number of services

3) the sphere of influence

NOTE: there are least number of capitals (1) and many hamlets.



Land use in towns and cities:

Central business district (CBD)

The land in urban areas is used for many different purposes:

- **leisure and recreation** - may include open land, eg parks or built facilities such as sports centres

- **residential** - the building of houses and flats
- **transport** - road and rail networks, stations and airports
- **business and commerce** - the building of offices, shops and banks
- **industry** - factories, warehouses and small production centres

The CBD in the city centre is where most business and commerce is located.

Features that identify the CBD

- High/multi-storey buildings.
- Expensive land values.
- Department stores or specialist shops, like jewellers.
- Shopping malls and pedestrian precincts.
- Cultural/historical buildings, museums and castles.
- Offices, finance, banks, administration, town hall (business sector).
- Bus and railway stations (transport centres).
- Multi-storey car parks.

The CBD is located 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

-**Residential areas**:

-**old inner city area**: The inner city is also known as the **twilight zone**. It is typically found next to the CBD and has mainly terraced houses in a grid like pattern. These were originally built to house factory workers who worked in the inner city factories. Many of these factories have now closed down.

-**inner city redevelopment**: still high density, more amenities, high rise flats, more modern, but there are dark corridors, built to improve on the old buildings.

-**suburbia**: the urban sprawl (outward growth of city) and rising popularity of owning cars led to the construction of well planned and spacious houses with normally garages, back and front gardens etc. Suburban houses are usually larger than inner city terraces and most have a garden. Typically, they are detached or semi detached and the roads around them are arranged in cul de sacs and wide avenues. Land prices are generally cheaper than in the CBD and inner city, although the desirability of housing can make some areas expensive.

-**outer city estate**: located on the fringes of cities with varied types of housing (low rise, high rise and single story), where people were relocated when the inner city was being redeveloped

The **rural urban fringe**: This is found at the edge of a town or city and is where town meets country. It is common for this area to have a mixture of land uses such as some housing, golf courses, allotments, business parks and airports.

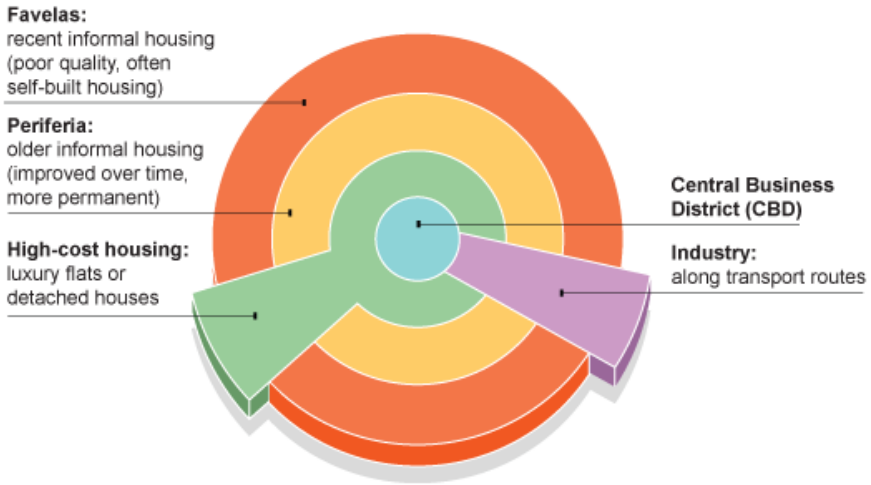
-**Industrial areas**: factories were built close as possible to the CBD but with enough space, next to canals and railways to transport materials, or rivers for cooling, power source or waste disposal and next to land where lots of workers could live.

-**Open spaces**: for a relaxing atmosphere

-**Transport routes**

Land use in LEDCs

Although every *LEDC* city has its own characteristics, models can be used to illustrate a typical LEDC city.



Model of an LEDC city

Both *MEDC* and LEDC cities have a *CBD* - often the oldest part of the city.

In LEDCs the poorest housing is found on the edge of the city - in contrast to MEDC cities whose suburban fringe is very often a place of high quality housing. The areas of poor quality housing found on the edge of cities in LEDCs are called **squatter settlements** or **shanty towns**

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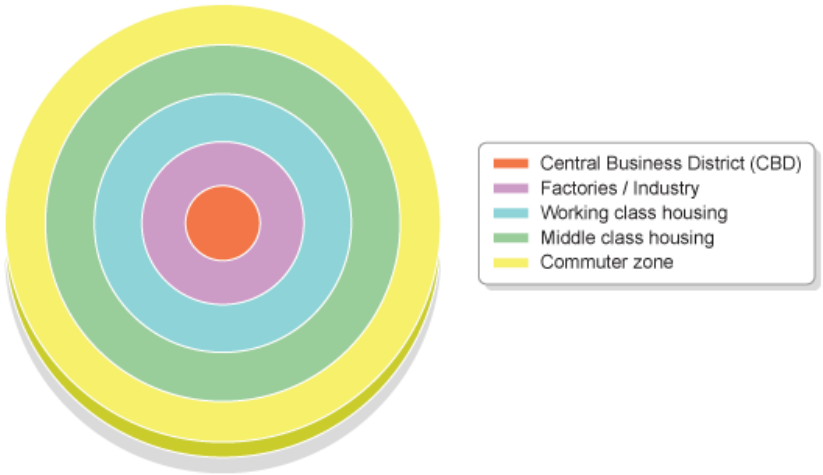
Land use in a MEDC

The Burgess and Hoyt model

Geographers have put together models of land use to show how a 'typical' city is laid out. One of the most famous of these is the **Burgess** or **concentric zone model**.

This model is based on the idea that land values are highest in the centre of a town or city. This is because competition is high in the central parts of the settlement. This leads to high-rise, high-density buildings being found near the **Central Business District (CBD)**, with low-density, sparse developments on the edge of the town or city.

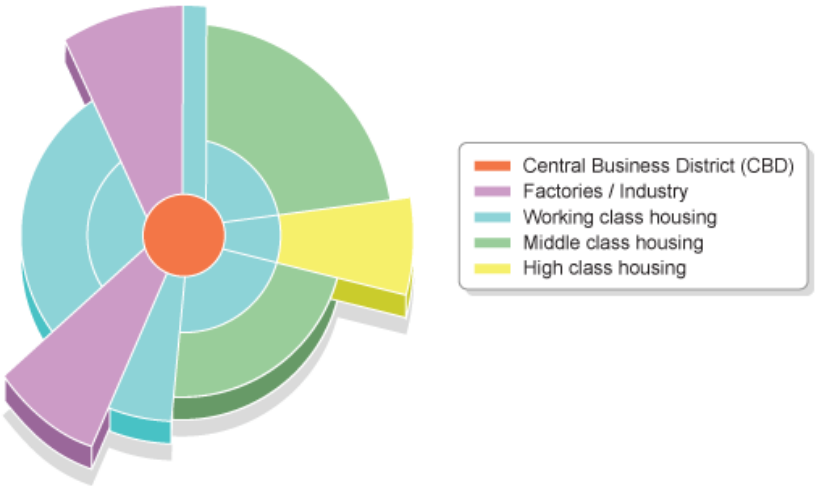


The Burgess model

However, there are limits to the Burgess model:

- The model is now quite old and was developed before the advent of mass car ownership.
- New working and housing trends have emerged since the model was developed. Many people now choose to live and work outside the city on the urban fringe - a phenomenon that is not reflected in the Burgess model.
- Every city is different. There is no such thing as a typical city.

Another urban model is the **Hoyt model**. This is based on the circles on the Burgess model, but adds sectors of similar land uses concentrated in parts of the city. Notice how some zones, eg the factories/industry zone, radiate out from the CBD. This is probably following the line of a main road or a railway.



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Problems of urban growth for people:

more crowded/overcrowded;
many people are unable to obtain jobs/more jobs are needed;
work for low pay/cannot afford housing/work in informal sector;
inadequate investment in housing stock/people live in squatter settlements/more housing is needed;
pressure on schools/inadequate education provision;
pressure on hospitals/inadequate medical care provision;
increased crime rates or example (max 1);
difficulties of waste/litter disposal;
traffic congestion;
noise pollution;
spread of disease;
food shortages;
lack of sanitation/fresh water/poor hygiene;
poor quality of life/standard of living;
loss of farmland etc.

Problems for environment:

loss of vegetation/deforestation;
loss of habitats;
impacts on food chains;
pollution of rivers;
death of fish/other species;

pollution of ground water/seepage of toxins from dumps;

air/atmospheric pollution;

rivers dry up due to water extraction/water table lowered etc.

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Theme 2. The Natural environment

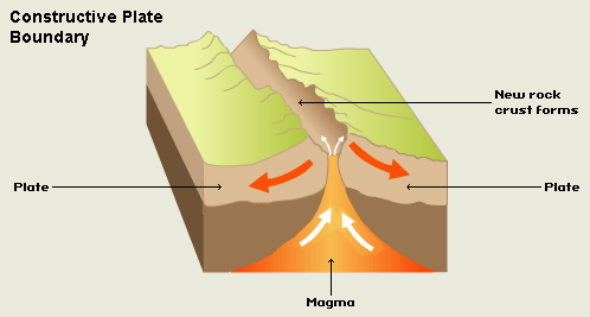
2.1 Plate tectonics

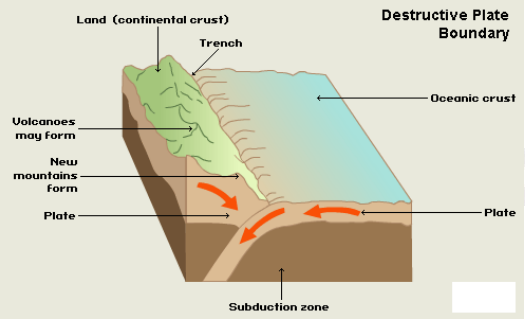
Oceanic crust: younger, heavier, can sink and is constantly being destroyed and replaced

Continental crust: older, lighter, cannot sink and is permanent

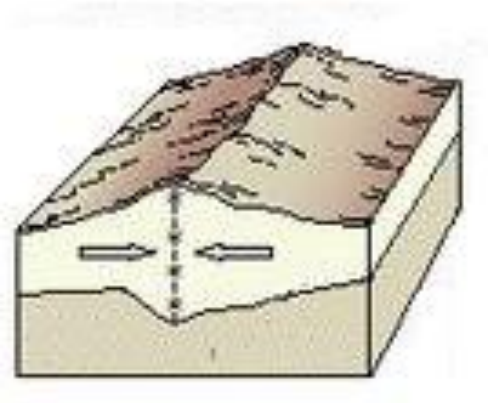
Earthquake, volcano and fold mountain distribution:

