

# GEOGRAPHY KNOWLEDGE ORGANISER



## Knowledge Organisers



## AQA Geography



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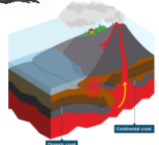





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## Paper 1

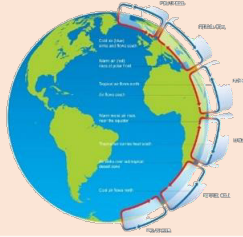
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The structure of the Earth		Volcanic Hazards		Managing Volcanic Eruptions			
 <b>The Crust</b>	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.	<b>Ash cloud</b>	Small pieces of pulverised rock and glass which are thrown into the atmosphere.	 <b>Warning signs</b>	<b>Monitoring techniques</b>		
<b>The Mantle</b>	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.	<b>Gas</b>	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.			Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
		<b>Lahar</b>	A volcanic mudflow which usually runs down a valley side on the volcano.			Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
		<b>Pyroclastic flow</b>	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.			When a volcano is close to erupting it starts to release gases.	Gas samples may be taken and chemical sensors used to measure sulphur levels.
<b>The Inner and outer Core</b>	Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.	<b>Volcanic bomb</b>	A thick (viscous) lava fragment that is ejected from the volcano.			<b>Preparation</b>	
				Creating an exclusion zone around the volcano.	Being ready and able to evacuate residents.		
				Having an emergency supply of basic provisions, such as food	Trained emergency services and a good communication system.		
Convection Currents		Case study –HIC Chile Earthquake 2010		Earthquake Management			
<b>The crust is divided into tectonic plates which are moving due to convection currents in the mantle.</b>							
<b>1</b>	Radioactive decay of some of the elements in the core and mantle generate a lot of heat.	<b>Background</b>	On 27 February 2010 an earthquake measuring 8.8 on the Richter scale struck just off the coast of central Chile. The earthquake occurred at a destructive plate margin (Nazca and South American plate).	<b>PREDICTING</b>			
<b>2</b>	When lower parts of the mantle molten rock (Magma) heat up they become <b>less dense</b> and <b>slowly rise</b> .	<b>Effects</b>	<ul style="list-style-type: none"><li>500 people died and 12,000 injured</li><li>220,000 homes destroyed</li><li>Cost of the earthquake was estimated at \$30 billion.</li><li>Several coastal towns devastated by tsunami waves.</li></ul>	<b>Methods include:</b>			
<b>3</b>	As they move towards the top they cool down, become <b>more dense</b> and <b>slowly sink</b> .	<b>Responses</b>	<ul style="list-style-type: none"><li>Power and water restored to 90% of homes in 10 days</li><li>President estimated Chile would be fully recovered in 4 years.</li><li>A national appeal raised \$60 million – enough to build 30,000 emergency shelters.</li></ul>	<ul style="list-style-type: none"><li>Satellite surveying (tracks changes in the earth's surface)</li><li>Laser reflector (surveys movement across fault lines)</li><li>Radon gas sensor (radon gas is released when plates move so this finds that)</li><li>Seismometer</li><li>Water table level (water levels fluctuate before an earthquake).</li><li>Scientists also use seismic records to predict when the next event will occur.</li></ul>			
<b>4</b>	These <b>circular movements</b> of semi-molten rock are <b>convection currents</b>						
<b>5</b>	Convection currents create <b>drag</b> on the base of the tectonic plates and this causes them to move.			<b>PROTECTION</b>			
<b>Types of Plate Margins</b>		<b>What is a Natural Hazard</b>		<b>You can't stop earthquakes</b> , so earthquake-prone regions follow these three methods to reduce potential damage:			
<b>Destructive Plate Margin</b>		A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.		<ul style="list-style-type: none"><li>Building earthquake-resistant buildings</li><li>Raising public awareness</li><li>Improving earthquake prediction</li></ul>			
When the denser plate subducts beneath the other, friction causes it to <b>melt and become molten magma</b> . The magma forces its ways up to the surface to form a volcano. This margin is also responsible for <b>devastating earthquakes</b> .		<b>Geological Hazard</b>	<b>Meteorological Hazard</b>	<b>Case study – LIC Nepal Earthquake 2015</b>			
		These are hazards caused by land and tectonic processes.	These are hazards caused by weather and climate.				
<b>Constructive Plate Margin</b>		<b>Causes of Earthquakes</b>		<b>Background</b>			
Here two plates are <b>moving apart</b> causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the <b>Mid Atlantic Ridge</b> .		Earthquakes are caused when two plates become <b>locked</b> causing <b>friction</b> to build up. From this <b>stress</b> , the <b>pressure</b> will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of <b>seismic waves</b> , to travel from the <b>focus</b> towards the <b>epicentre</b> . As a result, the crust vibrates triggering an earthquake.		On 25 April 2015 Nepal was struck by an earthquake measuring 7.9 on the Richter scale. The epi-centre was about 80km away from the capital city Kathmandu. This is a destructive plate margin (Indo-Australian and Eurasian plates).			
				<b>Effects</b>			
<b>Conservative Plate Margin</b>		The point directly above the focus, where the seismic waves reach first, is called the <b>EPICENTRE</b> .		<ul style="list-style-type: none"><li>9000 deaths and 20,000 injured</li><li>3 million people left homeless</li><li>Avalanches on Mount Everest</li><li>Cost of damage estimated at over \$5 billion.</li></ul>			
A conservative plate boundary occurs where plates <b>slide past each other</b> in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.		<b>SEISMIC WAVES</b> (energy waves) travel out from the focus.		<b>Responses</b>			
		The point at which pressure is released is called the <b>FOCUS</b> .		<ul style="list-style-type: none"><li>International search and rescue teams</li><li>Half a million tents provided</li><li>Social media widely used for search and rescue</li><li>Over 7000 schools re-built/repared</li><li>International conference to discuss rebuilding</li></ul>			
							



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Global pattern of air circulation	
Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.	
<b>Hadley cell</b>	Largest cell which extends from the <b>Equator</b> to between <b>30° to 40° north &amp; south</b> .
<b>Ferrel cell</b>	Middle cell where air flows <b>poleward</b> between <b>60° &amp; 70°</b> latitude.
<b>Polar cell</b>	<b>Smallest &amp; weakest</b> cell that occurs from the poles to the Ferrel cell.



Distribution of Tropical Storms.	High and Low Pressure				
They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.	<table> <tr> <th>Low Pressure</th><th>High Pressure</th></tr> <tr> <td>Caused by hot air rising. Causes stormy, cloudy weather.</td><td>Caused by cold air sinking. Causes clear and calm weather.</td></tr> </table>	Low Pressure	High Pressure	Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.
Low Pressure	High Pressure				
Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.				

Formation of Tropical Storms	
1	The sun's rays heats large areas of ocean in the summer and autumn. This causes <b>warm, moist air</b> to rise over the particular spots
2	Once the <b>temperature is 27°</b> , the rising warm moist air leads to a <b>low pressure</b> . This eventually turns into a thunderstorm. This causes air to be sucked in from the <b>trade winds</b> .
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to <b>spin</b> .
4	When the storm begins to <b>spin faster than 74mph</b> , a tropical storm (such as a hurricane) is officially born.
5	With the tropical storm growing in power, <b>more cool air sinks</b> in the centre of the storm, creating calm, clear condition called the <b>eye of the storm</b> .
6	When the tropical storm hits land, it <b>loses its energy source</b> (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

Changing pattern of Tropical Storms	
Scientist believe that global warming is having an impact on the frequency and strength of tropical storms. This may be due to an increase in ocean temperatures.	
Management of Tropical Storms	
<b>Protection</b> Preparing for a tropical storm may involve construction projects that will improve protection.	<b>Aid</b> Aid involves assisting after the storm, commonly in LIDs.
<b>Development</b> The scale of the impacts depends on the whether the country has the resources cope with the storm.	<b>Planning</b> Involves getting people and the emergency services ready to deal with the impacts.
<b>Prediction</b> Constant monitoring can help to give advanced warning of a tropical storm	<b>Education</b> Teaching people about what to do in a tropical storm.



