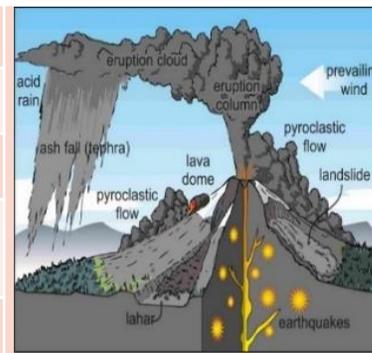


The structure of the Earth	
<b>The Crust</b>	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.
<b>The Mantle</b>	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.
<b>The Inner and outer Core</b>	Hottest 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.

Volcanic Hazards	
<b>Ash cloud</b>	Small pieces of pulverised rock and glass which are thrown into the atmosphere.
<b>Gas</b>	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.
<b>Lahar</b>	A volcanic mudflow which usually runs down a valley side on the volcano.
<b>Pyroclastic flow</b>	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.
<b>Volcanic bomb</b>	A thick (viscous) lava fragment that is ejected from the volcano.



Managing Volcanic Eruptions	
<b>Warning signs</b>	<b>Monitoring techniques</b>
Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
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>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	
<b>The crust is divided into tectonic plates which are moving due to convection currents in the mantle.</b>	
1	Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2	When lower parts of the mantle molten rock (Magma) heat up they become <b>less dense</b> and <b>slowly rise</b> .
3	As they move towards the top they cool down, become <b>more dense</b> and <b>slowly sink</b> .
4	These <b>circular movements</b> of semi-molten rock are <b>convection currents</b>
5	Convection currents create <b>drag</b> on the base of the tectonic plates and this causes them to move.

HIC -CS: Chile, 2010	
<b>Causes</b> Destructive plate margin. Pacific plate subducting beneath the Nazca plate.	
<b>Effects</b> 500 killed 12000 injured Cost of damage \$30bn 220,000 buildings damaged 4500 schools damaged <b>Secondary:</b> 1500km roads damaged by landslides Coastal towns hit by tsunami Fire in chemical plant in Santiago	<b>Management</b> Major supermarkets gave out food Buildings had been built to withstand magnitude 9 earthquakes Repairs made within 24 hours on the North-South Route 5 road Emergency services and army set up field hospitals and rescued people Power and water restored to 90% homes within ten days

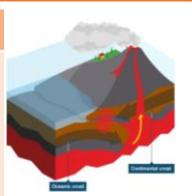
Earthquake Management	
<b>PREDICTING</b>	
<b>Methods include:</b>	
<ul style="list-style-type: none"> <li>Satellite surveying (tracks changes in the earth's surface)</li> <li>Laser reflector (surveys movement across fault lines)</li> <li>Radon gas sensor (radon gas is released when plates move so this 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>	

## The Challenges of Natural Hazards

### Types of Plate Margins

**Destructive Plate Margin**

When the denser plate subducts beneath the other, friction causes it to **melt and become molten magma**. The magma forces its way up to the surface to form a volcano. This margin is also responsible for **devastating earthquakes**.



**Constructive Plate Margin**

Here two plates are **moving apart** 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 **Mid Atlantic Ridge**.



**Conservative Plate Margin**

A conservative plate boundary occurs where plates **slide past each other** 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.



### What is a Natural Hazard

A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.

Geological Hazard	Meteorological Hazard
These are hazards caused by land and tectonic processes.	These are hazards caused by weather and climate.

### Causes of Earthquakes

Earthquakes are caused when two plates become **locked** causing **friction** to build up. From this **stress**, the **pressure** will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of **seismic waves**, to travel from the **focus** towards the **epicentre**. As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the <b>EPICENTRE</b> .	
<b>SEISMIC WAVES</b> (energy waves) travel out from the focus.	
The point at which pressure is released is called the <b>FOCUS</b> .	

### PROTECTION

**You can't stop earthquakes**, so earthquake-prone regions follow these three methods to reduce potential damage:

- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

### LIC-CS: Nepal, 2015

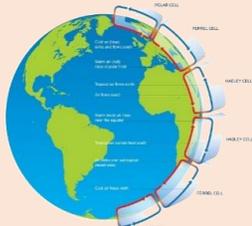
**Causes**  
**Collision plate margin, Indo-australian plate moving into the Eurasian plate. Two continental plates meeting.**

<b>Effects</b> <b>Primary:</b> 9000 killed, 20000 injured 3 million homes destroyed Cost \$5bn in damage 7000 schools destroyed <b>Secondary:</b> Avalanches and landslides on mountain sides Avalanches Mt Everest killed 19 Landslides blocked the Kali River	<b>Management</b> New routes created on Mt Everest to reopen it for climbers 300,000 people evacuated to Kathmandu the capital to stay with friends and family Half a million tents provided to shelter people (provided by charities e.g. Red Cross) UK sent helicopters and rescue workers quickly after the earthquake
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## Global pattern of air circulation

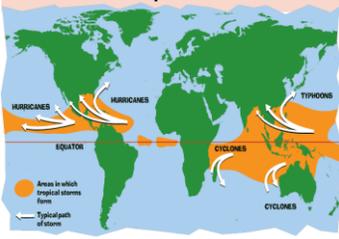
Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

<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; weakness</b> cell that occurs from the poles to the Ferrel cell.