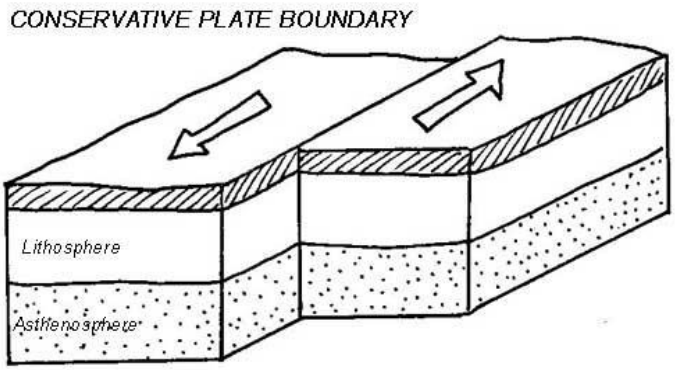
	Plate Boundary	What happens	Volcanoes?	Earthquakes?	Fold mountains?
A.	Constructive margins	2 plates move away from each other forming new oceanic crust	Gentle	Gentle	No
B. i)	Destructive margins	Oceanic crust moves towards continental and sinks under it, and is destroyed	Violent	Violent	Yes
B. ii)	Collision zones	2 continental crusts collide, neither can sink so forced upwards	None	Yes there is	Yes
C.	Conservative margins	2 plates move sideways past each other	none	violent	no





Collision zones:





Earthquake distribution (in terms of places, not boundary types):

-encircle the whole of the Pacific Ocean

-extend down the entire length of the mid-Atlantic Ocean

-stretch across southern Europe and Asia, linking the Atlantic and Pacific Oceans

Volcanoes:

-encircle the whole of the Pacific Ocean

-extend down the entire length of the mid-Atlantic Ocean

-smaller areas in southern Europe, the Caribbean, east Africa and the mid-Pacific Ocean

Fold mountains:

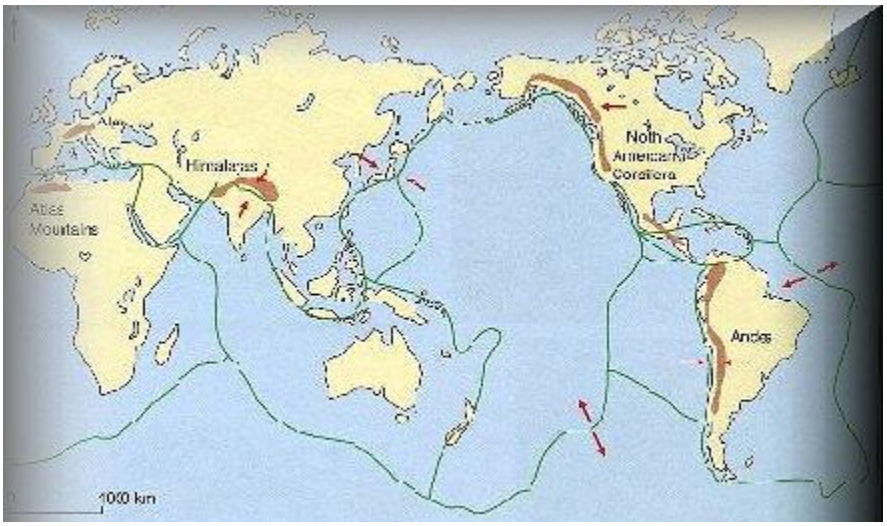


Plate movement is caused by convection currents in the mantle

Volcano features/vocab:

-The eruption column can collapse & flow down the volcano at over 200km/hr incinerating everything it touches. This is a pyroclastic flow (a)

-large crater called a **caldera** (b)

-crater

-poisonous gases

-blast wave

-volcanic bombs (ejected rocks)

-plume (ash cloud)

-Explosive eruption can produce mud flows called **lahars**. They are formed from ash mixed with water which can come from heavy rain, melted snow & ice or rivers (c)

lahars can be caused by:

- melting snows;
- heavy rainfall/water content of magma;
- mix with ash;
- flow down steep slopes/gravity;
- triggered by earthquakes

They are problematic because:

- loss of life;
- destroy buildings/homes;
- inundate farmland/destroy crops/livestock;
- disrupt communications;
- bring down power lines/damage water pipes;
- destroy workplaces/damage factories;
- occur without warning/at great speed etc.

-Most volcanoes at constructive boundaries erupt under the ocean. The lava cools quickly to form ball shapes – **pillow lava**. These volcanoes usually occur along a rift, not from one main vent (d)

-a bulge (before eruption)

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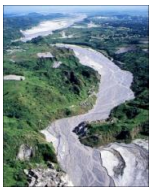
-**Volcanic plugs** are formed when lava solidifies in the pipe of an extinct volcano. Over time, the volcanic cone made up of less resistant rocks wears away, leaving behind the solidified **volcanic plug** (e)

-ash and steam (f)

-lava flow (g)

a) b) c)  d) e)

f) g)

Earthquake features/vocab:

-focus: point of earthquake

-epicenter: point directly above the focus, on the ground surface

-seismic waves

-shaking ground

A subduction zone occurs at a destructive plate boundary, it is where one plate goes under the other

Causes:

Earthquakes – 2 plates 'stick'; pressure builds up; one plate jerks forward sending shock waves to the surface

Volcanoes –

At constructive margin: plates move away from each other; magma rises to fill the gap; there might be steam or ash ejections, explosions

At destructive margin: oceanic crust melts from friction and heat from mantle; newly formed magma is lighter so it rises to the surface

A composite or stratovolcano

- Found at destructive plate boundaries.
- Formed by viscous (thick) lava.
- Eruption starts violently creating ash & pulverised rock. Later lava flows out.
- Have alternating layers of lava and rock fragments
- Usually large and conical

• alternate layers;

• ash/cinders and lava;

• slopes steeper at summit;

• main cone;

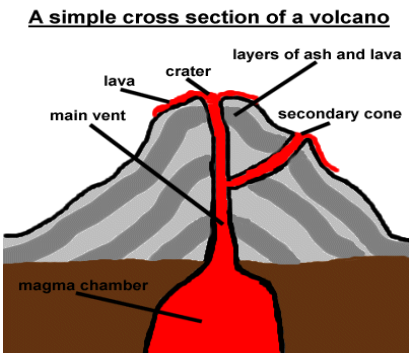
• crater;

• secondary cones;

• vent/pipe;

• magma chamber;

• dyke



Preventing damage or deaths by earthquake:

• Move away from areas of instability;

• Forecasting/warning to public;
• build earthquake proof buildings/or specific references to structures to
• awareness/what action to take;
• practise drills;
• emergency services organised;
• emergency food/supplies

Effects/difficulties of earthquakes:

• cost;
• may occur in country with low GNP;
• devastation may cover a wide area/large-scale/affects many people;
• magnitude of disaster/intensity;
• damage to infrastructure;
• damage to economy;
• impacts on food supplies/famine;
• impacts of disease on recovery;
• lack of hospitals/health care hinder recovery;
• homelessness;
• psychological impacts

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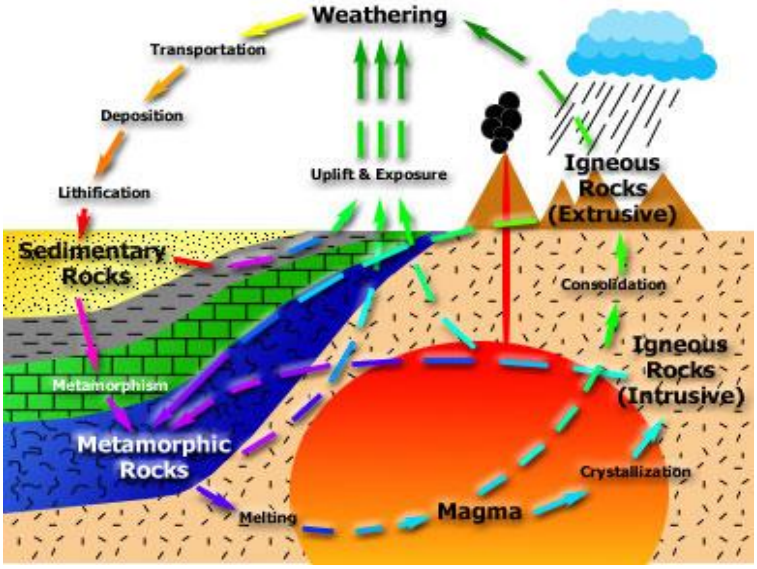
2.2 Landforms and landscape processes

2.2.1 Weathering

Me no thinks we has to know:



Weathering is the disintegration and decomposition of rocks in situ. There are several types:

-**Physical** weathering: weathering where there is no change in the chemical composition of the rock, due to physical processes:

Freeze-thaw aka **frost shattering** – occurs where there are cracked rocks and temperatures fluctuate around freezing point, repeated freezing and thawing causes the cracks to widen.

Associated landform: (screes)

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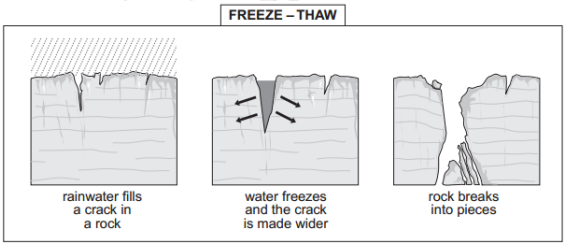
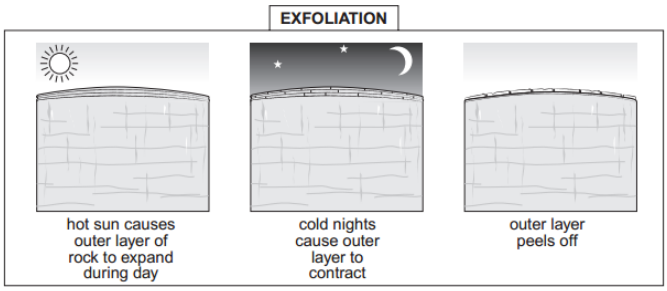
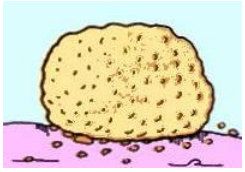


Exfoliation aka **onion weathering** – occurs in very warm climates where there are exposed, non-vegetated rocks. The outer layers heat up and cool down faster than the inner layers causing stresses in the rock; the outer layer peels off.