Primary Effects of Tropical Storms	
<ul style="list-style-type: none"> <li>The intense winds of tropical storms can destroy whole <b>communities, buildings and communication networks</b>.</li> <li>As well as their own destructive energy, the winds can generate abnormally high waves called <b>storm surges</b>.</li> <li>Sometimes the most destructive elements of a storm are these subsequent <b>high seas and flooding</b> they cause to coastal areas.</li> </ul>	

Secondary Effects of Tropical Storms	
<ul style="list-style-type: none"> <li>People are <b>left homeless</b>, which can cause distress, poverty and ill health due to lack of shelter.</li> <li><b>Shortage of clean water and lack of proper sanitation</b> makes it easier for diseases to spread.</li> <li><b>Businesses are damaged</b> or destroyed causing employment.</li> <li>Shortage of food as <b>crops are damaged</b>.</li> </ul>	

Case Study: Typhoon Haiyan 2013	
<b>Causes</b> Started as a tropical depression on <b>2<sup>nd</sup> November 2013</b> and gained strength. Became a Category 5 " <b>super typhoon</b> " and made landfall on the Pacific islands of the Philippines.	
<b>Effects</b> <ul style="list-style-type: none"> <li>Almost <b>6,500 deaths</b>.</li> <li><b>130,000 homes destroyed</b>.</li> <li>Water and sewage systems destroyed had caused <b>diseases</b>.</li> <li><b>Emotional grief</b> for dead.</li> </ul>	<b>Management</b> <ul style="list-style-type: none"> <li>The UN raised <b>£190m in aid</b>.</li> <li>USA &amp; UK <b>sent helicopter carrier ships</b> deliver aid remote areas.</li> <li><b>Education</b> on typhoon preparedness.</li> </ul>

Case Study: UK Heat Wave 2003	
<b>Causes</b> The heat wave was caused by an anticyclone (areas of high pressure) that stayed in the area for most of August. This blocked any low pressure systems that normally brings cooler and rainier conditions.	
<b>Effect</b> <ul style="list-style-type: none"> <li>People suffered from heat strokes and dehydration.</li> <li>2000 people died from causes linked to heatwave.</li> <li>Rail network disrupted and crop yields were low.</li> </ul>	<b>Management</b> <ul style="list-style-type: none"> <li>The NHS and media gave guidance to the public.</li> <li>Limitations placed on water use (hose pipe ban).</li> <li>Speed limits imposed on trains and government created 'heatwave plan'.</li> </ul>



What is Climate Change?	
Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.	
Recent Evidence for climate change.	
<b>Global temperature</b>	Average global temperatures have increased by more than <b>0.6°C since 1950</b> .
<b>Ice sheets &amp; glaciers</b>	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by <b>10% in 30 years</b> .
<b>Sea Level Change</b>	Average global <b>sea level has risen by 10-20cms</b> in the past 100 years. This is due to the additional water from ice and thermal expansion.

Enhanced Greenhouse Effect	
Recently there has been an increase in <b>humans burning fossil fuels</b> for energy. These fuels (gas, coal and oil) emit <b>greenhouse gases</b> . This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing <b>less to be reflected</b> . As a result, the Earth is becoming warmer.	

Evidence of natural change	
<b>Orbital Changes</b>	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
<b>Sun Spots</b>	Dark spots on the Sun are called Sun spots. They increase the <b>amount of energy Earth receives</b> from the Sun.
<b>Volcanic Eruptions</b>	Volcanoes release large amounts of <b>dust containing gases</b> . These can <b>block sunlight</b> and results in cooler temperatures.

Managing Climate Change	
<b>Carbon Capture</b> This involves new technology designed to reduce climate change.	<b>Planting Trees</b> Planting trees increase the amount of carbon is absorbed from atmosphere.
<b>International Agreements</b> Countries aim to cut emissions by signing international deals and by setting targets.	<b>Renewable Energy</b> Replacing fossil fuels based energy with clean/natural sources of energy.



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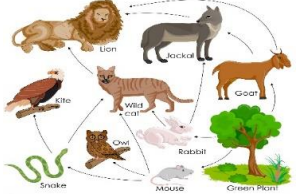
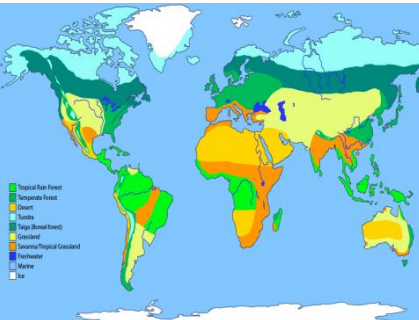
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What is an Ecosystem?		
An ecosystem is a system in which organisms interact with each other and with their environment.		
Ecosystem's Components		
Abiotic	These are <b>non-living</b> , such as air, water, heat and rock.	
Biotic	These are <b>living</b> , such as plants, insects, and animals.	
	Flora	Plant life occurring in a particular region or time.
	Fauna	Animal life of any particular region or time.
		
<b>Food Web and Chains</b>		
Simple <b>food chains</b> are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level. <b>Food webs</b> however consists of a network of many food chains interconnected together.		
Nutrient cycle		
Plants take in <b>nutrients</b> to build into new organic matter. Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by <b>decomposers</b> .		
Litter	This is the <b>surface layer</b> of vegetation, which over time breaks down to become <b>humus</b> .	
Biomass	The total <b>mass of living organisms</b> per unit area.	
Biomes		
A biome is a <b>large geographical area of distinctive plant and animal groups</b> , which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.		
		
The <b>most productive biomes</b> – which have the greatest biomass- grow in climates that are <b>hot and wet</b> .		

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

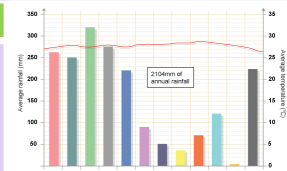
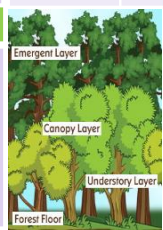
Unit 1b

AQA

The Living World

Tropical Rainforest Biome		
Tropical rainforest cover about <b>2 per cent</b> of the Earth's surface yet they are home to <b>over half of the world's plant and animals</b> .		
Interdependence in the rainforest		
A rainforest works through <b>interdependence</b> . This is where the plants and animals <b>depend on each other</b> for survival. If one component changes, there can be <b>serious knock-up effects</b> for the entire ecosystem.		
Distribution of Tropical Rainforests		
Tropical rainforests are <b>centred along the Equator</b> between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and South-East Asia. The <b>Amazon</b> is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.		
Rainforest nutrient cycle		
The <b>hot, damp conditions</b> on the forest floor allow for the <b>rapid decomposition</b> of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are in high demand from the many fast-growing plants, they do not remain in the soil for long and stay close to the surface. If vegetation is removed, the soils quickly become <b>infertile</b> .		
Climate of Tropical Rainforests		
<ul style="list-style-type: none"><li>Evening temperatures rarely fall below <b>22°C</b>.</li><li>Due to the <b>presence of clouds</b>, temperatures rarely rise above <b>32°C</b>.</li><li>Most afternoons have heavy showers.</li><li>At night with no clouds insulating, temperature drops.</li></ul>		

CASE STUDY: UK Ecosystem: Epping Forest, Essex		
This is a typical English lowland deciduous woodland. <b>70% of the area</b> is designated as a <b>Site of Special Scientific Interest (SSI)</b> for its biological interest, with <b>66 %</b> designated as a <b>Special Area of Conservation (SAC)</b> .		
Components & Interrelationships		Management
Spring	<b>Flowering plants</b> (producers) such as bluebells store nutrients to be eaten by consumers later.	<ul style="list-style-type: none"><li>Epping has been managed for centuries.</li><li>Currently now used for <b>recreation and conservation</b>.</li><li>Visitors <b>pick fruit</b> and berries, helping to <b>disperse seeds</b>.</li><li>Trees cut down to encourage <b>new growth for timber</b>.</li></ul>
Summer	Broad tree leaves grow quickly to <b>maximise photosynthesis</b> .	
Autumn	Trees shed leaves to <b>conserve energy</b> due to sunlight hours decreasing.	
Winter	Bacteria <b>decompose</b> the leaf litter, releasing the nutrients into the soil.	
Layers of the Rainforest		
Emergent	Highest layer with trees reaching <b>50 metres</b> .	
Canopy	Most life is found here as It receives <b>70% of the sunlight</b> and <b>80% of the life</b> .	
U-Canopy	Consists of trees that reach <b>20 metres high</b> .	
Shrub Layer	Lowest layer with <b>small trees</b> that have adapted to living in the <b>shade</b> .	