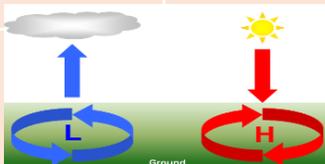
## Distribution of Tropical Storms.

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.



## High and Low Pressure

Low Pressure	High Pressure
Caused by <b>hot air rising</b> . Causes stormy, cloudy weather.	Caused by <b>cold air sinking</b> . Causes clear and calm weather.



## Formation of Tropical Storms

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

## Changing pattern of Tropical Storms

Scientists 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

- The intense winds of tropical storms can destroy whole **communities, buildings and communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.

## Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- Shortage of clean water and lack of proper sanitation** makes it easier for diseases to spread.
- Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**.

## Case Study: Typhoon Haiyan 2013



**Causes:** Started as a tropical depression on **2<sup>nd</sup> November 2013** and gained strength. Became a Category 5 "**super typhoon**" and made landfall on the Pacific islands of the Philippines.

<b>Effects</b> <b>Primary:</b> Tacloban airport destroyed by 5m storm surge 6300 killed <b>Secondary:</b> Looting in Tacloban Disease-cholera from dirty water	<b>Management</b> • <b>Mass graves</b> - reduce disease spread • <b>USS George Washington</b> ship • <b>Oxfam</b> paid for new fishing boats • New cyclone shelter built
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## Case Study: Beast from the East & Storm Emma



**Causes:** Storm Emma from Portugal met the Beast from the East (Siberia) Storm Emma then came from the south-east and caused snow as it hit the extremely cold air over the UK - this caused severe snow coupled with strong winds which resulted in deep drifts.

<b>Effects</b> <b>Social</b> - 15 killed, Thousands of students couldn't go to school as schools closed! <b>Economic</b> - £1bn per day <b>Environmental</b> - As much as 50cm of snow settled in areas such as Dartmoor and Exmoor, Rural areas experienced lows of -12 degrees Celsius, Snow and strong winds of 60-70mph caused snow drifts as high as 7m	<b>Management</b> Army drives doctors and nurses to work Greggs delivery driver hands out cakes to stranded drivers 500 gritting lorries were sent out to grit roads
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## 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 **humans burning fossil fuels** energy. These fuels (gas, coal and oil) emit **greenhouse gases**. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing **less to be reflected**. 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.



## What is an Ecosystem?

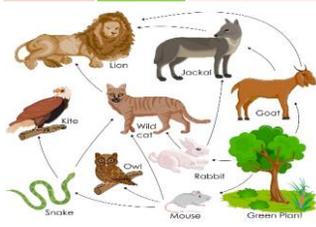
An ecosystem is a system in which organisms interact with each other and with their environment.

## Ecosystem's Components

**Abiotic** These are **non-living**, such as air, water, heat and rock.

**Biotic** These are **living**, such as plants, insects, and animals.

**Flora** Plant life occurring in a particular region or time.  
**Fauna** Animal life of any particular region or time.

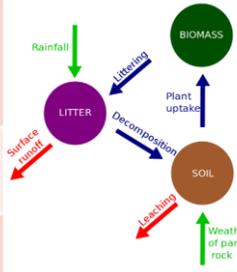


## Food Web and Chains

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

## Nutrient cycle

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

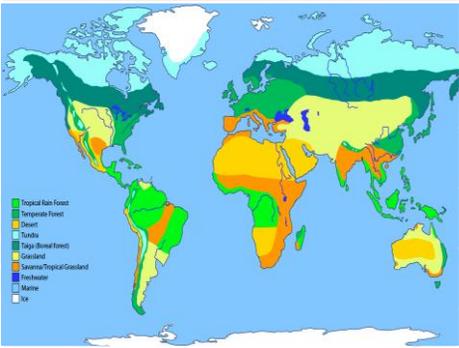


**Litter** This is the **surface layer** of vegetation, which over time breaks down to become **humus**.

**Biomass** The total **mass of living organisms** per unit area.

## Biomes

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



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

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

## Biome's climate and plants

Biome	Location	Temperature	Rainfall	Flora	Fauna
<b>Tropical rainforest</b>	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
<b>Tropical grasslands</b>	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.
<b>Hot desert</b>	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.
<b>Temperate forest</b>	Between latitudes 40°- 60° north of Equator.	Warm summers + mild winters (5-20°C)	Variable rainfall (500-1500m /year)	Mainly deciduous trees; a variety of species.	Animals adapt to colder and warmer climates. Some migrate.
<b>Tundra</b>	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.
<b>Coral Reefs</b>	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 orogati	Small range of plant life which includes algae and sea grasses	Dominated by polyps and a diverse range of fish species