Associated landform: (Ayer's rock, Australia)

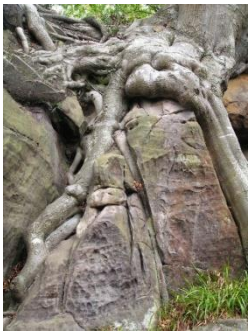
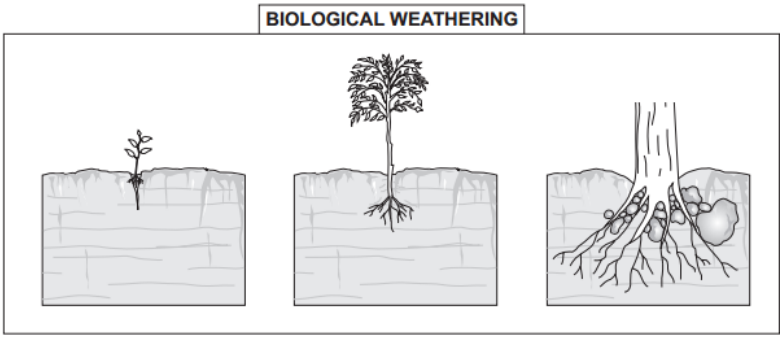


Granular disintegration: Like exfoliation this occurs where there are extremes of temperature as in a desert. If the rock is made of different minerals of different colours. The darker minerals will expand & contract more than the lighter ones. This will form small angular pieces of rock like sand which will collect at the base of the rock.



Biological weathering – roots widen weaknesses in the rock until part of the rock detaches

Associated landform:

Chemical weathering: occurs in warm, moist climates

- Lichens produce organic acids that dissolve rocks so that they can absorb the minerals.
- Rotting vegetation also releases organic acids that will chemically react with rocks.

Limestone solution – aka carbonation

carbon dioxide in air reacts with rainwater;

forms carbonic acid/acid rain;

reacts with calcium carbonate/limestone or chalk;

pervious/seeps through cracks;

forms calcium bicarbonate/calcium hydrogen carbonate;

which is soluble in water;

widens/deepen cracks etc.

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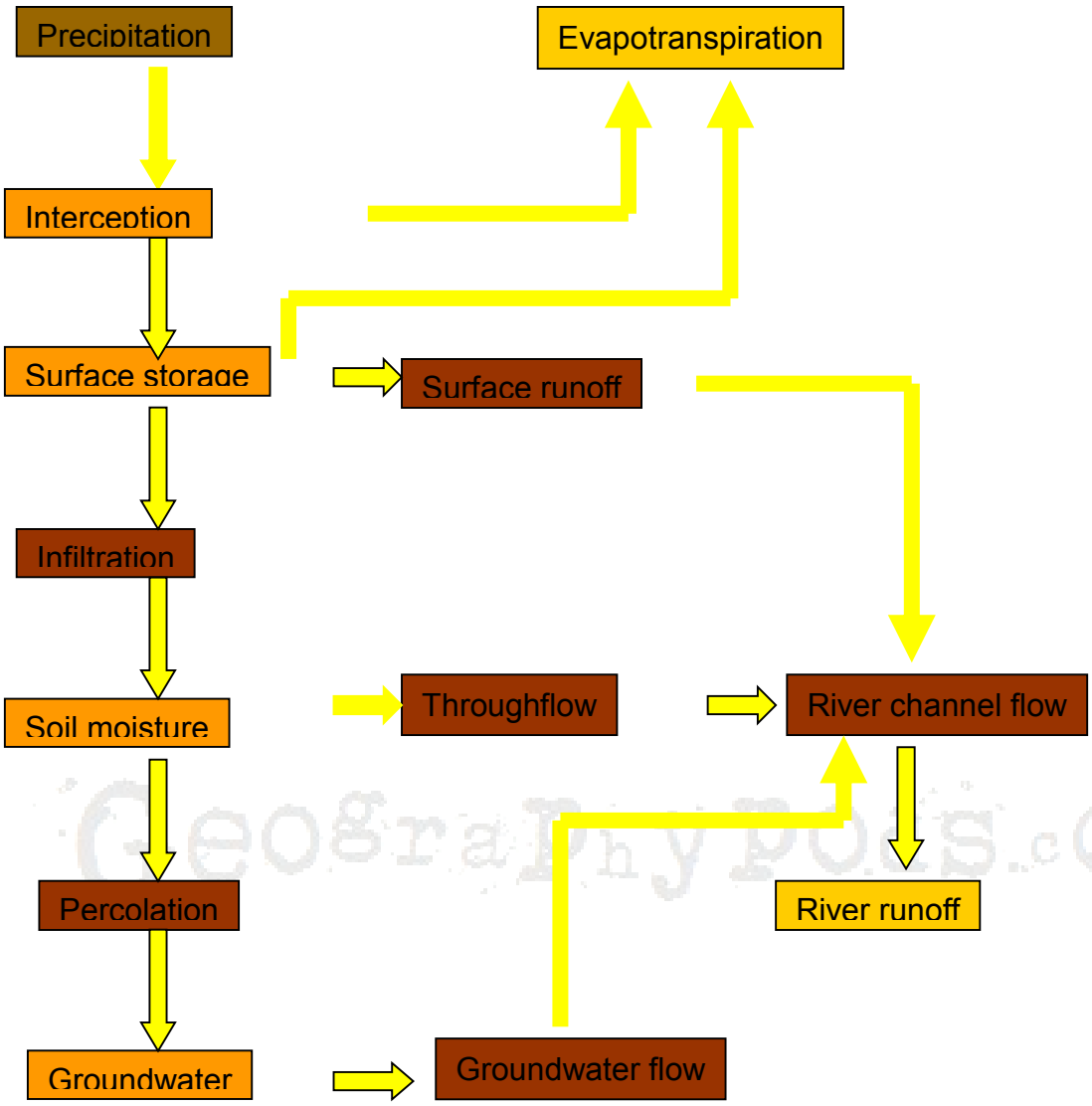
Associated landform: dry valleys and limestone pavement

Oxidation:

- Many minerals in rocks can be oxidised in the presence of water.
- One on the most common minerals to oxidise is iron. It forms iron(III) oxide (Fe_2O_3) or rust. This gives the rock a reddish brown colour.
- The rock is weakened & eventually crumbles away.

2.2.2 River processes



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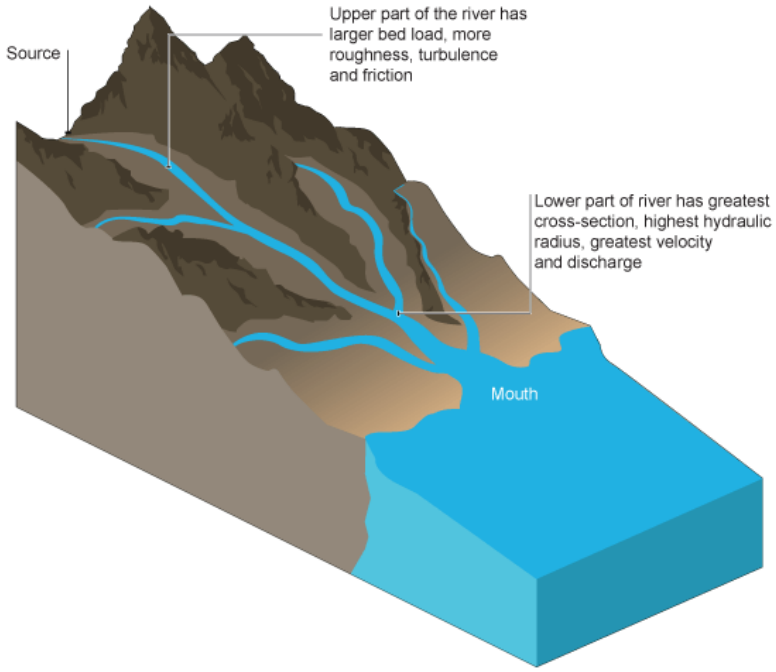
Terminology for the study of rivers

- **Drainage basin** - the area of land drained by a river.
- **Catchment area** - the area within the drainage basin.
- **Watershed** - the edge of highland surrounding a drainage basin. It marks 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 or smaller river which joins a larger stream or river.
- **Mouth** - the point where the river comes to the end, usually when entering a sea.

Changes in a river from top to bottom:



Drainage basins act as a system with inputs, (precipitation) transfers (stemflow, infiltration, percolation, surface runoff, throughflow, & groundwater flow) stores, (interception, surface storage, soil moisture storage & groundwater storage) and outputs (evaporation & transpiration or evapotranspiration)

Transportation – river transports material by 4 processes

Traction – rolling stones along the bed

Saltation – sand-sized particles bounce along the bed in a leapfrog motion

Suspension –silt and clay-sized are carried within the water flow

Solution – minerals dissolve in the water

Erosion – the wearing of land and rocks, there are 4 types

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

Corrasion – smaller particles rub against the river banks and bed like sand-paper; also called *abrasion*; occurs at low part of river (where there are smaller particles)

Corrosion – acids in the river dissolve rocks (occurs at any part of river)

Deposition – when a river lacks the energy to carry its load; it begins with the heaviest particles; happens when there is less water (a dry spell) or where the current slows down (e.g. the inside of a meander). Large boulders are deposited at the top, and very small particles are deposited at the end, resulting in sorting.

Associated landforms:

• **V-shaped valleys**: Near its source, a river is high above sea level so most of the erosion is vertical.

• In theory this would produce vertical valley sides, but once exposed the valley sides are weathered. The loose material falls down the slope & is carried away by the river, resulting in a steep sided V-shape.

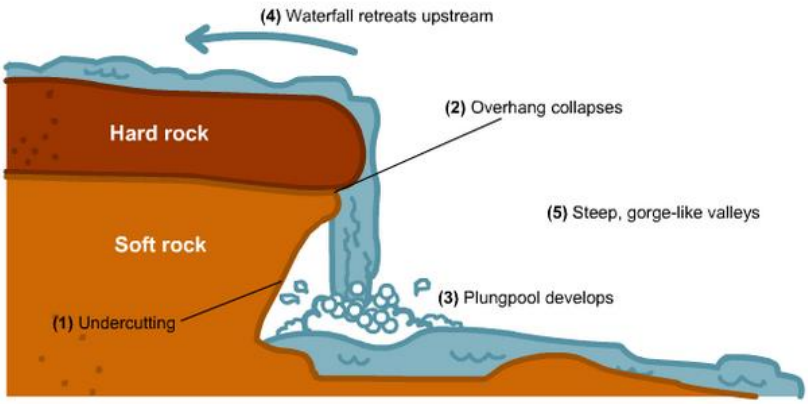
• **Interlocking spurs***:* In the upper valley a river is in the mountains. Water takes the easiest path downhill so twists & turns around the high land (spurs) forming interlocking spurs.