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## Tropical Rainforests: Case Study Malaysia







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


Adaptations to the rainforest		Rainforest inhabitants
<b>Orangutans</b>	Large arms to swing & support in the tree canopy.	Many tribes have developed sustainable ways of survival. The rainforest provides inhabitants with... <ul style="list-style-type: none"> <li>• <b>Food</b> through hunting and gathering.</li> <li>• <b>Natural medicines</b> from forest plants.</li> <li>• <b>Homes and boats</b> from forest wood.</li> </ul>
<b>Drip Tips</b>	Allows heavy rain to <b>run off leaves easily</b> .	
<b>Lianas &amp; Vines</b>	<b>Climbs</b> trees to reach sunlight at canopy.	

Issues related to biodiversity	What are the causes of deforestation?	
<b>Why are there high rates of biodiversity?</b>	<b>Logging</b> 	<b>Agriculture</b> 
<ul style="list-style-type: none"> <li>• <b>Warm and wet climate</b> encourages a wide range of vegetation to grow.</li> <li>• There is <b>rapid recycling of nutrients</b> to speed plant growth.</li> <li>• Most of the rainforest is <b>untouched</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• Most widely reported cause of destructions to biodiversity.</li> <li>• Timber is harvested to create <b>commercial items</b> such as furniture and paper.</li> <li>• <b>Violent confrontation</b> between indigenous tribes and logging companies.</li> </ul>	<ul style="list-style-type: none"> <li>• Large scale '<b>slash and burn</b>' of land for ranches and palm oil.</li> <li>• Increases <b>carbon emission</b>.</li> <li>• <b>River saltation and soil erosion</b> increasing due to the large areas of <b>exposed land</b>.</li> <li>• Increase in <b>palm oil</b> is making the <b>soil infertile</b>.</li> </ul>

Main issues with biodiversity decline	<b>Mineral Extraction</b> 	<b>Tourism</b> 
<ul style="list-style-type: none"> <li>• <b>Keystone species</b> (a species that are important of other species) are extremely important in the rainforest ecosystem. Humans are threatening these vital components.</li> <li>• <b>Decline in species</b> could cause tribes being unable to survive.</li> <li>• <b>Plants &amp; animals</b> may become <b>extinct</b>.</li> <li>• Key medical <b>plants</b> may become <b>extinct</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Precious metals</b> are found in the rainforest.</li> <li>• Areas <b>mined</b> can experience <b>soil and water contamination</b>.</li> <li>• <b>Indigenous people</b> are becoming <b>displaced</b> from their land due to roads being built to transport products.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mass tourism</b> is resulting in the building of hotels in extremely <b>vulnerable areas</b>.</li> <li>• Lead to <b>negative relationship</b> between the government and indigenous tribes</li> <li>• Tourism has <b>exposed animals</b> to human <b>diseases</b>.</li> </ul>

Impacts of deforestation	<b>Energy Development</b> 	<b>Road Building</b> 
<b>Economic development</b>  <ul style="list-style-type: none"> <li>+ Mining, farming and logging creates employment and tax income for government.</li> <li>+ Products such as palm oil provide valuable income for countries.</li> <li>- The loss of biodiversity will reduce tourism.</li> </ul>	<ul style="list-style-type: none"> <li>• The <b>high rainfall</b> creates ideal conditions for <b>hydro-electric power (HEP)</b>.</li> <li>• The <b>Bakun Dam</b> in Malaysia is key for creating energy in this developing country, however, both people and environment have suffered.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Roads</b> are needed to bring supplies and <b>provide access</b> to new mining areas, settlements and energy projects.</li> <li>• In Malaysia, logging companies use an <b>extensive network of roads</b> for heavy machinery and to transport wood.</li> </ul>
<b>Soil erosion</b> 	<b>Sustainability for the Rainforest</b>	

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

Climate Change
 <ul style="list-style-type: none"> <li>-When rainforests are cut down, the climate becomes <b>drier</b>.</li> <li>-Trees are <b>carbon 'sinks'</b>. With greater deforestation comes more greenhouse emissions in the atmosphere.</li> <li>-When trees are burnt, they <b>release more carbon in the atmosphere</b>. This will enhance the <b>greenhouse effect</b>.</li> </ul>
Possible strategies include:
<ul style="list-style-type: none"> <li>• <b>Agro-forestry</b> - Growing trees and crops at the same time. It prevents soil erosion and the crops benefit from the nutrients.</li> <li>• <b>Selective logging</b> - Trees are only felled when they reach a particular height.</li> <li>• <b>Education</b> - Ensuring those people understand the consequences of deforestation</li> <li>• <b>Afforestation</b> - If trees are cut down, they are replaced.</li> <li>• <b>Forest reserves</b> - Areas protected from exploitation.</li> <li>• <b>Ecotourism</b> - tourism that promotes the environments &amp; conservation</li> </ul>

## Cold Environments: Case Study Svalbard




Svalbard is a Norwegian territory in the Arctic Ocean and the most northern permanently inhabited group of islands in the world.

Distribution of the world's cold environments	Major characteristics of cold environments
Most of the world's cold environments are located in the polar regions. The latitude of these regions is 66° N/S.	<ul style="list-style-type: none"> <li>• <b>Polar:</b> Soil permanently covered by ice, low precipitation, temperatures in winter falling below -50 °C.</li> <li>• <b>Tundra:</b> Winter temperatures -20 °C, Soil is generally infertile and frozen in winter, precipitation high in coastal areas.</li> </ul>

Cold environment inhabitants	Climate of Cold environments
<ul style="list-style-type: none"> <li>• People at a serious risk of frostbite</li> <li>• Wear thermal underwear, winter jackets and boots.</li> <li>• Outdoor work can be <b>very slow and dangerous</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Polar:</b> Low precipitation and temperatures in winter falling below -50 °C.</li> <li>• <b>Tundra:</b> Winter temperatures -20 °C and precipitation is high in coastal areas.</li> </ul>



Adaptations to cold environments	Interdependence
<b>Polar bears</b> <ul style="list-style-type: none"> <li>• Thick fur to retain heat.</li> <li>• Insulating layer of fat.</li> <li>• Black nose and foot pads absorb sun light</li> </ul>	 <p>Different parts of the cold environments ecosystem <b>are closely linked together and depend on each other</b>, especially in a such a harsh environment.</p>
<b>Bearberry</b> <ul style="list-style-type: none"> <li>• Very low growing to survive strong winds.</li> <li>• Small leathery leaves help retain water</li> <li>• Bright red berries eaten by birds and owls and this helps distribute seeds.</li> </ul>	

## Opportunities and challenges in Cold environments

Opportunities	Challenges
<ul style="list-style-type: none"> <li>• <b>Mineral extraction:</b> Svalbard is rich in coal. It is the main economic activity and employs over 300 people.</li> <li>• <b>Energy developments:</b> Coal is used to power one power station, however Svalbard is increasingly looking at Geothermal energy and Carbon capture.</li> <li>• <b>Fishing:</b> The cold waters near Svalbard are one of the richest fishing grounds in the world.</li> <li>• <b>Tourism:</b> In 2011 70,000 people visited Svalbard.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Extreme temperatures:</b> Make it challenging for humans to complete outdoor work.</li> <li>• <b>Construction:</b> The frozen ground has to be protected from melting and there are issues with the quality of dirt/gravel roads.</li> <li>• <b>Services:</b> Water/Energy are generally provided to individual buildings and have to be kept off the ground (to avoid freezing)</li> </ul>

Causes of environmental damage		Strategies to reduce Desertification
<b>Fragile environments are environments that are delicate and easily damaged.</b>	<b>Climate Change</b> Rising temperatures has resulted in temperature change and melting of ice in polar regions.	<ul style="list-style-type: none"> <li>• <b>Technology:</b> Raising oil pipelines to avoid it melting the permafrost and pumping stations to keep the oil moving.</li> <li>• <b>Action by governments:</b> Alaska has strict policies on protecting the environment from resource exploitation.</li> <li>• <b>International Agreements:</b> The Antarctica Treaty (1959) protects the natural environment.</li> <li>• <b>Conservation Groups:</b> The WWF provides scientific information, expertise and resources.</li> </ul>
<b>Vehicle damage</b> People driving off-road vehicles erodes the soil which is often soggy in summer (as it melts)	<b>Economic Development</b> Exploiting resources leads to environmental damage as coal has to be mined from underground.	
<b>Oil pollution</b> Pollutes rivers, leaks into the environment and infrastructure construction causes damage.	<b>Tourism</b> Puts pressure on resources which can result in land being cleared for buildings/roads/	



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## Relief of the UK

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

### Key

#### Lowlands

#### Uplands



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

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

## Types of Erosion

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

<b>Attrition</b>	Rocks that bash together to become smooth/smaller.
<b>Solution</b>	A chemical reaction that dissolves rocks.
<b>Abrasion</b>	Rocks hurled at the base of a cliff to break pieces apart.
<b>Hydraulic Action</b>	Water enters cracks in the cliff, air compresses, causing the crack to expand.