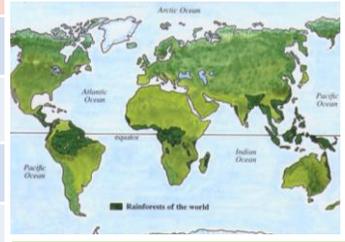
## The Living World

### Tropical Rainforest Biome

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

### Interdependence in the rainforest

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



### Distribution of Tropical Rainforests

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

### Rainforest nutrient cycle

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

### Climate of Tropical Rainforests

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

## CASE STUDY: UK Ecosystem: Mr Sparshatt's pond

This is a typical English pond.

### Components & Interrelationships

Energy from the sun is taken in by the reeds and water lily, which convert energy by photosynthesis. The plants are consumed by the Great diving beetle, who is in turn consumed by the perch or duck, finally the perch is eaten by the heron.

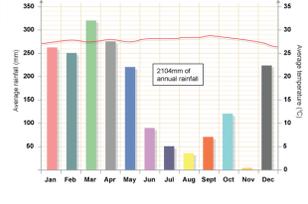
Sun →reed/ water lily → Great diving beetle → Perch/ duck → Heron

Dead animal and plant material is broken down by bacteria and fungi and adds to nutrients in the soil

The nutrients are then used by plants in the nutrient cycle process.

### Layers of the Rainforest

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



## Tropical Rainforests: Case Study Malaysia



Malaysia is a NEE country in south-east Asia. 67% of Malaysia is a tropical rainforest. It has the fastest rate of deforestation compared to anywhere in the world

### Adaptations to the rainforest

<b>Orangutans</b>	Large arms to swing & support in the tree canopy.
<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.
<b>Epiphytes</b>	Parasite- live on trees to reach sunlight

### Rainforest inhabitants

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

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

### Issues related to biodiversity

### What are the causes of deforestation?



### Why are there high rates of biodiversity?

### Logging



### Agriculture: farming Palm oil

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

Malaysia earns \$2 billion a year from logging, especially mahogany trees. Had the highest rate of deforestation in the 1980's, now a lot of logging is replaced with selective logging to try and be more sustainable.

Palm oil employs more than 600,000 people. 50% of Malaysia's tropical forest is now agricultural (farming) land. Palm oil is making the **soil infertile**.

**Violent confrontation** between indigenous tribes and logging companies.

### Main issues with biodiversity decline

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

### Mineral Extraction



### Energy development



Mining for minerals such as gold, employs approx. 20,000 people. Areas **mined** can experience **soil and water contamination**.

Bakun dam in Sarawak flooded over 700 km<sup>2</sup> of forest, provides renewable energy. Large area **flooded** and **tribes** forced to leave

### Impacts of deforestation



### Economic development :

+ Mining, farming, dams and logging creates employment and tax income for government and profits of \$17bn a year)  
- **The loss of biodiversity will reduce tourism.**

### Environmental: Soil erosion



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

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

### Social:

- **tribes forced to leave tribal lands e.g. Penan people**

### Sustainability for the Rainforest

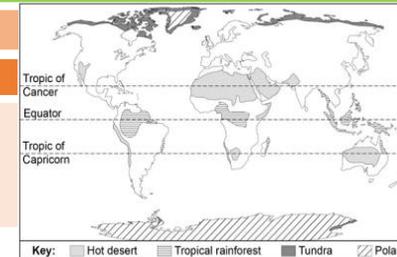


### Possible strategies include:

- **Agro-forestry** - Growing trees & crops together. It prevents soil erosion and the crops benefit from the nutrients.
- **Selective logging** - only most valuable trees taken, leaving the rest behind allowing forest to recover more easily
- **Education** - Ensuring those people understand the consequences of deforestation
- **Afforestation** - If trees are cut down, they are replaced.
- **Forest reserves** - Areas protected from exploitation.
- **Ecotourism** - tourism that promotes the environments & conservation, small numbers of tourists pay to visit the rainforest
- **Debt cancellation**, World bank has reduced debts/ cancelled some in return for agreements that the rainforests are not destroyed

## Cold Desert: Case Study

### Location



### Distribution

Most extreme are polar regions at the North and south poles. Tundra areas are around the Arctic. In the north. Alpine areas are less extreme, areas of high mountains with cold winters.