• **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”.

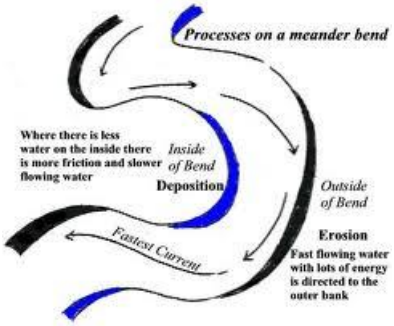
• The force of the water erodes the bottom of the waterfall to form a plunge pool.

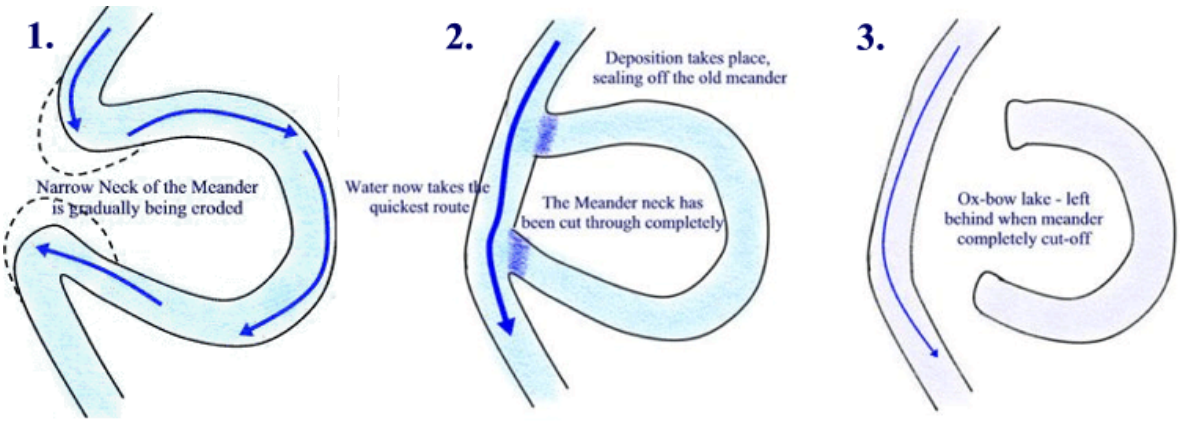
• The hard rock gets undercut as the soft rock erodes so that it eventually collapses.



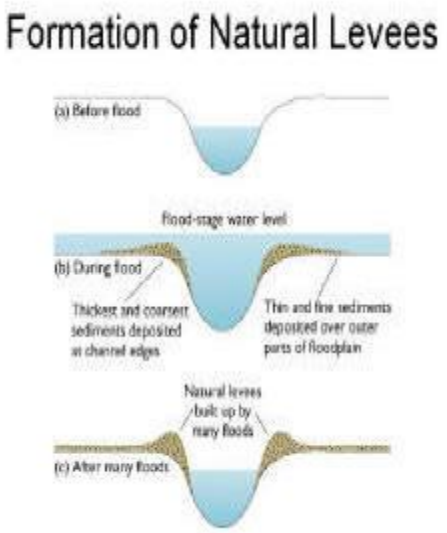
FORMATION OF A WATERFALL

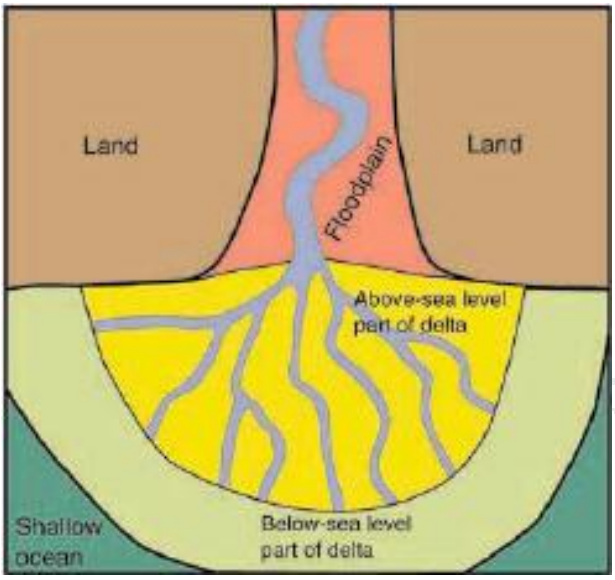
• **Rapids:** They form also where the river passes over hard rock, but either the band of rock is not very deep or there are a series of shallow rock bands.
• **Potholes:** Can be found in the upper & middle valley where a river flows over solid rock.
• Swirling water forms eddies which can cause stones to move in circular motions so eroding circular holes in the rock.
• **Meanders:** Wide sweeping bends found in the lower part of the river.
• They are formed by a combination of lateral erosion & deposition.
• They help form the flood plain.





• **Ox-bow Lakes:** Ox-bow lakes form when the neck of the 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.
• **Delta:** Form when a large river is carrying a high sediment load. Ex: Nile Delta. The river loses energy as it enters a lake or sea. The sea is sheltered and has few currents to carry away the sediment so it is deposited in the mouth. Sediment is deposited and chokes up the channel forming islands. The river breaks up around these deposits forming several channels called distributaries.





•**Flood plain**: The river widens its valley by lateral erosion. At times of high discharge, the river has plenty of energy so carries a lot material in suspension. When the river floods, the water spreads across the flat land. The sudden increase in friction will reduce the water's velocity and the fine silt is deposited. Each time the river floods, it deposits a layer of fine silt. This is a flood plain.

•**Levées**: when a river floods, the coarsest material is deposited first (so on the edges of the river) forming a natural embankment called a levée.

Causes of flooding:

- **A steep-sided channel** - a river channel surrounded by steep slopes causes fast *surface run-off*.
- **A lack of vegetation or woodland** - trees and plants intercept precipitation (ie they catch or drink water). If there is little vegetation in the drainage basin then surface run-off will be high.
- A *drainage basin*, consisting of mainly *impermeable* rock - this will mean that water cannot **percolate** through the rock layer, and so will run faster over the surface.
- **A drainage basin in an urban area** - these consist largely of impermeable concrete, which encourages overland flow. Drains and sewers take water quickly and directly to the river channel. Houses with sloping roofs further increase the amount of run-off.
- **Deforestation, overgrazing and overcultivation, and population pressures** cause soil erosion causes sediment to go into rivers decreasing the cross-sectional area

Flood management: afforestation, dams, canalising rivers, artificial levées, flood relief canals, warning systems, dredging, cutting off meanders to straighten river, flood gates

Dams:

- Dams are often built along the course of a river in order to control the amount of discharge. Water is held back by the dam and released in a controlled way. This controls flooding.
- Water is usually stored in a reservoir behind the dam. This water can then be used to generate hydroelectric power or for recreation purposes.
- Building a dam can be very expensive.
- Sediment is often trapped behind the wall of the dam, leading to erosion further downstream.
- Settlements and agricultural land may be lost when the river valley is flooded to form a reservoir.
  River engineering:
- The river channel may be widened or deepened allowing it to carry more water. A river channel may be straightened so that water can travel faster along the course. The channel course of the river can also be altered, diverting floodwaters away from settlements.
- Altering the river channel may lead to a greater risk of flooding downstream, as the water is carried there faster.

Afforestation:

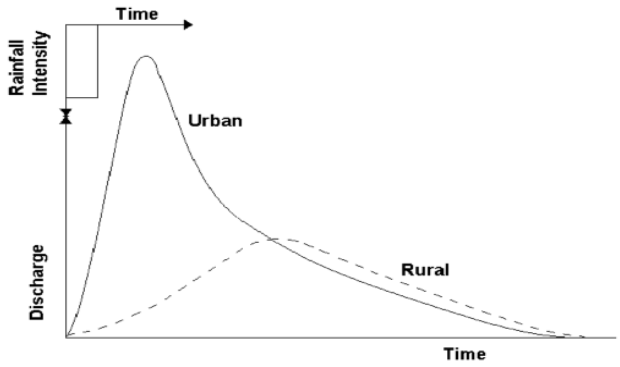
Trees are planted near to the river. This means greater interception of rainwater and lower river discharge. This is a relatively low cost option, which enhances the environmental quality of the drainage basin.

Managed flooding:
The river is allowed to flood naturally in places, to prevent flooding in other areas - for example, near settlements.

Planning:

- Local authorities and the national government introduce policies to control urban development close to or on the floodplain. This reduces the chance of flooding and the risk of damage to property.
- There can be resistance to development restrictions in areas where there is a shortage of housing. Enforcing planning regulations and controls may be harder in LEDCs.

Hydrographs:



2.2.3. Marine processes

Types of waves:

• **Constructive waves:** have a low wave height & usually the beach gradient is gentle.

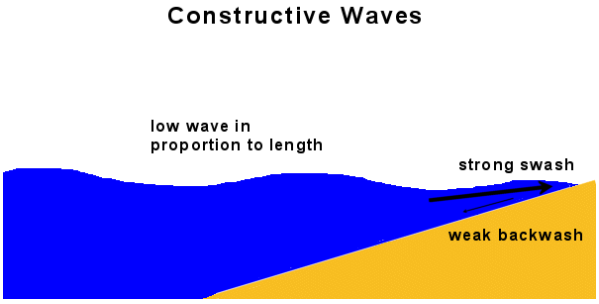
• The waves spill forward gently creating a strong swash. The water drains away through the beach material so the backwash is weak.

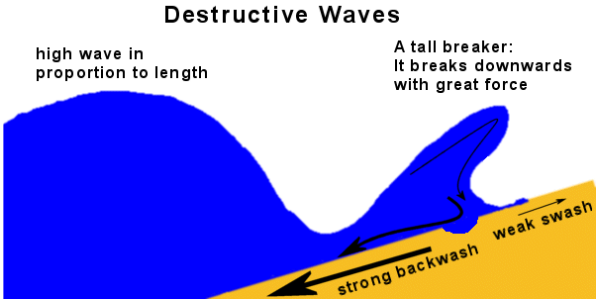
• These waves deposit material & build up beaches.

• **Destructive waves:** have a high wave height & the beach tends to be steep.

• The wave plunges forward onto the beach so the swash is weak, but the rotation of the water causes a strong backwash.

• These waves tend to erode beaches.





Components of Waves:

Swash: when a wave breaks & washes up the beach.

Backwash: when the water drains away back into the oncoming wave.