## Types of Transportation

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

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

## Mass Movement

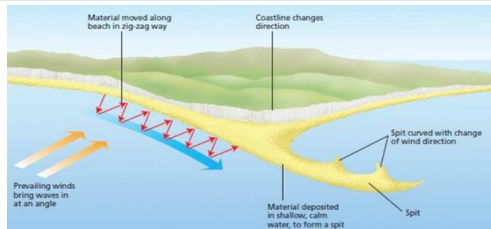
A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

- 1 Rain saturates the permeable rock above the impermeable rock making it heavy.
- 2 Waves or a river will erode the base of the slope making it unstable.
- 3 Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
- 4 The debris at the base of the cliff is then removed and transported by waves or river.



## Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.

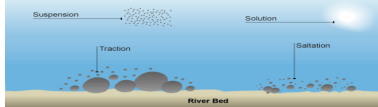


- 1) Swash moves up the beach at the angle of the prevailing wind.
- 2) Backwash moves down the beach at 90° to coastline, due to gravity.
- 3) Zigzag movement (Longshore Drift) transports material along beach.
- 4) Deposition causes beach to extend, until reaching a river estuary.
- 5) Change in prevailing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

## Types of Weathering

Weathering is the breakdown of rocks where they are.

<b>Carbonation</b>	Breakdown of rock by changing its chemical composition.
<b>Mechanical</b>	Breakdown of rock without changing its chemical composition.



## What is Deposition?

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

## Unit 1c

# Physical Landscapes in the UK

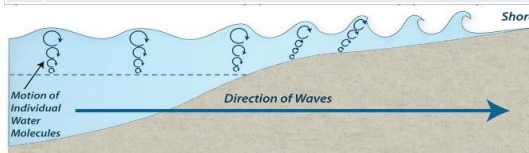


## How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

## Why do waves break?

- 1 Waves start out at sea.
- 2 As waves approaches the shore, friction slows the base.
- 3 This causes the orbit to become elliptical.
- 4 Until the top of the wave breaks over.



## Mechanical Weathering Example: Freeze-thaw weathering

### Stage One

Water seeps into cracks and fractures in the rock.



### Stage Two

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



### Stage Three

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



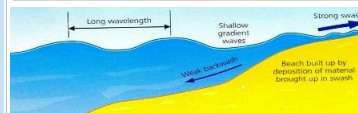
## Size of waves

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

## Types of Waves

### Constructive Waves

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

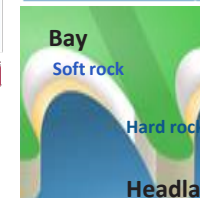


### Destructive Waves

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



## Formation of Bays and Headlands



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

## Formation of Coastal Stack



Example: Old Harry Rocks, Dorset

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



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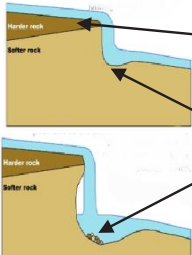


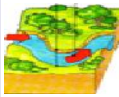
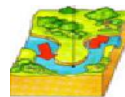


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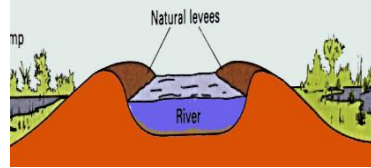
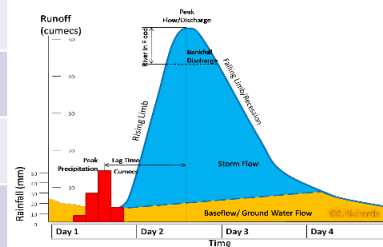
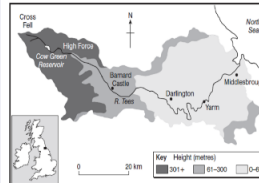


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Coastal Defences		
Hard Engineering Defences		
<b>Groynes</b>	Wood barriers prevent longshore drift, so the beach can build up.	<div>✓</div> Beach still accessible. <div>✗</div> No deposition further down coast = erodes faster.
<b>Sea Walls</b>	Concrete walls break up the energy of the wave. Has a lip to stop waves going over.	<div>✓</div> Long life span <div>✓</div> Protects from flooding <div>✗</div> Curved shape encourages erosion of beach deposits.
<b>Gabions or Rip Rap</b>	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	<div>✓</div> Cheap <div>✓</div> Local material can be used to look less strange. <div>✗</div> Will need replacing.
Soft Engineering Defences		
<b>Beach Nourishment</b>	Beaches built up with sand, so waves have to travel further before eroding cliffs.	<div>✓</div> Cheap <div>✓</div> Beach for tourists. <div>✗</div> Storms = need replacing. <div>✗</div> Offshore dredging damages seabed.
<b>Managed Retreat</b>	Low value areas of the coast are left to flood & erode.	<div>✓</div> Reduce flood risk <div>✓</div> Creates wildlife habitats. <div>✗</div> Compensation for land.
Case Study: Lyme Regis Coastal Management		
<b>Location and Background</b> Located on the south coast of England. The town is a popular sea resort for tourists to visit all year round and is part of the Jurassic coast World Heritage Site.		
<b>Geomorphic Processes</b> <ul style="list-style-type: none"> <li>Much of the town has been built on unstable cliffs</li> <li>Coastline is eroding more rapidly than any other in Europe due to the powerful waves from the south west.</li> </ul>		
<b>Management</b> <ul style="list-style-type: none"> <li>Phase 1 (1995) – New sea wall and promenade and a £1.4 million emergency project to stabilise the cliffs.</li> <li>Phase 2 (2007) – £22 million of extensive improvements including a new sea wall and promenade, creation of a wide sand and shingle beach, extension of rock armour.</li> <li>Phase 3 (not undertaken) – Initial plans to prevent landslips shelved. It was decided to leave the Cobb area alone as the costs outweighed the benefits.</li> <li>Phase 4 (2015) – Final phase cost £20 million and involved constructing a new 390m sea wall and extensive nailing, piling and drainage to provide cliff stabilisation to protect 480 homes.</li> </ul>		

Water Cycle Key Terms	
<b>Precipitation</b>	Moisture falling from clouds as rain, snow or hail.
<b>Interception</b>	Vegetation prevent water reaching the ground.
<b>Surface Runoff</b>	Water flowing over surface of the land into rivers
<b>Infiltration</b>	Water absorbed into the soil from the ground.
<b>Transpiration</b>	Water lost through leaves of plants.
Physical and Human Causes of Flooding.	
<b>Physical:</b> Prolong & heavy rainfall Long periods of rain causes soil to become saturated leading runoff.	<b>Physical:</b> Geology Impermeable rocks causes surface runoff to increase river discharge.
<b>Physical:</b> Relief Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	<b>Human:</b> Land Use Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.
Upper Course of a River	
Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.	
Formation of a Waterfall	
	<ol style="list-style-type: none"> <li>1) River flows over alternative types of rocks.</li> <li>2) River erodes soft rock faster creating a step.</li> <li>3) Further hydraulic action and abrasion form a plunge pool beneath.</li> <li>4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.</li> <li>5) Waterfall retreats leaving steep sided gorge.</li> </ol>

Middle Course of a River	
Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.	
Formation of Ox-bow Lakes	
<b>Step 1</b>	<b>Step 2</b>
	
<b>Step 3</b>	<b>Step 4</b>
	

Lower Course of a River	
Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.	
Formation of Floodplains and levees	
<div>✓</div> When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.	
<div>✓</div> Nutrient rich soil makes it ideal for farming. <div>✓</div> Flat land for building houses.	
River Management Schemes	
<b>Soft Engineering</b>	<b>Hard Engineering</b>
<b>Afforestation</b> – plant trees to soak up rainwater, reduces flood risk. <b>Demountable Flood Barriers</b> put in place when warning raised. <b>Managed Flooding</b> – naturally let areas flood, protect settlements.	<b>Straightening Channel</b> – increases velocity to remove flood water. <b>Artificial Levees</b> – heightens river so flood water is contained. <b>Deepening or widening river</b> to increase capacity for a flood.
Hydrographs and River Discharge	
River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall	
<ol style="list-style-type: none"> <li>1. <b>Peak discharge</b> is the discharge in a period of time.</li> <li>2. <b>Lag time</b> is the delay between peak rainfall and peak discharge.</li> <li>3. <b>Rising limb</b> is the increase in river discharge.</li> <li>4. <b>Falling limb</b> is the decrease in river discharge to normal level.</li> </ol>	
Case Study: The River Tees	
<b>Location and Background</b> Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.	
<b>Geomorphic Processes</b> <b>Upper</b> – Features include V-Shaped valley, rapids and waterfalls. Highforce Waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed. <b>Middle</b> – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town. <b>Lower</b> – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.	
	