### Polar

### Tundra

### Climate

Extreme- winter temperatures fall below -50°C, strong winds and low snowfalls

Less extreme- winter temperatures, may drop to -20°C, warm brief summers, higher levels of snow around the coast

### Soils

Permafrost covered by ice

Surface permafrost melting in summer causes waterlogged soils

### Plants

Few mosses and lichens on the edges of ice

Low growing plants with special adaptations. No trees!

### Animals

Polar bears (north pole). Penguins (south pole)

More species due to there being more food options. Arctic fox, Arctic hare, insects etc.

### Adaptations

### Barberry plant

Low growing to protect it from strong winds. Small leathery leaves retain moisture. Grow close together to retain heat. Hairy stems to insulate plant

### Polar bear

White fur for camouflage from prey on the snow and ice. Thick layers of fat and fur for insulation against the cold. A greasy coat that sheds water after swimming



## Opportunities and challenges in Alaska

### Opportunities

### Challenges

Half of Alaska's income comes from **oil and gas**. Most oil fields are in Prudhoe bay and the Trans-Alaska oil pipeline takes oil to the South, at Valdez where it can be shipped to customers.

**Tourism** attracts one - two million visitors each year. To visit the wildlife such as migrating whales and grizzly bears. However, many travel by cruise ship so not as much money is actually spent in Alaska .e.g. less staying in hotels.

**Fishing:** Some of the biggest salmon, crab and whitefish fisheries in the world which provides 78,500 jobs and US\$6 billion to the state therefore benefitting the local and national economy.

**Mineral extraction:** gold silver, copper- 1/5 of their wealth is from mining- not as important as it once was (1800)

**Extreme temperature** - very low temperatures and long hours of darkness make building very difficult.

**Infrastructure** - building buildings, roads, railways and pipelines for water and electricity supplies is very difficult on frozen ground that is liable to melting.

**Inaccessibility:** In winter, the only way to get to some towns is by air, or dangerous ice roads. In summer, the ground is too soft so some places have no roads! Mountainous areas make it inaccessible for vehicles delivering materials for construction.

### Management

People find ways to overcome the challenges e.g. parts of Trans-Alaska oil pipeline are raised on stilts to prevent it melting the permafrost which would make the ground unstable and damage the pipeline and risk oil spills.

The Arctic National Wildlife Refuge ANWR protects Americas last great wildernesses, endangered species are protected, but there is growing pressure from industry especially oil and gas to exploit this area in the future

### 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.

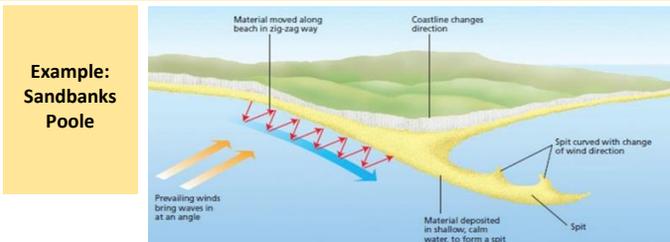
<b>Solution</b>	Minerals dissolve in water and are carried along.
<b>Suspension</b>	Sediment is carried along in the flow of the water.
<b>Saltation</b>	Pebbles that bounce along the sea/river bed.
<b>Traction</b>	Boulders that roll along a river/sea bed by the force of the flowing water.

### 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

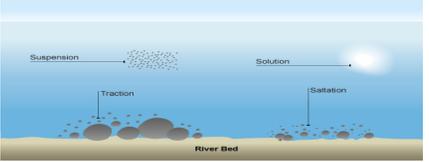


- 1) Swash moves up the beach at the angle of the prevailing wind.
- 2) Backwash moves down the beach at 90° to coastline, due to gravity.
- 3) Zigzag movement (Longshore Drift) transports material along beach.
- 4) Deposition causes beach to extend, until reaching a river estuary.
- 5) Change in prevailing 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

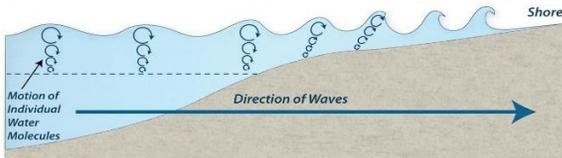


### How do waves form?

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.



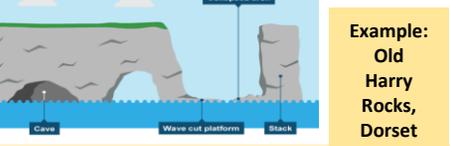
### Mechanical Weathering Example: Freeze-thaw weathering

<b>Stage One</b>	Water seeps into cracks and fractures in the rock.	
<b>Stage Two</b>	When the water freezes, it expands about 9%. This wedges apart the rock.	
<b>Stage Three</b>	With repeated freeze-thaw cycles, the rock breaks off.	