The size of waves depends upon three factors:

1. The strength of the wind.
2. The length of time the wind has been blowing.
3. The fetch or distance over which the wind can blow.

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Methods of 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

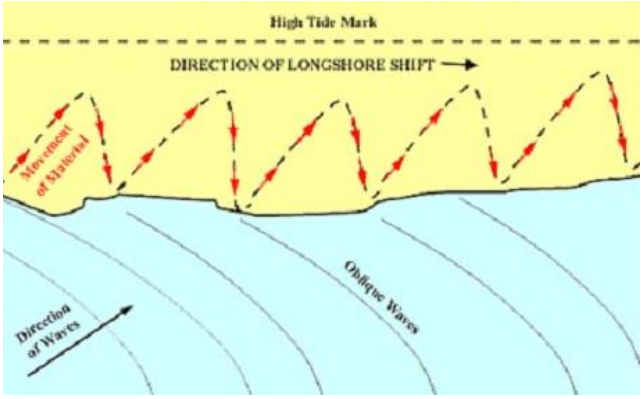
Hydraulic action – force of waves compresses air in the cliffs

Longshore Drift:

• When waves approach the coast at an angle the swash moves up the beach at an angle.

• The backwash, however, drains straight back down the beach.

• This will gradually move sand/stones along the beach in a zig-zag motion.



Cliff and wave-cut platform formation:

• Wave erosion is concentrated at the foot of the cliff so a wave-cut notch is formed.

• The cliff is undercut & collapses.

• Repeated collapse causes retreat of the cliff producing a platform of flat rock at the cliff foot extending out to sea.

Caves, Arches and Stacks:

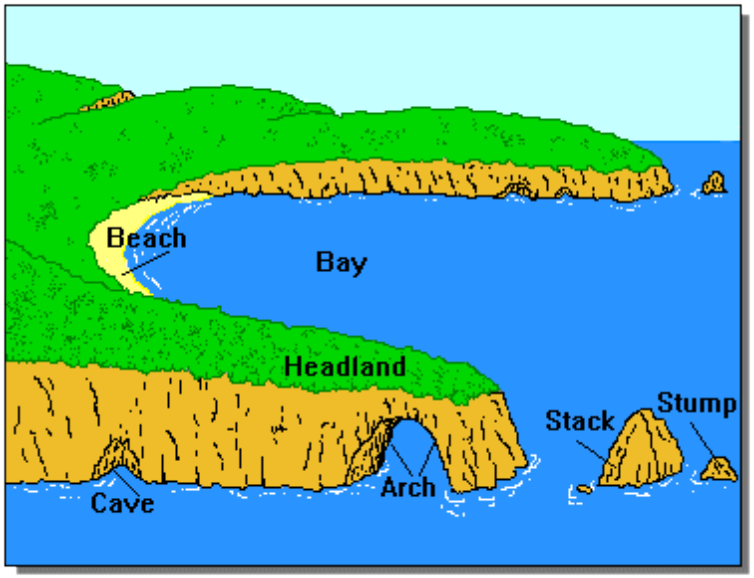
•A band of weaker rock extends through a headland.

• More erosion occurs producing caves on both sides of the headland.

• Continued erosion produces an arch through the headland.

• Eventually the roof is weakened & 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 form when the coastline changes direction. Longshore drift continues to carry material in the same direction.

• Sand & shingle is built up to form the spit.

• The end of the spit curves round due to wave refraction or secondary winds.

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 then grow on it which stabilize it & trap more sand.

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Salt Marsh:

• Mud is deposited by the tides. The beach builds up above sea level forming mudflats.

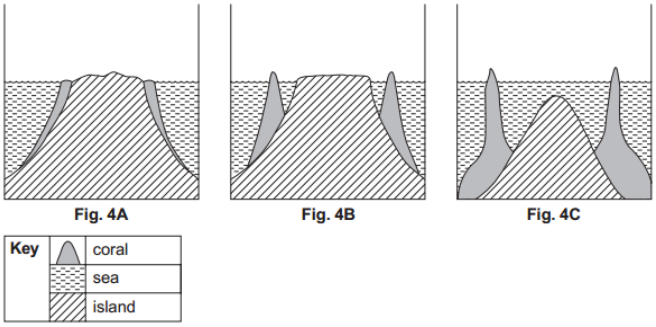
• Plants start to grow in the mud & trap more sediment. This forms into a salt marsh.

Coral Reefs:

-Conditions required for the growth of coral reef:

Warm water/seas; temperatures above 20 degrees C (dev)
Shallow water; not more than 60 metres deep (dev)
Water free from sediment/clear/availability of light;
Plentiful supply of oxygen in water/unpolluted;
Plentiful supply of plankton;
Lack of strong currents etc.

- **Fringing reef:** Coral reefs grow in the shallow water of the coast in tropical areas (4A)
- **Barrier reef:** Due to plate tectonics the island starts to sink the reef grows to keep up with the sinking, but a lagoon develops between the reef & the land (4B)
- **Coral atoll:** These form around islands that are sinking. The coral growth keeps up with this & the island keeps sinking (4C)
- Eventually the island sinks below sea level forming a ring of coral with a lagoon in the centre.



2.3 Weather, climate and natural vegetation

2.3.1 Weather

Weather Instruments

1. **Rain gauge:** Is 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.

• A container to collect the water. This might be graduated or water can be poured into a measuring cylinder. It is emptied once every 24hrs at the same time. Rain is measured in millimetres.

• Is sunk into the ground, but not level with the surface so that splashes or surface water cannot get into it.

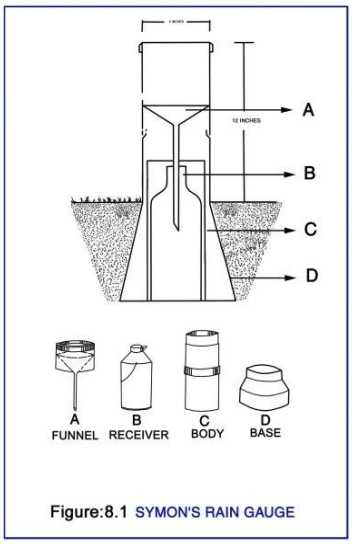


Figure:8.1 SYMON'S RAIN GAUGE

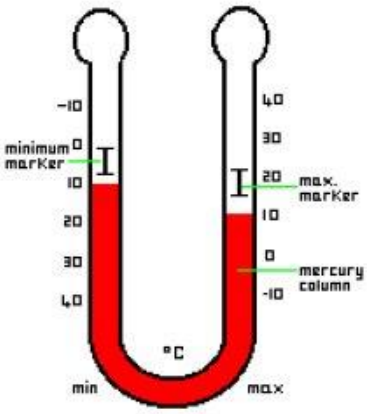
2. Maximum-minimum thermometer: Records max. & min. temps. over a 24hr period.

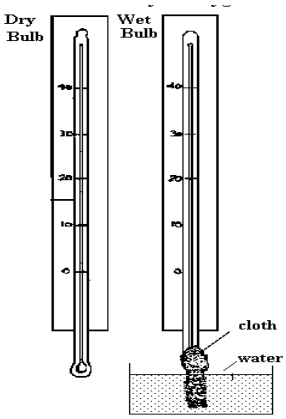
• Maximum thermometer contains mercury the minimum contains alcohol.

• As temperature rises mercury expands & pushes up a metal index when it cools & mercury contracts the index is left in place at highest temp.

• As temperature falls alcohol contracts & pulls metal index with it, but as the alcohol expands it flows passed the index leaving it in place at the lowest temp.

• Both indexes are read once every 24hrs from the bottom of the index.





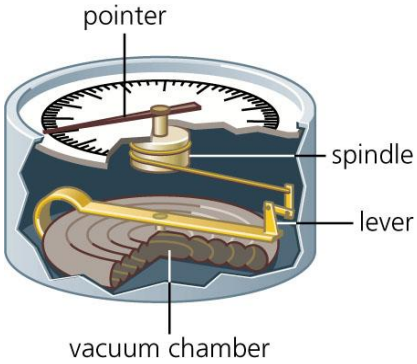
3. **Wet and dry bulb thermometer (hygrometer):** Dry bulb is a normal mercury thermometer it measures actual air temp.

• Wet bulb is the same but the bulb is covered with a fine cloth which is connected to a reservoir of water.

Water evaporates from the cloth & cools the temperature so it reads a few degrees lower than air temp.

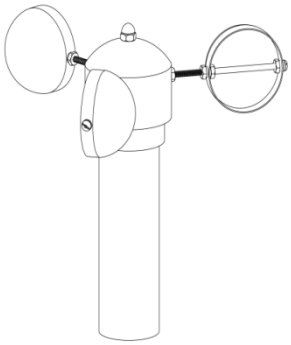
• Both the wet & dry bulb temperatures are read.

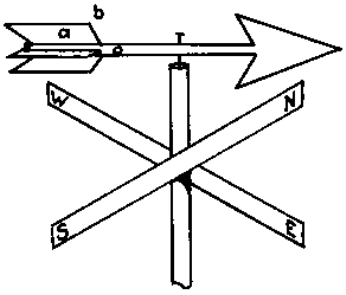
4. **Barometer:** Measure air pressure.
• An aneroid barometer has a corrugated chamber containing a vacuum.
• As air pressure rises & falls the chamber contracts & expands.
• Levers conduct this movement to a spindle which moves the pointer on the dial which records the air pressure in mm of mercury.



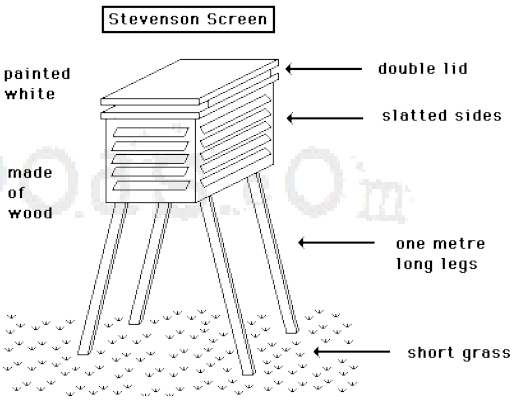
5. Anemometer: Measures wind speed.
• Three light rotating cups are blown around by the wind the revolutions are counted & converted into; metres per sec.; km per hour; knots etc.

6. **Wind vane:** Records wind direction.
• The fang is blown by the wind so that the arrow head points into the wind.
• Both are mounted on a high pole.