<b>Management</b> <ul style="list-style-type: none"> <li>- Towns such as Yarm and Middlesbrough are economically and socially important due to houses and jobs that are located there.</li> <li>- Dams and reservoirs in the upper course, controls river's flow during high &amp; low rainfall.</li> <li>- Better flood warning systems, more flood zoning and river dredging reduces flooding.</li> </ul>	

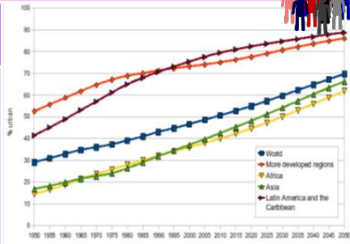

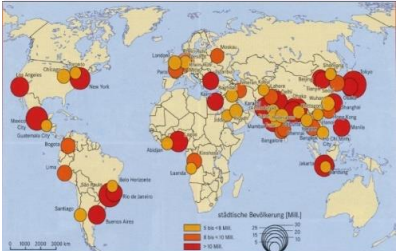




# GEOGRAPHY KNOWLEDGE ORGANISER

## Paper 2

# GEOGRAPHY KNOWLEDGE ORGANISER

What is Urbanisation?		Sustainable Urban Living		Traffic Management	
<p>This is an increase in the amount of people living in urban areas such as towns or cities. In 2007, the UN announced that for the first time, more than 50 % of the world's population live in urban areas.</p>		<p>Sustainable urban living means being able to live in cities in ways that do not pollute the environment and using resources in ways that ensure future generations also can use them.</p>		<p>Urban areas are busy places with many people travelling by different modes of transport. This has caused urban areas to experience different traffic congestion that can lead to various problems.</p>	
<p><b>Where is Urbanisation happening?</b></p> <p>Urbanisation is happening all over the world but in LICs and NEEs rates are much faster than HICs. This is mostly because of the rapid economic growth they are experiencing.</p>		<p><b>Water Conservation</b></p> <p>This is about reducing the amount of water used.</p> <ul style="list-style-type: none"> <li>Collecting rainwater for gardens and flushing toilets.</li> <li>Installing water meters and toilets that flush less water.</li> <li>Educating people on using less water.</li> </ul>	<p><b>Energy Conservation</b></p> <p>Using less fossil fuels can reduce the rate of climate change.</p> <ul style="list-style-type: none"> <li>Promoting renewable energy sources.</li> <li>Making homes more energy efficient.</li> <li>Encouraging people to use energy.</li> </ul>	<p><b>Environmental problems</b></p> <ul style="list-style-type: none"> <li>Traffic increases air pollution which releases greenhouse gases that is leading to climate change.</li> </ul>	
<p><b>Causes of Urbanisation</b></p>		<p><b>Creating Green Space</b></p> <p>Creating green spaces in urban areas can improve places for people who want to live there.</p> <ul style="list-style-type: none"> <li>Provide natural cooler areas for people to relax in.</li> <li>Encourages people to exercise.</li> <li>Reduces the risk of flooding from surface runoff.</li> </ul>	<p><b>Waste Recycling</b></p> <p>More recycling means fewer resources are used. Less waste reduces the amount that eventually goes to landfill.</p> <ul style="list-style-type: none"> <li>Collection of household waste.</li> <li>More local recycling facilities.</li> <li>Greater awareness of the benefits in recycling.</li> </ul>	<p><b>Economic problems</b></p> <ul style="list-style-type: none"> <li>Congestion can make people late for work and business deliveries take longer. This can cause companies to lose money.</li> </ul>	<p><b>Social Problems</b></p> <ul style="list-style-type: none"> <li>There is a greater risk of accidents and congestion is a cause of frustration. Traffic can also lead to health issues for pedestrians.</li> </ul>
<p><b>Rural - urban migration (1)</b></p>	<p><b>The movement of people from rural to urban areas.</b></p>				
<p><b>Push</b></p> <ul style="list-style-type: none"> <li>Natural disasters</li> <li>War and Conflict</li> <li>Mechanisation</li> <li>Drought</li> <li>Lack of employment</li> </ul>	<p><b>Pull</b></p> <ul style="list-style-type: none"> <li>More Jobs</li> <li>Better education &amp; healthcare</li> <li>Increased quality of life.</li> <li>Following family members.</li> </ul>				
<p><b>Natural Increase (2)</b></p>	<p><b>When the birth rate exceeds the death rate.</b></p>				
<p><b>Increase in birth rate (BR)</b></p> <ul style="list-style-type: none"> <li>High percentage of population are child-bearing age which leads to high fertility rate.</li> <li>Lack of contraception or education about family planning.</li> </ul>	<p><b>Lower death rate (DR)</b></p> <ul style="list-style-type: none"> <li>Higher life expectancy due to better living conditions and diet.</li> <li>Improved medical facilities helps lower infant mortality rate.</li> </ul>				
<p><b>Types of Cities</b></p>					
<p><b>Megacity</b></p>	<p>An urban area with over 10 million people living there.</p>				
		<p>More than two thirds of current megacities are located in either NEEs (Brazil) and LICs (Nigeria). The amount of megacities are predicted to increase from 28 to 41 by 2030.</p>			

## Unit 2a



## Urban Issues & Challenges

### Sustainable Urban Living Example: Freiburg

Background & Location	Sustainable Strategies
<p>Freiburg is in west Germany. The city has a population of about 220,000. In 1970 it set the goal of focusing on social, economic and environmental sustainability.</p>	<ul style="list-style-type: none"> <li>The city's waste water allows for rainwater to be retained.</li> <li>The use of sustainable energy such as solar and wind is becoming more important.</li> <li>40% of the city is forested with many open spaces for recreation, clean air and reducing flood risk.</li> </ul>



### Integrated Transport System

This is the linking of different forms of public and private transport within a city and the surrounding area.

### Brownfield Site

Brownfield sites is an area of land or premises that has been previously used, but has subsequently become vacant, derelict or contaminated.



### Traffic Management Example: Bristol

In 2012 Bristol was the most congested city in the UK. Now the city aims to develop it's integrated transport system to encourage more people to use the public transport. The city has also invested in cycle routes and hiring schemes.



### Greenbelt Area

This is a zone of land surrounding a city where new building is strictly controlled to try to prevent cities growing too much and too fast.

### Urban Regeneration

The investment in the revival of old, urban areas by either improving what is there or clearing it away and rebuilding.



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## Urban Change in a Major UK City: Bristol Case Study





Location and Background	City's Importance
<p>Bristol is a city in the South-West of England. The population of the city is 440,500 making it the tenth largest district in the UK. The city grew during the triangular trade</p> 	<ul style="list-style-type: none"> <li>It holds a strategic position on the M4 corridor with good road, rail, air and ferry services.</li> <li>There has been a shift in the main industries in the city, particularly financial services, defence, technology and the media.</li> <li>High level of inward investment</li> <li>Bristol University attracts students from all over the world.</li> </ul>
Migration to Bristol	City's Opportunities
<p>During the triangular trade (linking West Africa and the West Indies) Bristol became an important shipping dock. Today it still has two major docks – Avonmouth and Royal Portbury.</p> <p>Its accessibility, particularly with the future electrification of the rail line will reduce the journey time to London to seventy minutes. Its connectivity has attracted many companies and therefore people to relocate.</p> <p>More recently, refugees have arrived from Syria and Iraq. Also Bristol has attracted thousands of students from the UK &amp; abroad.</p> 	<p><b>Social:</b> Bristol has various cultural attractions such as the Colston Hall. Also Cabot Circus and Cribbs Causeway are very popular with shoppers.</p> <p><b>Economic:</b> The retail sectors contribute to thousands of jobs. The Universities and development of global industries adds contribute to the city's economy.</p> <p><b>Environmental:</b> In 2015 Bristol became the first city in the UK to be awarded the status of European Green Capital, due to a focus on sustainable transport and renewable energy.</p>
City Challenges	Temple Quarter Regeneration
<p><b>Social:</b> House prices have increased along with greater house shortages. Derelict housing has led to issues of anti social behaviour .</p> <p><b>Economic:</b> A lack of housing has caused an urban sprawl. Derelict industrial buildings in the city have contributed to this.</p> <p><b>Environmental:</b> Urban sprawl has led to increased pressure and decline of greenfield sites around the city.</p>	<p>Aims: to regenerate brownfield sites and to create 17,000 jobs by 2037.</p> <p>Main features: Brownfield sites and derelict buildings regenerated, Investment in its train station to improve connections, Key projects such as the Paintworks (mixed use development) and the Engine Shed (for creative businesses)</p>