### Size of waves

<ul style="list-style-type: none"> <li>Fetch how far the wave has travelled</li> <li>Strength of the wind.</li> <li>How long the wind has been blowing for.</li> </ul>	<h3>Constructive Waves</h3> <p>This wave has a swash that is stronger than the backwash. This therefore builds up the coast.</p>	<h3>Destructive Waves</h3> <p>This wave has a backwash that is stronger than the swash. This therefore erodes the coast.</p>
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### Formation of Coastal Stack



- 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 form 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 leaves a stump.

### Formation of Bays and Headlands

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

**Example: Old Harry Rocks, Dorset**

## Coastal Defences

Hard Engineering Defences		
<b>Groynes</b>	Wood barriers prevent longshore drift, so the beach can build up.	<ul style="list-style-type: none"> <li>✓ Beach still accessible.</li> <li>✗ No deposition further down coast = erodes faster.</li> </ul>
<b>Sea Walls</b>	Concrete walls break up the energy of the wave. Has a lip to stop waves going over.	<ul style="list-style-type: none"> <li>✓ Long life span</li> <li>✓ Protects from flooding</li> <li>✗ Curved shape encourages erosion of beach deposits.</li> </ul>
<b>Gabions or Rip Rap</b>	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	<ul style="list-style-type: none"> <li>✓ Cheap</li> <li>✓ Local material can be used to look less strange.</li> <li>✗ Will need replacing.</li> </ul>

## Soft Engineering Defences

<b>Beach Nourishment</b>	Beaches built up with sand, so waves have to travel further before eroding cliffs.	<ul style="list-style-type: none"> <li>✓ Cheap</li> <li>✓ Beach for tourists.</li> <li>✗ Storms = need replacing.</li> <li>✗ Offshore dredging damages seabed.</li> </ul>
<b>Managed Retreat</b>	Low value areas of the coast are left to flood & erode.	<ul style="list-style-type: none"> <li>✓ Reduce flood risk</li> <li>✓ Creates wildlife habitats.</li> <li>✗ Compensation for land.</li> </ul>

## Case Study: West Wittering and East Head, West Sussex

**Reasons for management:** The Hinge at East head has been breached several times by heavy storms. Defend against coastal processes of erosion and longshore drift. Protect valuable land of West Wittering estate and village. To protect the natural habitat of East Head spit a SSI (Site of Special Scientific Interest)

**Management:** East Head successfully used marram grass stabilising dunes. Beach nourishment at hinge to widen it so its less likely to flood. Gabions at the hinge to absorb wave energy. However, had to be removed as they have fallen apart and broken. Groynes at West Wittering, trap sediment moved by LSD so a large beach is created so wave energy is absorbed, protecting the car park and West Witting village from floods. However, groynes have caused beach starvation at East Head spit causing the neck to become even narrower, which increases the risk of erosion

**The resulting effects and conflicts.** National Trust manage East Head spit, they favour soft engineering. This means they prefer to work with the environment, and may conflict with West Wittering estate who prefer hard engineering which involves building more structures that can harm the environment. The hard engineering at West wittering of the groyne, stops sediment reaching the spit and is causing the spit to be eroded more quickly

## 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.

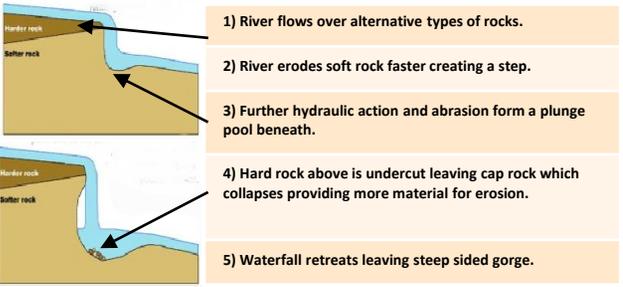
## Physical and Human Causes of Flooding.

<b>Physical: Prolong &amp; heavy rainfall</b> Long periods of rain causes soil to become saturated leading runoff.	<b>Physical: Geology</b> Impermeable rocks causes surface runoff to increase river discharge.
<b>Physical: Relief</b> Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	<b>Human: Land Use</b> 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.