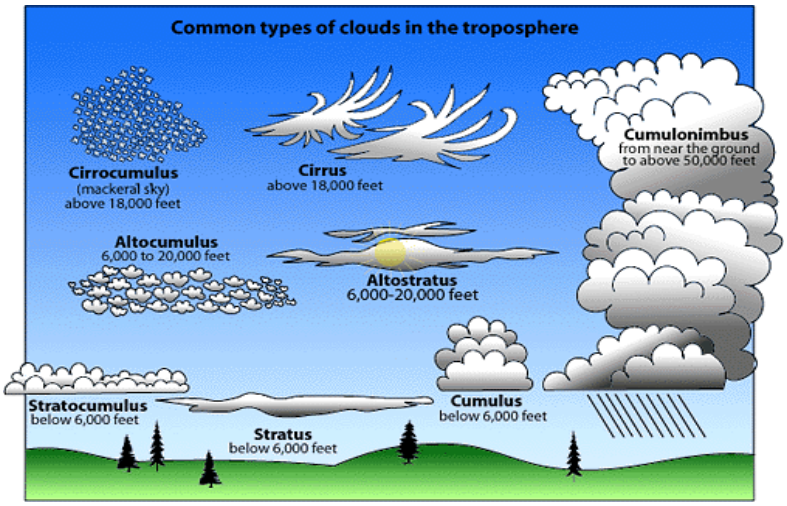




Stevenson's Screen: Contains the thermometers.
• Painted white to reflect the sun with a double lid for insulation.
• Slatted sides to let the air circulate, but slanted downwards to prevent light getting in.
• Legs 1m long to prevent heating from ground.
• On short grass so it's standardised i.e. same amount of reflectivity.



Cloud types:
Cumulus: These clouds usually have flat bases lumpy tops & distinctive boundaries.
Cumulonimbus: The cloud type associated with a thunderstorm & heavy rain, (at high levels cooled water droplets convert to ice crystals).
Altocumulus: These clouds are a good indicator of medium level instability and high moisture content -and often the precursor for widespread thunder activity within the following 24 to 48 hours.



Stratocumulus: Low-level cloud type, varying from thin, well broken layers with little impact for general weather, to deep, sometimes unstable character, and a risk of moderate turbulence & moderate icing. Little rain.
Nimbostratus: Heavy cloud layer, often dark in appearance. Often combined with continuous falling rain/drizzle or snow

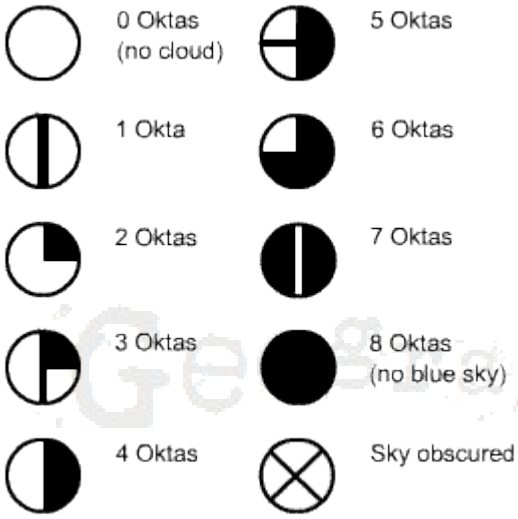
Stratus: Are thin-layered clouds
• Are low to the earth's surface
• Look like stripes or streaks in the sky.
• No rain.
Cirrus: Thin because they form in the higher levels of the atmosphere where little water vapor is present. No rain. Made of ice crystals

Locating weather stations

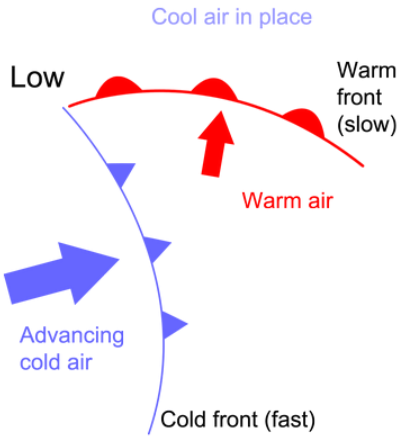
- They should be on short grass. (Concrete reflects heat, tarmac absorbs it.)
- They should be in an open area away from obstacles like buildings & trees so there is no shade or protection from the wind or rain

Weather symbols

Cloud cover is measured in eighths: Hold the sheet directly above your head & estimate the cloud cover directly above you.



Warm and cold front symbols:



2.3.2 Climate

Tropical rainforest:

Location: Tropical rainforests are located in a band around the equator, mostly in the area between the Tropic of Cancer (23.5° N latitude) and the Tropic of Capricorn (23.5° S latitude). This 3,000 mile (4800 km) wide band is called the "tropics." Tropical rainforests are found in South America, West Africa, Australia, southern India, and Southeast Asia.

Mean temperature of the hottest month: about 25°C

Mean temperature of the coldest month: about 25°C

Annual temperature range: less than 5°C

Rainfall – amount: exceeds 2000mm

Rainfall – seasonal distribution: same throughout year

Wind: low

Cloud: heavy

Humidity: high

Pressure: low

Tropical desert:

Location: between 5° and 30° north and south of the equator

Mean temperature of the hottest month: 30°C

Mean temperature of the coldest month: no less than 18°C

Annual temperature range: less than 5°C

NOTE: during the day it can get to 50°C but during the night it gets to about 0°C so the average is lower.

Rainfall – amount: less than 250mm in a year

Rainfall – seasonal distribution: irregular rainfall

Wind: strong

Cloud: virtually cloudless skies

Humidity: low

Pressure: high

Contributing factors:

distance from oceans;

winds blow over large areas of land;

winds blow offshore/do not blow from sea hence no source of moisture/water sources;

low humidity;

lack of evaporation;

sparse vegetation;

lack of transpiration;

high air pressure;

descending air;

cold offshore currents etc.

Factors affecting temperature:

-**latitude**: closer to the equator = higher temperature

-**distance from the sea**: coastal area = warmer winters and cooler summers

-**prevailing winds**: the seasonal difference in heating between land and sea (land heats up more quickly in summer and cools more rapidly than the sea in winter) affects the temperature of the 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)

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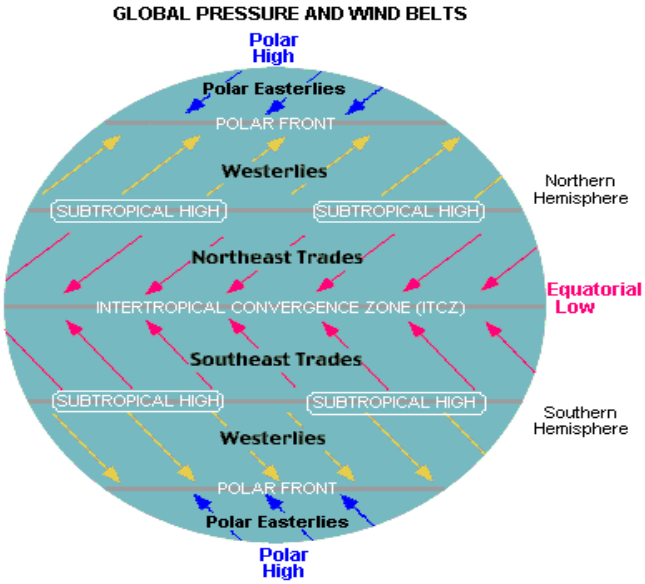
-Pressure systems & wind belts:

- The angle of the sun creates pressure belts: low pressure at the equator & mid latitudes; high pressure at the tropics & poles.
- Wind blows out of high pressure into low pressure creating a global pattern of winds.
- The direction of the prevailing winds affects the climate of places. Making it warmer or colder, wetter or dryer.
- The pressure & wind belts move with the overhead sun. So prevailing wind directions can change with the seasons.



Types of rainfall:

Convectional rain:

1. The sun's rays heat the ground.
2. This heats the air above it so it rises.
3. As the air rises it cools.
4. Condensation point is reached & cloud forms producing thunder storms.

Frontal Rain:

This happens mostly at mid-latitudes where warm tropical air meets cold polar air.

1. Warm air moves towards the cold air.
2. Being less dense the warm air rises over the cold air.
3. The air cools as it rises.
4. Condensation occurs & clouds form to produce rain.

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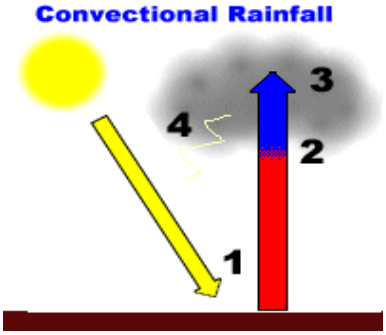
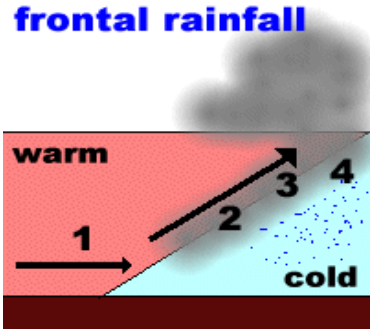
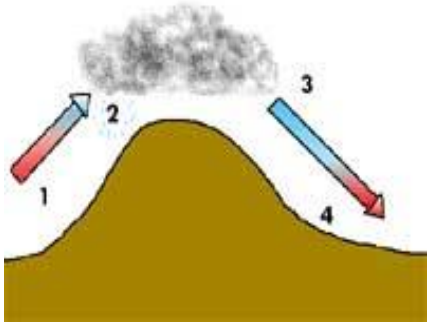
Relief Rain:

1. When warm, moist air hits mountains it is forced to rise.
2. As it rises it cools. Condensation occurs producing clouds & rain or snow.
3. On the leeward side the cool air sinks getting warmer.
4. The air behind the mountains is warmer & dryer so there's less rain. The rain shadow area.







2.3.3 Ecosystems

Tropical rainforest:

Vegetation grows in distinct layers.

- Emergent layer: tall trees up to 50m. Few lower branches. Grow above others to get full sunlight.
- Main canopy: trees 30-40m forming a continuous canopy. Few lower branches.
- Under canopy: trees 20m high (& young trees) – less dense can survive in less sunlight.
- Shrub layer: low shrubs & saplings. Shade plants.

Forest floor: little grows except fungi – too little light.

- Since the trees grow so tall they have large buttress roots to give them support.
- Lianas use the large trees as a support in order to reach the sunlight.
- Epiphytes grow on trees to get light & have hanging roots that collect rainwater.
- Leaves shed the water easily having drip tips & "channels" to direct the water.