## Urban Change in a Major NEE City: RIO DE JANEIRO Case Study



Location and Background	City's Importance
<p>Rio is a coastal city situated in the South East region of Brazil within the continent of South America. It is the second most populated city in the country (6.5 million) after Sao Paulo.</p> 	<ul style="list-style-type: none"> <li>Has the second largest GDP in Brazil It is headquarters to many of Brazil's main companies, particularly with Oil and Gas.</li> <li>Sugar Loaf mountain is one of the seven wonders of the world.</li> <li>One of the most visited places in the Southern Hemisphere.</li> <li>Hosted the 2014 World Cup and 2016 Summer Olympics.</li> </ul>
Migration to Rio De Janeiro	City's Opportunities
<p>The city began when Portuguese settlers with slaves arrived in 1502. Since then, Rio has become home to various ethnic groups.</p> <p>However, more recently, millions of people have migrated from rural areas that have suffered from drought, lack of services and unemployment to Rio. People do this to search for a better quality of life.</p> <p>This expanding population has resulted in the rapid urbanisation of Rio de Janeiro.</p> 	<p><b>Social:</b> Standards of living are gradually improving. The Rio Carnival is an important cultural event for traditional dancing and music.</p> <p><b>Economic:</b> Rio has one of the highest incomes per person in the country. The city has various types of employment including oil, retail and manufacturing.</p> <p><b>Environmental:</b> The hosting of the major sporting events encouraged more investment in sewage works and public transport systems.</p>
City Challenges	Self-help schemes - Rocinha, Bairro Project
<p><b>Social:</b> There is a severe shortage of housing, schools and healthcare centres available. Large scale social inequality, is creating tensions between the rich and poor.</p> <p><b>Economic:</b> The rise of informal jobs with low pay and no tax contributions. There is high employment in shanty towns called Favelas</p> <p><b>Environmental:</b> Shanty towns called Favelas are established around the city, typically on unfavourable land, such as hills.</p>	<ul style="list-style-type: none"> <li>The authorities have provided basic materials to improve peoples homes with safe electricity and sewage pipes.</li> <li>Government has demolished houses and created new estates.</li> <li>Community policing has been established, along with a tougher stance on gangs with military backed police.</li> <li>Greater investment in new road and rail network to reduce pollution and increase connections between rich and poor areas.</li> </ul>



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## What is development?

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

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

## Measuring development

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

### Economic indicators examples

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

### Social indicators examples

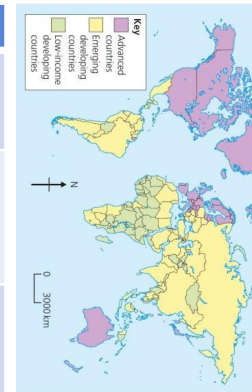
<b>Infant mortality</b>	The number of children who die before reaching 1 per 1000 babies born.
<b>Literacy rate</b>	The percentage of population over the age of 15 who can read and write.
<b>Life expectancy</b>	The average lifespan of someone born in that country.

### Mixed indicators

<b>Human Development Index (HDI)</b>	A number that uses life expectancy, education level and income per person.
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## Variations in the level of development

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



## Causes of uneven development

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

## Unit 2b

## The Changing Economic World



## Physical factors affecting uneven development

<b>Natural Resources</b> <ul style="list-style-type: none"> <li>Fuel sources such as oil.</li> <li>Minerals and metals for fuel.</li> <li>Availability for timber.</li> <li>Access to safe water.</li> </ul>	<b>Natural Hazards</b> <ul style="list-style-type: none"> <li>Risk of tectonic hazards.</li> <li>Benefits from volcanic material and floodwater.</li> <li>Frequent hazards undermines redevelopment.</li> </ul>
<b>Climate</b> <ul style="list-style-type: none"> <li>Reliability of rainfall to benefit farming.</li> <li>Extreme climates limit industry and affects health.</li> <li>Climate can attract tourists.</li> </ul>	<b>Location/Terrain</b> <ul style="list-style-type: none"> <li>Landlocked countries may find trade difficulties.</li> <li>Mountainous terrain makes farming difficult.</li> <li>Scenery attracts tourists.</li> </ul>

## Human factors affecting uneven development

<b>Aid</b> <ul style="list-style-type: none"> <li>Aid can help some countries develop key projects for infrastructure faster.</li> <li>Aid can improve services such as schools, hospitals and roads.</li> <li>Too much reliance on aid might stop other trade links becoming established.</li> </ul>	<b>Trade</b> <ul style="list-style-type: none"> <li>Countries that export more than they import have a trade surplus. This can improve the national economy.</li> <li>Having good trade relationships.</li> <li>Trading goods and services is more profitable than raw materials.</li> </ul>
<b>Education</b> <ul style="list-style-type: none"> <li>Education creates a skilled workforce meaning more goods and services are produced.</li> <li>Educated people earn more money, meaning they also pay more taxes. This money can help develop the country in the future.</li> </ul>	<b>Health</b> <ul style="list-style-type: none"> <li>Lack of clean water and poor healthcare means a large number of people suffer from diseases.</li> <li>People who are ill cannot work so there is little contribution to the economy.</li> <li>More money on healthcare means less spent on development.</li> </ul>
<b>Politics</b> <ul style="list-style-type: none"> <li>Corruption in local and national governments.</li> <li>The stability of the government can effect the country's ability to trade.</li> <li>Ability of the country to invest into services and infrastructure.</li> </ul>	<b>History</b> <ul style="list-style-type: none"> <li>Colonialism has helped Europe develop, but slowed down development in many other countries.</li> <li>Countries that went through industrialisation a while ago, have now develop further.</li> </ul>

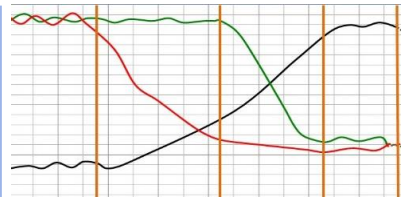
## Consequences of Uneven Development

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

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

## The Demographic Transition Model

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



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



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## Reducing the Global Development Gap

### Microfinance Loans

This involves people in LICs receiving smalls loans from traditional banks.

- + Loans enable people to begin their own businesses
- Its not clear they can reduce poverty at a large scale.

### Aid

This is given by one country to another as money or resources.

- + Improve literacy rates, building dams, improving agriculture.
- Can be wasted by corrupt governments or they can become too reliant on aid.

### Fair trade

This is a movement where farmers get a fair price for the goods produced.

- + Paid fairly so they can develop schools & health centres.
- Only a tiny proportion of the extra money reaches producers.

### Foreign-direct investment

This is when one country buys property or infrastructure in another country.

- + Leads to better access to finance, technology & expertise.
- Investment can come with strings attached that country's will need to comply with.

### Debt Relief

This is when a country's debt is cancelled or interest rates are lowered.

- + Means more money can be spent on development.
- Locals might not always get a say. Some aid can be tied under condition from donor country.

### Technology

Includes tools, machines and affordable equipment that improve quality of life.

- + Renewable energy is less expensive and polluting.
- Requires initial investment and skills in operating technology

## CS: Reducing the Development Gap In Jamaica

### Location and Background

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

### Tourist economy

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

### Multiplier effect

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

### Development Problems

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

## Case Study: Economic Development in Nigeria

### Location & Importance

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

### Influences upon Nigeria's development

#### Political

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

#### Cultural

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

### The role of TNCs

TNCs such as Shell have played an important role in its economy.

- + Investment has increased employment and income.
- Profits move to HICs.
- Many oil spills have damaged fragile environments.

### Environmental Impacts

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

### Effects of Economic Development

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



## Case Study: Economic Change in the UK

### UK in the Wider World

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



### Causes of Economic Change

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

### Towards Post-Industrial

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

### Developments of Science Parks

Science Parks are groups of scientific and technical knowledge based businesses on a single site.