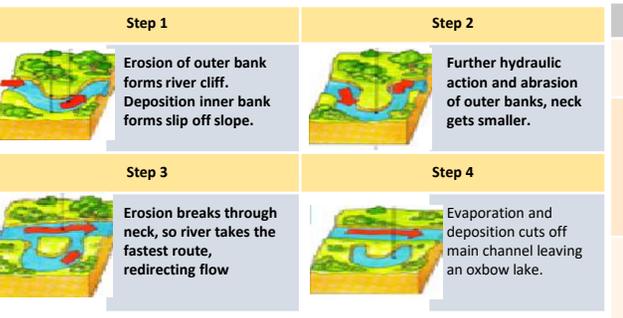
## Formation of a Waterfall



## 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



## 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
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.
<ul style="list-style-type: none"> <li>✓ Nutrient rich soil makes it ideal for farming.</li> <li>✓ Flat land for building houses.</li> </ul>

## River Management Schemes

Soft Engineering	Hard Engineering
<p><b>Afforestation</b> – plant trees to soak up rainwater, reduces flood risk.</p> <p><b>Demountable Flood Barriers</b> put in place when warning raised.</p> <p><b>Managed Flooding</b> – naturally let areas flood, protect settlements.</p>	<p><b>Straightening Channel</b> – increases velocity to remove flood water.</p> <p><b>Artificial Levees</b> – heightens river so flood water is contained.</p> <p><b>Deepening or widening river</b> to increase capacity for a flood.</p>

## Hydrographs and River Discharge

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

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

## Case Study: The River Tees, North England, flowing 137km from Pennines to North Sea

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

## Case study: River management: River Cocker, Cockermouth

**Why the scheme was needed**

A storm from the Atlantic caused extreme flooding in 2009, killing one and £100million of damage Cockermouth at the confluence (meeting point) of two rivers which increases its risk of flooding

**The management strategy**

£4.4 million pound management scheme with new flood walls will stop the flooding Paid by the Government and local businesses  
 Strong glass have been placed at the top of the floodwalls and it rises up automatically- will keep more water in the river and glass so people can still see out  
 River dredged more regularly to deepen the channel – will hold more water

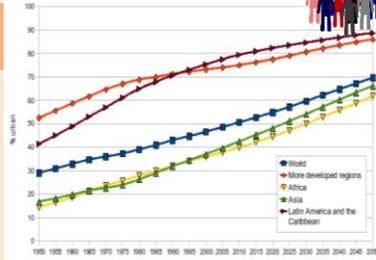
**The social, economic and environmental issues.**  
**Social:** The defences have made it a safer place to live. Many residents think the new floodwalls look ugly, even  
**Economic:** The scheme cost £4.4 million, significantly less than value of the properties and land in the town. Will need further spending to dredge the rivers in ten years' time  
**Environmental:** Habitats have been damaged at the bottom of the rivers where it has been dredged

## What is Urbanisation?

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.

### Where is Urbanisation happening?

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.



## Causes of Urbanisation

### Rural - urban migration (1)

The movement of people from rural to urban areas.

#### Push

- Natural disasters
- War and Conflict
- Mechanisation
  - Drought
- Lack of employment

#### Pull

- More Jobs
- Better education & healthcare
- Increased quality of life.
- Following family members.

### Natural Increase (2)

When the birth rate exceeds the death rate.

#### Increase in birth rate (BR)

- High percentage of population are child-bearing age which leads to high fertility rate.
- Lack of contraception or education about family planning.

#### Lower death rate (DR)

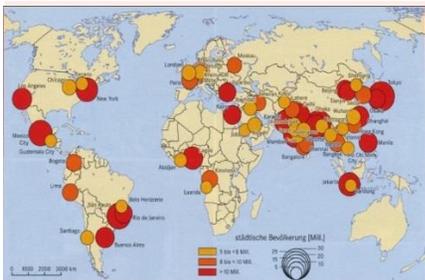
- Higher life expectancy due to better living conditions and diet.
- Improved medical facilities helps lower infant mortality rate.

## Types of Cities

### Megacity

An urban area with over 10 million people living there.

More than two thirds of current megacities are located in either NEEs (Brazil) and LICs (Nigeria). The amount of megacities are predicted to increase from 28 to 41 by 2030.



## Sustainable Urban Living

Sustainable urban living means being able to live in cities in ways that do not pollute the environment and using resources in ways that ensure future generations also can use them.

### Water Conservation

This is about reducing the amount of water used.

- Collecting rainwater for gardens and flushing toilets.
- Installing water meters and toilets that flush less water.
- Educating people on using less water.

### Energy Conservation

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

- Promoting renewable energy sources.
- Making homes more energy efficient.
- Encouraging people to use energy.

### Creating Green Space

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

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

### Waste Recycling

More recycling means fewer resources are used. Less waste reduces the amount that eventually goes to landfill.

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

# Unit 2a Urban Issues & Challenges



## Sustainable Urban Living Example: BedZed

**Waste recycling:**  
60% waste recycled (3X UK average) as each home has underground bin divided into 4 sections and urban tree waste powers the bio-fuelled power plant.