Tropical desert:

Plants such as cacti:

- have thick, waxy cuticles to reduce transpiration;
- fleshy stems to store water;
- leaves reduced to spines to reduce surface area for transpiration & prevent animals eating them & sunken stomata.

Shrubs have:

- small, waxy leaves & like cacti long tap roots to reach down to the water table and/or shallow roots to collect any moisture before it evaporates.
- Seeds can lie dormant for years. After rain they germinate quickly, flower & produce seeds within 2-3 weeks.

2.4 Inter-relationships between the natural environment and human activities

Environmental hazards to humans include:

-volcanic eruptions
-earthquakes
-tropical storms
-flooding
-drought

Environmental opportunities for humans:

-energy source renewable e.g. solar, hydroelectric etc, or non-renewable e.g. coal
-where there are droughts, lack of cloud is ideal for solar power
-volcanic areas are good for geothermal energy
-medical research and genetic engineering of crops using genetic material
-flooding rivers have alluvium deposits which make very fertile land
-exotic foods from Amazon rainforest
-tourist destination = source of wealth
-tropical rainforests provide wood for making paper, furniture etc.
-volcanic eruptions (and forest fires) produce fertile soil (Merapi)

Corals create a tourist attraction:

-it is beautiful/unique/visually attractive/spectacular/to see one before they die out completely;
-fishing;
-diving;
-boat trips;
-lots of species of fish/exotic fish/plants/large biodiversity etc.

Volcanoes:

Positive:

fertile/volcanic soils;
geothermal power;
attract tourists/tour guides/souvenirs etc.;
resource extraction/or examples e.g. sulphur;
researchers/vulcanologists live close by to study volcanoes;
they have lived there all their lives/sentimental attachment;
close to family/friends;
work/education in area;
cannot afford to move;
pressure of living space;
confidence in prediction/safety;
willing to take the risk/they don't think it will erupt etc.

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Negative:

-death by jumping in volcano :p
-death by tripping over tree root which has grown because of the fertile ash deposits
-if the ash and mud from a volcanic eruption mix with rain water or melting snow, fast moving mudflows are created (lahars)
-clears settlements/woodland/agriculture
-changes landscape

Food Shortages:

Causes:

Human Causes:

-poverty
-poor distribution/transport difficulties
-war and civil conflict
-commercial farming

-overpopulation
-poor government management of resources

Physical causes:

-soil exhaustion
-drought
-flood
-tropical cyclones
-pests
-disease

Effects:

-hunger
-susceptible to infectious diseases
-impair physical and mental development
-reduce labour productivity
-increase risk of premature death
-5 to 10% reduction in lifetime earnings

Solutions:

The Green Revolution

The introduction of modern farming methods to poorer countries to increase their food production, such as:

1. High-yield Varieties (HYVs)
   Advantage: faster growing & resistant to disease
   Disadvantage: need N fertilisers & pesticides = less sustainable due to damage to the environment
2. Irrigation - overcoming unreliable weather
3. Appropriate technology – simple wells, low cost sustainable schemes
4. Land reform – improve efficiency, increase farm size for small landowners, set an upper limit of land owned by the wealthy, give surplus land to landless people (this is done in the Lower Ganges Valley)
5. Nitrogen fertilisers – increasing yield, surplus can be sold for profit but, expensive, possible eutrophication

Food aid - collecting and transporting food to crisis areas

Theme 3: Economic development and the use of resources

3.1 Agricultural systems

An agricultural system is made up of three parts: **inputs**, **outputs** and **processes**.

Inputs can be physical: amount of rain, season temperatures, length of growing season, relief, soil and drainage
Inputs can be human/economic/social/political: labour, rent, transport costs, machinery/technology, fertiliser and pesticides, market demand, accessibility to market, government control, seeds – livestock, farm buildings, energy (electricity)

Processes include the patterns and methods of farming

Outputs are the products (milk, meat etc.) and in developed countries, usually a profit

Classification of farming types:
Specialisation: either **arable** (crops), **pastoral** (animals) or **mixed** (both)
Economic Status: either **commercial** (for profit) or **subsistence** (for yourself)
Intensity of land use: either **extensive** (farm size is very large in comparison with either the amount of money spent on it or the number of workers) or **intensive** (small farm size in comparison with either the amount of money spent on it or the number of workers).
Land tenure: either **shifting** (and **nomadic)** where farmers move from one area to another or **sedentary** farm location is permanent
Factors influencing farming:
temperature determines crops grown;
crops need to be grown where there is an adequate growing season;
there must be sufficient rainfall for crops to grow/irrigation needed if insufficient rain;
cereal crops/vines need sunshine to ripen;
too much rainfall may waterlog/flood crops/require a drainage system;
in areas with frost/long winter hardy animals may be kept;
if it is windy wind breaks are needed etc.

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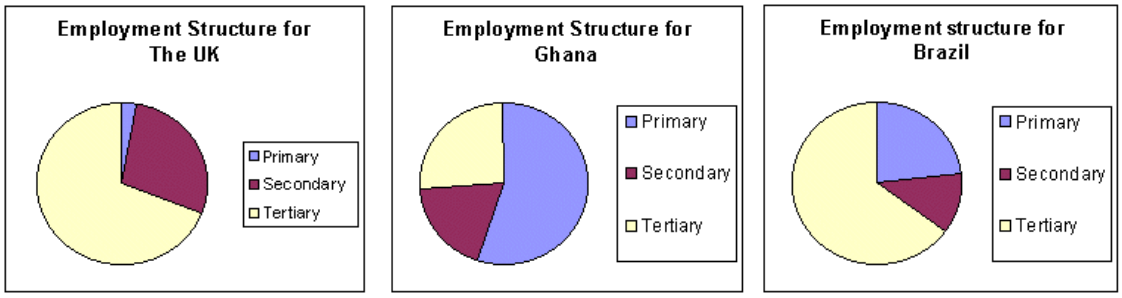
3.2 Industrial systems

Primary industry: an industry, such as farming, fishing, forestry and mining, that extracts raw materials directly from the land or sea.
Secondary industry: an industry that processes or manufactures primary raw materials (such as steelmaking) assembles parts made by other industries (such as cars) or is part of the construction industry.
Tertiary industry: an occupation, such as health, education, transport and retailing, which provides a service to people



Employment structure (how the workforce is divided up between employment sectors) of an **MEDC** e.g. UK

- Low proportion of people working in primary industry.
  - Mechanisations of jobs in the primary sector.
  - Also, as ***primary*** resources have become exhausted (e.g. coal)
  - A lot of resources are now imported.

- The number of people employed in the ***secondary*** sector is falling.
  - Mechanisation - as machines are taking over jobs in factories.
- The ***tertiary*** sector is the main growth area.
  - Most people work in hospitals, schools, offices and financial services.
  - Greater demand for leisure services as people have more free time and become wealthier.
  - More jobs become available in the tertiary sector.

Employment structure of an **LEDC** e.g. Ghana

- The majority of people work in the ***primary*** sector.
  - This is due to the lack of machinery available in farming, forestry and mining.
  - Farming is very important because people often grow the food they eat.
- Few people work in ***secondary*** industries due to the lack of factories –
  - machinery is too expensive
  - Multi-national companies rely on the raw materials available in Ghana to assist in manufacturing products
- Tertiary sector can be larger than secondary sector.
  - Most informal work is in the tertiary sector
  - Growth of jobs in tourism

Employment structure of a **NIC** e.g. Brazil

Brazil is a NIC or Newly Industrialized Country. While it is developing its economic base 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 for this is because of the growth of Brazil as a tourist destination. Also, there have been significant improvements in the provision of health care, education and transport.

The industrial system has 3 parts: inputs, processes and outputs

Inputs include: physical (natural) which are the resources such as coal and iron ore, or human/economic (artificial) such as labour and costs.

Processes include: turning raw materials into usable things such as steelmaking and also turning the usable things into other things for example assembling cars.

Outputs include: profit or loss + waste materials e.g. slag + products for sale

Locating an industry:

Physical factors:

-**power/energy**: the industry should be near the raw materials or a port/station where the materials come from

-**natural routes**: river valleys and flat land is good for transport

-**site and land**: flat land & enough space might be needed, cheap land

Human and economic factors:

-**labour:** quantity (industry might need many people) and/or quality (very-skilled workers, close to a university)

-**capital (money)**

-**markets**: size and location of market

-**transport**: cost increases when items are bulky (steel), fragile (glassware) , heavy (steel) or perishable (fruit/veg.)

-**government policies**

-**improved technology**: e.g. people who reply to phone calls as a job (noobs)

-**leisure facilities**: countryside views / amenities

High-tech industries are footloose as they do not need to be near raw materials so are located:

-in a pleasant working environment near to large markets and major transport routes

Or

-especially in the case of foreign companies, been tempted by government policies to locate in former industrial areas which often had higher levels of unemployment

3.3 Leisure activities and tourism

Tourism has increased because:

-greater affluence: higher salary + holiday with pay
-greater mobility: increase in car ownership + more aircraft
-improved accessibility and 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 retirements
-change in recreational activities
-advertising of holiday destinations: TV and interwebz
-green tourism

Advantages of tourism:

-growth in income
-an increase in foreign exchange
-employment opportunities
-the development of infrastructure and facilities which may be used by the local population
-the encouragement of other developments to take place in an area
-cultural advantages

Disadvantages of tourism:

-seasonal unemployment
-under-use of facilities at certain times of the year (ski-towns in summer)
-increased congestion, pollution (the Lake District)
-a shortage of services e.g. water supplies
-social/cultural problems
-damage to the physical landscape (foot path erosion in the Lake District)

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Growth of tourism in an area will depend on factors such as:

-accessibility
-scenery
-climate
-accommodation
-amenities
-sustainability

3.4 Energy and water resources

FIY the syllabus only asks for the significance of renewable and non renewable and the siting of 3 types of power station but I'm going to add a little bit more to that.

Types of resources

- Non-renewable resources: These are finite. Fossil fuels were initially produced by photosynthesis. In theory they are renewable, but it takes millions of years for them to form. E.g. coal, oil, gas, (uranium).
- Renewable resources: These are continuous e.g. solar, wind, water, geothermal. They are therefore sustainable.

Non-renewable resources:

Fossil fuels (coal, oil and natural gas) used mainly by MEDCs

Uranium for nuclear energy

Fuel-wood non-commercial source of energy in MEDCs but important in LEDCs; women have to walk long distances each day to collect wood. They cook over open wood fires or wood burning stoves.