- Access to transport routes.
- Highly educated workers.
- Staff benefit from attractive working conditions.
- Attracts clusters of related high-tech businesses.

### CS: UK Car Industry

Every year the UK makes 1.5 million cars. These factories are owned by large TNCs. i.e. Nissan.

- 7% of energy used there factories is from wind energy.
- New cars are more energy efficient and lighter.
- Nissan produces electric and hybrid cars.

### Change to a Rural Landscape

#### Social

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

#### Economic

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

### Improvements to Transport

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

### UK North/South Divide

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








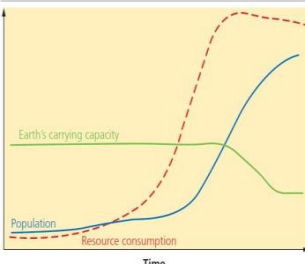

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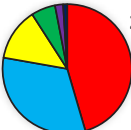



















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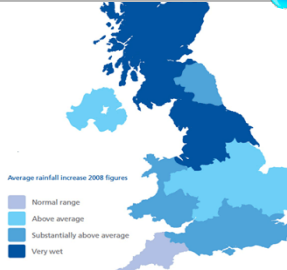
# GEOGRAPHY KNOWLEDGE ORGANISER

Resource Challenges		
Resources are things that humans require for life or to make our lives easier. Humans are becoming increasingly dependent on exploiting these resources, and as a result they are in high demand.		
Significance of Water		
Resources such as food, energy and water are what is needed for basic human development.		
FOOD 	WATER 	ENERGY 
Without enough nutritious food, people can become <b>malnourished</b> . This can make them ill . This can prevent people working or receiving education.	People need a supply of <b>clean and safe water</b> for drinking, cooking and washing. Water is also needed for food, clothes and other products.	A good supply of energy is needed for a basic standard of living. People need <b>light and heat</b> for cooking or to stay warm. It is also needed for industry.
Demand outstripping supply		
The demand for resources like food, water and energy is rising so quickly that supply cannot always keep up. Importantly, access to these resources vary dramatically in different locations		
1. Population Growth 	2. Economic Development 	
<ul style="list-style-type: none"><li>Currently the global population is <b>7.3 billion</b>.</li><li>Global population has risen <b>exponentially</b> this century.</li><li>Global population is expected to reach <b>9 billion by 2050</b>.</li><li>With more people, the <b>demand</b> for food, water, energy, jobs and space <b>will increase</b>.</li></ul>	<ul style="list-style-type: none"><li>As LICs and NEEs develop further, they require <b>more energy</b> for industry.</li><li>LICs and NEEs want similar lifestyles to HICs, therefore they will need to <b>consume more resources</b>.</li><li>Development means <b>more water is required</b> for food production as diets improve.</li></ul>	
		
Resource Reliance Graph		
<p><b>Consumption</b> – The act of using up resources or purchasing goods and produce.</p> <p><b>Carry Capacity</b> – A maximum number of species that can be supported.</p> <p><b>Resource consumption exceeds Earth's ability to provide!</b></p>		
3. Changing Technology and Employment 		
<ul style="list-style-type: none"><li>The demand for resources has driven <b>the need for new technology</b> to reach or gain more resources.</li><li>More people in the <b>secondary and tertiary industry</b> has increased the <b>demand for resources</b> required for electronics and robotics.</li></ul>		

Food in the UK 	
Growing Demand	Impact of Demand
<ul style="list-style-type: none"> <li>The UK imports about 40% of its food. This increases people's <b>carbon footprint</b>.</li> <li>There is growing demand for greater choice of <b>exotic foods</b> needed all year round.</li> <li>Foods from abroad are more affordable.</li> <li>Many food types are unsuitable to be grown in the UK.</li> </ul>	<p>Foods can travel long distances (food miles). Importing food adds to our carbon footprint.</p> <p>+ Supports workers with an income + Supports families in LICs. + Taxes from farmers' incomes contribute to local services.</p> <p>- Less land for locals to grow their own food. - Farmers exposed to chemicals.</p>
Agribusiness 	Sustainable Foods 
<p>Farming is being treated like a large industrial business. This is increasing food production.</p> <p>+ Intensive farming maximises the amount of food produced. + Using machinery which increases the farms efficiency. - Only employs a small number of workers. - Chemicals used on farms damages the habitats and wildlife.</p>	<p>Organic foods that have little impact on the environment and are healthier have been rising. Local food sourcing is also rising in popularity.</p> <ul style="list-style-type: none"> <li>Reduces emissions by only eating food from the UK.</li> <li>Buying locally sourced food supports local shops and farms.</li> <li>A third of people grow their own food.</li> </ul>

## Unit 2c The Challenge of Resource Management

Energy in the UK													
													
Growing Demand	Energy Mix												
<p>The UK <b>consumes less energy</b> than compared to the 1970s despite a smaller population. This is due to the <b>decline of industry</b>.</p>	<p>The majority of UK's energy mix comes from <b>fossil fuels</b>. By 2020, the UK aims for 15% of its energy to come from <b>renewable sources</b>. These renewable sources do not contribute to <b>climate change</b>.</p>												
Changes in Energy Mix													
<ul style="list-style-type: none"><li>75% of the UK's oil and gas has been used up.</li><li>Coal consumption has declined.</li><li>UK has become too dependent on imported energy.</li></ul>	<div><div><p>2009</p></div><div><p>2020</p></div></div> <table><tr><td></td><td>Oil</td><td></td><td>Gas</td><td></td><td>Renewable</td></tr><tr><td></td><td>Nuclear</td><td></td><td>Coal</td><td></td><td>Other</td></tr></table>		Oil		Gas		Renewable		Nuclear		Coal		Other
	Oil		Gas		Renewable								
	Nuclear		Coal		Other								

Water in the UK																																																													
Growing Demand	Deficit and Surplus																																																												
<p>The average water used per household has risen by 70%. This growing demand is predicted to increase by 5% by 2020.</p> <p>This is due to:</p> <ul style="list-style-type: none"><li>• A growing UK population.</li><li>• Water-intensive appliances.</li><li>• Showers and baths taken.</li><li>• Industrial and leisure use.</li><li>• Watering greenhouses.</li></ul>	<p>The north and west have a <b>water surplus</b> (more water than is required).</p> <p>The south and east have a <b>water deficit</b> (more water needed than is actually available).</p> <p>More than half of England is experiencing <b>water stress</b> (where demand exceeds supply).</p>																																																												
Pollution and Quality	Water stress in the UK																																																												
<p><b>Cause and effects include:</b></p> <ul style="list-style-type: none"><li>• Chemical run-off from farmland can destroy habitats and kills animals.</li><li>• Oil from boats and ships poisons wildlife.</li><li>• Untreated waste from industries creates unsafe drinking water.</li><li>• Sewage containing bacteria spreads infectious diseases.</li></ul>																																																													
Management	Water Transfer																																																												
<p>UK has <b>strict laws</b> that limits the amount of discharge from factories and farms.</p> <p><b>Education campaigns</b> to inform what can be disposed of safely.</p> <p><b>Waste water treatment plants</b> remove dangerous elements to then be used for safe drinking. Pollution traps catch and filter pollutants.</p>	<p>Water transfer involves moving water through pipes from areas of surplus (Wales) to areas of deficit (London).</p> <p><b>Opposition includes:</b></p> <ul style="list-style-type: none"><li>• Effects on <b>land and wildlife</b>.</li><li>• High maintenance <b>costs</b>.</li><li>• The <b>amount of energy</b> required to move water over long distances.</li></ul>																																																												
Energy in the UK (continued)																																																													
Significance of Renewables	Exploitation																																																												
<p>+ The UK government is investing more into low carbon alternatives.</p> <p>+ UK government aims to meet targets for reducing emissions.</p> <p>+ Renewable sources include wind, solar and tidal energy.</p> <p>- Although infinite, renewables are still expensive to install.</p> <p>- Shale gas deposits may be exploited in the near future</p>	<table><tr><th></th><th>Nuclear</th><th>Wind Farm</th></tr><tr><td rowspan="3">New plants provide job opportunities.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Problems with safety and possible harm to wildlife.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Nuclear plants are expensive.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Locals have low energy bills.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Reduces carbon footprint.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Construction cost is high.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Visual impacts on landscape.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td rowspan="3">Noise from wind turbines.</td><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>			Nuclear	Wind Farm	New plants provide job opportunities.							Problems with safety and possible harm to wildlife.							Nuclear plants are expensive.							Locals have low energy bills.							Reduces carbon footprint.							Construction cost is high.							Visual impacts on landscape.							Noise from wind turbines.						
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## Option 1: FOOD

Food Security is when people at all times need to have physical & economic access to food to meet their dietary needs for an active & healthy life. This is the opposite to Food Insecurity which is when someone is unsure when they might next eat.