**Water conservation:**  
58% less water used as rainwater is stored in a tank underground & is used to flush toilets and watering gardens. Conservation strategies e.g.. dual/low flush toilets)

**Energy conservation:**  
Extra insulated walls (30cm thick) to keep in heat- less energy is needed, 80% less energy is used compared to 'standard homes

**Creating greenspace:**  
The roof is covered in seedum (grasses and wild flowers)

**Reduce traffic congestion:**  
Green transport :secure bike storage units, car sharing of electric car scheme and access to nearby public transport (trams- 5 minute walk from Mitcham common, trains -5 minute walk from Hackbridge station, buses-3 buses stop right outside.

### 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

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.

### Environmental problems

- Traffic increases air pollution which releases greenhouse gases that is leading to climate change.

### Economic problems

- Congestion can make people late for work and business deliveries take longer. This can cause companies to lose money.

### Social Problems

- There is a greater risk of accidents and congestion is a cause of frustration. Traffic can also lead to health issues for pedestrians.

## Congestion Solutions

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

## Traffic Management Example: Portsmouth

SolentGo integrated transport making public transport much easier and more attractive to people – one card for all transport + app Park and Ride buses with a new priority bus lane on the M275 that travels to Gunwharf – one of the most congested areas at the moment. Buses every 10 minutes



## 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.

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



Location	City's Importance
A coastal city South England - population of 100,000. Only island city in the UK.	Portsmouth is the home of the Royal Navy The European HQ for IBM is based in Portsmouth Portsmouth University ranked in top 100 modern universities , 23,000 students Portsmouth is well connected to London and UK by A3 and M27 + rail! The Solent is the heart of the UK's Maritime sector, enables global reach!

### Impacts of national and international migration on growth and character of the city

International migration has increased – 2001 only 8% were migrants-2011 16%, tensions with illegal migrants in the ferry ports and increased demands on police and the border force.  
International migrants have brought new foods, restaurants, improving diversity in the city.  
Internal migration has come from skilled workers moving to the area to work in IBM and other businesses.  
Has put increasing pressure on housing and caused further urban sprawl north along the A3 into the Downs

#### Social and economic opportunities



**Dockyard:** 1/10 of people employed in dockyard, Portsmouth biggest industry – defence.  
**BAE's** Portsmouth shipyard is constructing the two new *Queen Elizabeth class* aircraft carriers. A £100 million contract was signed to develop the facilities at Portsmouth.  
**Tourism:** Significant sector of the local economy. The city has a long established national and international profile as a visitor destination, with its Historic Dockyard and other attractions  
**Students:** A growing student population means there is a large number of young people in the city. There are a variety of bars and clubs mainly centred around Guildhall Walk and Albert Road. **£64 million** worth of spending linked to the **international students**.  
**Lakeside:** Out of town office and science park, provides office space to more than 90 different companies, including IBM, Porsche and Coffin Mew Solicitors  
**Integrated transport:** SolentGo integrated transport making public transport easier and more attractive to people –app for all transport  
Park and Ride buses with a new priority bus lane on the M275 that travels to Gunwharf – one of the most congested areas at the moment. Buses every 10 minutes

#### Environmental opportunities

**Urban greening:** A landfill site is being turned into a 128 acre park called Horse Sea Island Country Park – 50 000 trees are to be planted helping make the air cleaner

### City Challenges

**Social and economic: Urban deprivation and Inequality:** East west divide, poverty in west e.g. Charles Dickens ward's life expectancy is 15yrs less than some eastern wards. Highest density of council housing in Charles Dickens

**Environmental: Dereliction and brownfield sites:** As the navy dockyard closed in 1980s, large areas became derelict, leading to increased crime and the area becoming run down. The area, Gunwharf has now been built on and regenerated and the area is of a very high standard.

**Air pollution:** Portsmouth has been labelled as one of the worst cities for air pollution due to there being only three routes in to the city: M27, Eastern road and the A3. No room for new roads lots of traffic congestion.

**Waste disposal.** Lowest recycling rates in the country. Solution: Smaller wheelie bins residents are then encouraged to recycle everything else and prize draw for recycling!!! You win vouchers!.

**The impact of urban sprawl:** spread north along A3 = pressure on protected land The south Downs National Park and green field sites and commuter settlements have grown. Commuter settlements mean people leave to work in Portsmouth during the day, so many businesses do not earn money and close as no one is there in the day!