Renewable energy supplies:

-reduce dependence upon fossil fuels
-alleviate the world's energy crisis
-offer opportunities for the development of alternative energy sources
-they do not pollute
-they do not add to Global Warming
-the source lasts forever

Renewable energy supplies are:

-geothermal
-wind
-solar
-bio fuel (since photosynthesis equals the amount of CO_2 from combustion)
-hydroelectric
-tidal

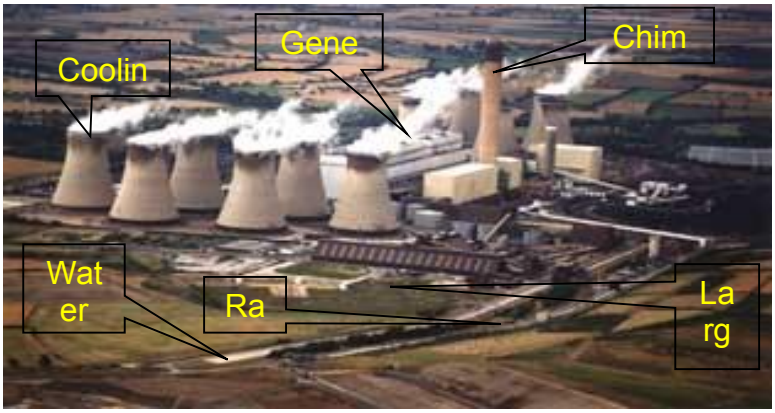
Thermal power stations:

- In a thermal power station, fuel (coal or natural gas) is burned in a boiler to convert water to steam.
- The high-pressure steam is directed into a turbine, which turns the turbine shaft.
- This shaft, connected to an electrical generator, produces electricity as it turns.
- A condenser converts the spent steam from the turbine back to water that is reused in the boiler.
- The condenser cooling water comes from the reservoir and is returned for reuse.

They need:

- A large area of flat land
- A water source
- A rail link
- Isolated area for nuclear
- Cooling towers

Positioning a power station (the 3 you have to know):



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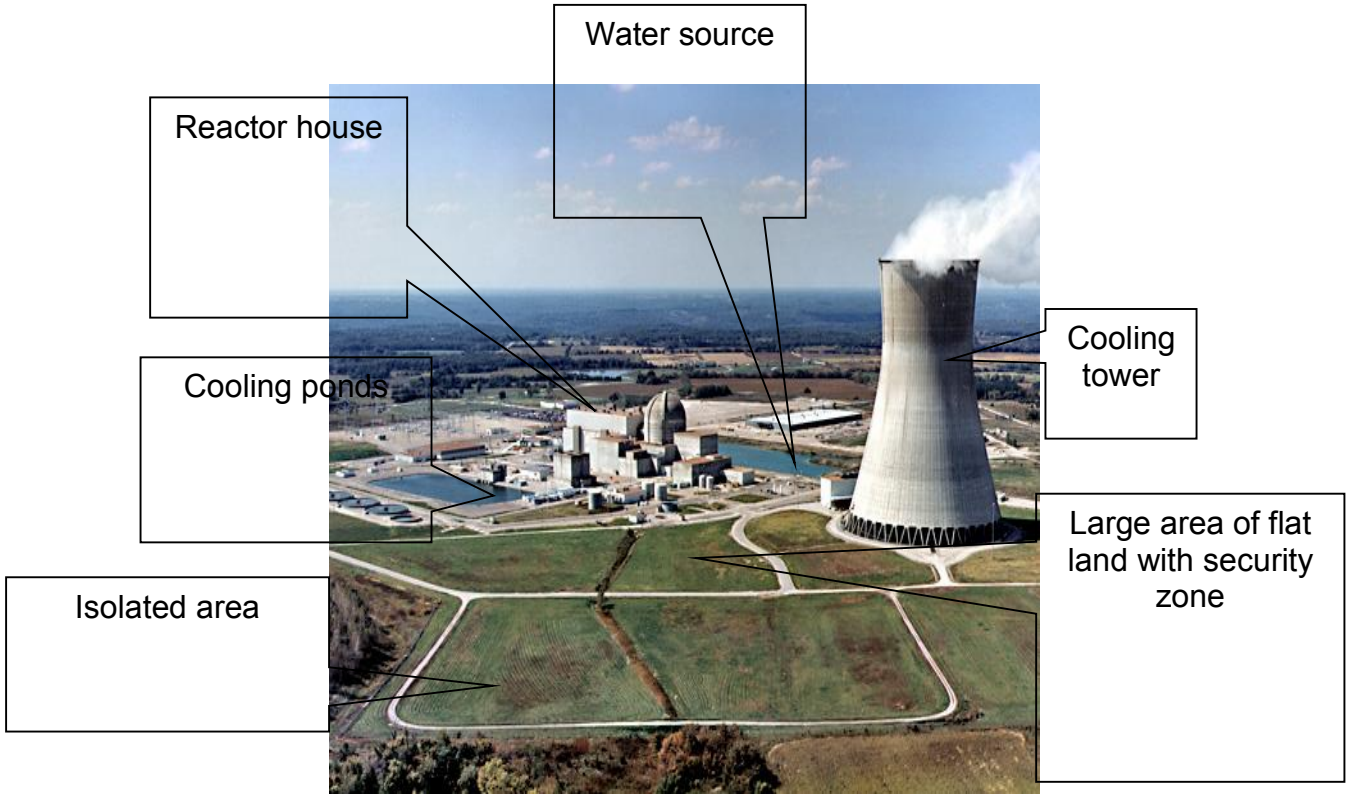

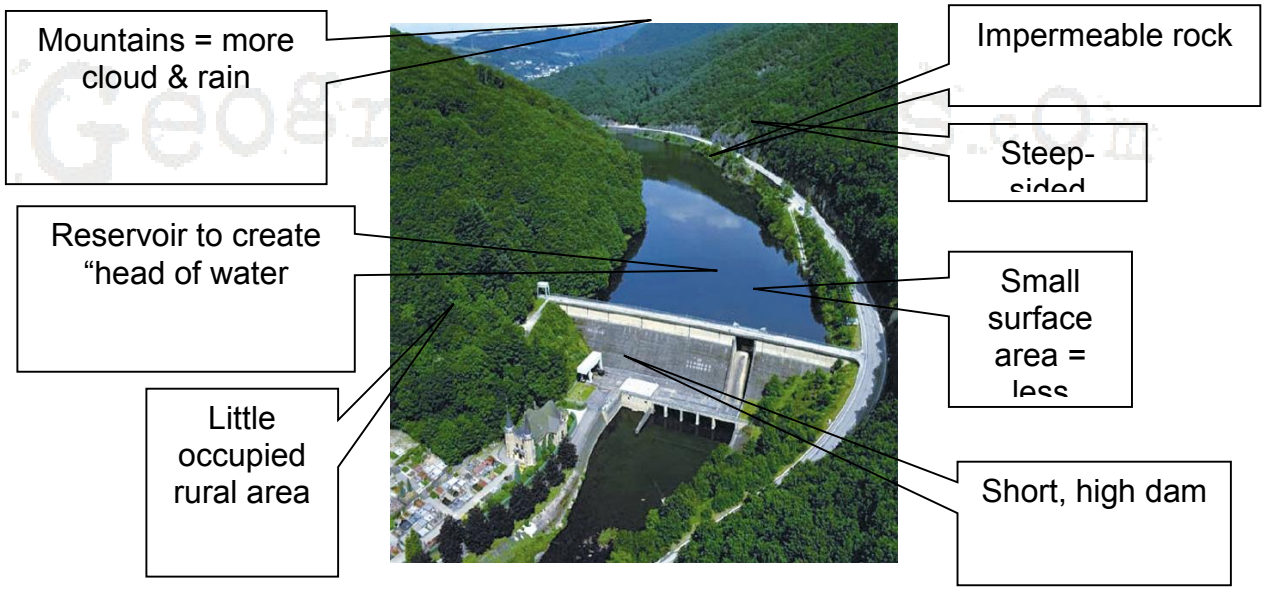

- Heavy precipitation (relief rainfall) over high mountains
- Snow and glaciers provide spring water
- Large drainage basin traps more water
- Natural glacial lake or reservoir provides constant supply of water
- Impervious rock prevents water infiltration = surface runoff
- Steep-sided glaciated valley helps dam construction, water travels faster
- Site of former waterfall provides a head of water
- Nearby industrial and domestic demand
- Small surface area = less evaporation

Resource	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.

Water uses:
-Agriculture: to water the plants etc.
-Domestic: cooking, cleaning and drinking
-Industrial: heated to make steam in order to turn turbines, and for cooling down reactors

3.5 Environmental risks and benefits: resource conservation and management

Problems with development:
Soil erosion: occurs in farms, where the rainforest is cleared – soil is washed away by rain because there are no tree roots to retain it. In the Amazon rainforest, eroded soil goes into rivers and pollutes the drinking water.
Global warming: the greenhouse effect is when infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and lower atmosphere. Global warming happens as a result of too much greenhouse gas

The effects:
-melting ice-sheets
-rising sea levels
-increase in storms
-change in the distribution of precipitation
-plants and wildlife might not have the time to adjust
-lower crop yields in Africa, parts of Asia and Latin America too, may increase in northern America and Europe
-more people at risk from insect-borne and water-borne diseases

Greenhouse gases are:
-CO_2 from burning fossil fuels or wood in power stations, cars and homes
-methane from decomposing organic matter and waste gases from digestion – cows farting haha
-CFCs or chlorofluorocarbons from aerosols, air conditioners, foam packaging and refrigerators (now banned)
-nitrous oxide from car exhausts, power stations and agricultural fertiliser
Air pollution: cars (transport) and power stations (energy production)
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 – nitrogen and oxygen from air combine in a hot environment (hot furnace or car engine) same effect as sulphur dioxide
Lead oxide: damages nervous system, from burning leaded petrol/diesel
Water pollution:
-industrial waste because it is cheap, does not take up land (as opposed to a land-fill site), and people favour economic growth over the protection of the environment
-soil in rivers due to soil erosion (as shown in the Amazon)
-nitrates from fertilisers and phosphates from manure cause eutrophication

-oil spilling into the sea
-acid rain lowers pH (increases acidity) of lakes/ponds and leaches aluminium out of the soil causing:
-the fishes gills to be damaged eventually killing them, fixed by adding calcium hydroxide (slaked lime)
-destroys the top of the trees and the aluminium damages tree roots = dead tree, important nutrients leached away
-health hazards for humans
-damages limestone buildings and sculptures
-fewer crops can be grown on an acidic field

Visual pollution: all those things are ugly compared to unspoiled nature

Noise pollution: vehicles (including planes) – transport, tractors – agriculture, mining or quarrying (Lake District) probably produces noise, noisy tourists who stay up late partying, music – tourism.

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