### Human

- **Poverty** prevents people affording food and buying equipment.
- **Conflict** disrupts farming and prevents supplies.
- **Food waste** due to poor transport and storage.
- **Climate Change** is affecting rainfall patterns making food production difficult.

### Physical

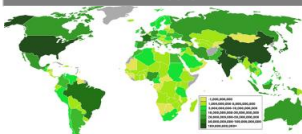
- The **quality of soil** is important to ensure crops have key nutrients.
- **Water supply** needs to be reliable to allow food to grow.
- **Pest, diseases and parasites** can destroy vast amounts of crops that are necessary to populations.
- **Extreme weather** events can damage crops (i.e. floods).

### Daily Calorie Intake



This map shows how many **calories per person** that are consumed on average for each country. This can indicate the global distribution of **available food** and **food inequality**.

### Food Supply



This map shows the amount of **food produced** in different countries. Whilst Asia and **North America** have **high** production outputs, **Africa** and **Central America** have **low** production outputs.

### Increasing Food Supply

**Hydroponics** - A method of growing plants without soil. Instead they use nutrient solution.

**New Green Revolution** - Aims to improve yields in a more sustainable way. Involves using both GM varieties and traditional and organic farming.

**Biotechnology** - Genetically modified (GM) crops changes the DNA of foods to enhance productivity and properties.

**Irrigation** - Artificially watering the land so crops can grow. Useful in dry areas to make crops more productive.

Located in Kent, the site involves four huge greenhouses using hydroponics.

### Advantages

- Supports more than 500 jobs.
- Produces food all year round.
- Provides UK with food security.

### Disadvantages

- Money generated mostly goes to large companies not community.
- Requires a lot of energy.
- Causes visual & light pollution.

### Sustainable Food Supply

This ensures that **fertile soil**, **water** and **environmental resources** are available for **future generations**.

**Organic Farming** - The banned use of chemicals and ensuring animals are raised naturally.

**Permaculture** - People growing their own food and changing eating habits. Fewer resources are required.

**Urban Farming** - Planting crops in urban areas, i.e. roundabouts.

**Managed Fishing** - Includes setting catch limits, banning trawling and promoting pole and line methods.

### C.S. NEE- Indus Basin Irrigation System

Largest irrigation scheme in the world. Involves large and small dams. Thousands of channels provides water to supports Pakistan's rich farmlands.

### Advantages

- Improves food security by adding 40% more land for farming.
- Increased yield & range of foods.

### Disadvantages

- Few take an unfair share of water
- Water is wasted and demand is rising due to population growth.
- High cost to maintain reservoirs.

## Option 2: WATER

Water security is when people have good access to enough clean water to sustain well-being and good health. Water insecurity is when areas are without sufficient water supplies. Water Stress is when less than 1700m<sup>3</sup> is available per person.

### Human

- **Pollution** caused from human and industrial waste being dumped into peoples water sources.
- **Poverty** prevents low income families affording water.
- **Limited infrastructure** such as a lack of water pipes and sewers.
- **Over-abstraction** is when more water is taken than is replaced.

### Physical

- **Climate** needs to provide enough rainfall to feed lakes and rivers. Droughts affect supply if water.
- **Geology** can affect accessibility to water. Permeable rock means sourcing water from difficult aquifers, whereas impermeable allows water to run-off into easily collected basins.

### Impact of Water Insecurity

#### Food production

The less water available for irrigating crops the less food that will be produced. This could lead to starvation.

#### Industrial output

Manufacturing industries depend heavily on water. A severe lack of water can impact economic output.

#### Disease and Water Pollution

Inadequate sanitation systems pollutes drinking water causing diseases such as cholera and typhoid.

#### Water conflict

Water sources that cross national borders can create tensions and even war between countries.

### Increasing Water Supply

**Water diversion** - Involves diverting water to be stored for longer periods. Often water is pumped underground to prevent evaporation.

**Dams and Reservoirs** - Dams control flow and storage of water. Water is released during times of water deficit.

**Water transfer** - includes schemes to move water from areas of surplus to areas of deficit.

**Desalination** - Involves the extraction of salt from sea water to produce fresh drinking water.

Lesotho is a highland country dependent on South Africa. Lesotho has water surplus due to high rainfall.

### Advantages

- Provides 75% of Lesotho's GDP.
- Provides water to areas of drought in South Africa.

### Disadvantages

- Dams displaced 30,000 people.
- Destruction to key ecosystems.
- 40% lost through pipe leakages.

### Sustainable Water Supply

Ensures water supplies don't cause damage to the environment whilst also supporting the local economy.

**Water conservation** - Aims to reduce the amount of water wasted.

**Groundwater Management** - Involves the monitoring of extracting groundwater. Laws can be introduced.

**Recycling and 'Grey' Water** - Means taking water that has already been used and using it again rather than returning it to a river or the sea. This includes water taken from bathrooms and washing machines.

### C.S. NEE - The Wakel River Basin

A project in India that aims to improve water use by encouraging greater use of rainwater harvesting techniques.

### How does the project work?

- Provides 'taankas' that store water underground.
- Small dams called 'johed' interrupt water flow and encourages infiltration.
- Villages take turns to irrigate their fields so water is not overused.
- Maintained by farmers so it is entirely sustainable.
- Greater education for awareness.

## Option 3: ENERGY

Energy security means having a reliable, uninterrupted and affordable supply of energy available. Energy insecurity can be experienced by countries with both a high and low energy consumption. Technology is increasing energy consumption.

### Physical

- **Geology** determines the availability of fossil fuels.
- **Climate variations** will affect the potential use of renewable energy.
- **Natural disasters** can damage energy infrastructure.

### Economic

- **Cost** of extracting fossil fuels is becoming costly and difficult.
- **Price of fossil fuels** are volatile to potential political changes.
- **Infrastructure** for energy is costly, especially for LICs.

### Technology

- **New technology** is making once difficult energy sources now reachable/exploitable.

### Political

- **Conflict** and turmoil in energy rich countries can affect exports.
- **Stricter regulations** over Nuclear.

### Impact of Energy Insecurity

#### Sensitive environments

Exploration of energy resources threatens to harm sensitive areas such as the oil drilling in Alaska, USA.

#### Food production

Food production depends on the energy needed to power machinery and transport goods to different markets.

#### Energy conflict

Shortages of energy resources can lead to tensions and violence. Conflict can be caused by fear of energy insecurity.

#### Industry

Countries can suffer from shortfalls in energy leading to a decline in manufacturing and services.

### Increasing Energy Supply

#### Non-renewables

**Fossil Fuels** - Conventional power stations can be made more efficient with carbon capture overcoming the environmental impacts.

**Nuclear** - Once a nuclear plant is built it can provide a cheap and long-term dependable source of energy.

#### Renewables

**Wind, Solar, Biomass** - These are examples of environmentally friendly renewable sources that can't run out but cost a lot to install.

### C.S. UK Fracking

Fracking is used to extract natural gas trapped in underground shale rock. It is a method considered by the UK.

### Advantages

- Estimated to create 64,000 jobs.
- UK has large shale gas reserves.
- Is far cheaper than natural gas.

### Disadvantages

- May cause groundwater pollution
- Is a non-renewable resource.
- May trigger minor earthquakes.

### Sustainable Energy Supply

This involves balancing supply & demand. It also includes reducing waste & supporting the environment.

**Home design** - Building homes to conserve energy, i.e. roof insulation.

**Reduce demand** - Changing attitudes towards energy used to save energy.

**Efficient technology** - Making cars more efficient by improving engine design and weight, i.e. Hybrid engines.

**Transport** - Using public buses & bikes.

### C.S. NEE - Chambamontera

Chambamontera is an isolated community in the Andes of Peru. It introduced a micro-hydro to exploit water power as an energy source.

### Benefits to the community

- Provides renewable energy.
- Low maintenance & running costs
- Has little environmental impacts.
- Using local labour and materials.
- Businesses are developing.
- Less wood is needed to be burnt.



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