### Regeneration projects

Gunwharf – was disused, derelict military brownfield site. Closed in 1980s, run down and encouraged crime!  
Today: a mixed regeneration project involving residential, commercial and entertainment.  
Has created 2500 jobs and contributes to the £58 million tourist revenue in Portsmouth  
☉ Increased traffic ☉ Housing not affordable to all (Penthouse £2.5million)



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



Location and Background	City's Importance
A coastal city, South East of Brazil in the continent of South America. It is the second most populated city in the country (6.5 million) after Sao Paulo (12.5 million including slums)	<ul style="list-style-type: none"> <li>Grown rapidly over the past 50 years.</li> <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>Christ the Redeemer one of the new seven wonders of the world.</li> <li>Hosted the 2014 World Cup and 2016 Summer Olympics.</li> </ul>

### Migration to Rio De Janeiro

The city began when Portuguese settlers with slaves arrived in 1502.

Migrants from rural Brazil e.g. the Amazon, suffering from drought, and unemployment , other South America e.g. Argentina & Bolivia, more recently South Korea & China seeking new opportunities/ better quality of life.  
Caused rapid urbanisation!



**Social:** Standards of living are gradually improving. Local area benefits- companies pay taxes, taxes are used to improve and build new schools, hospitals, housing, police etc so better quality of life!

**Economic:** Lots of employment e.g. tourism, ports –Brazil nuts, construction- low skilled work, oil refineries- BP, factories. Local economy benefits- multiplier effect- industry opens, locals earn money, they spend money in other businesses, encouraged more business to open, creates more jobs etc. a snowballing of economic activity

**Environmental:** Hosting major sporting events encouraged more investment in sewage works and public transport systems.

### City Challenges and solution

**Social:**  
2013 only **55%** had a local clinic → Santa Maria **13km** from nearest hospital Medical kits in homes and test for **20** disease and treat them ☹  
Only **50%** of over 14s had access to education → Building new schools, including **University of Rochina**  
**12%** had no access to clean water → **300km** of pipeline laid to give fresh water and **seven** new treatment plants  
Frequent **blackouts** of power. **Unsafe** electricity supply in favelas → **Simplicio Hydro electric power station**

#### Economic:

Crime Drug gangs and violence in the Favelas → Pacification units where police control the slums  
High unemployment over 20% in favelas → Schools of tomorrow programme practical skill based courses and Free childcare teenage parents to study

**Environmental:** Rivers entering the bay brings pollution (raw sewage from favelas) + Oil spills from BP refinery  
→ 12 new sewage works to treat sewage + 5km sewage pipes  
Favelas rubbish cant get in, rats, cholera → Power plant running on methane from rubbish (power for 1000 homes)  
Increased car use (+40%) 5,000 deaths yr → Metro (underground trains) network getting bigger and Pay to use road

### Improving life for the urban poor: Favela, Bairro Project (site and service scheme)

Local government provides the land and services for residents to build houses on e.g. in Complexo do Alemao, 60,000 live in favelas/  
A Pacifying Police Unit (UPP) set up, with police patrolling the community to help reduce crime.  
Widening and paving of streets to allow easier access (especially for emergency services).  
Building a cable car to the commercial centre of Ipanema – inhabitants are given one free return tickets per day.  
Steep hillsides have been secured with steel beams drilled into the hillside to prevent landslides  
Building materials provided to residents so they can improve their homes and make them safer (self help)  
BUT ☹ There is a budget of \$1 billion, it will not be enough to cover every favela  
☹ The newly built infrastructure e.g. water pipes is not being maintained  
☹ Residents lack skills to maintain the new facilities

## 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

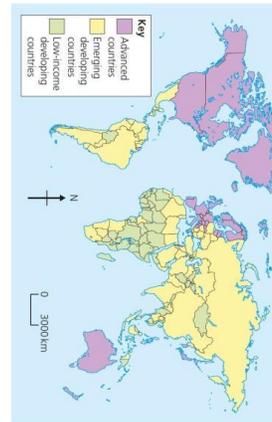
<b>Infant mortality</b>	The number of children who die before reaching 1 per 1000 babies born.
<b>Literacy rate</b>	The percentage of population over the age of 15 who can read and write.
<b>Life expectancy</b>	The average lifespan of someone born in that country.

### 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



## 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</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</li> </ul>

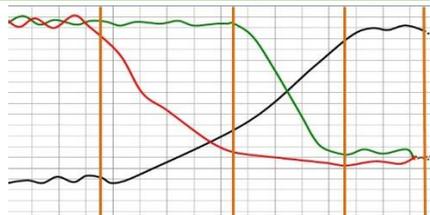
## Consequences of Uneven Development

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

## Reducing the Global Development Gap

### Microfinance Loans

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

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



### Foreign-direct investment

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

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



### Aid

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

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



### Debt Relief

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

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



### Fair trade

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

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



### Technology

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

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



## CS: Reducing the Development Gap In Jamaica

### Location and Background

Jamaica is a LIC in the Caribbean. Attractive place; tropical blue seas and palm filled sandy beaches and reggae culture



### Tourist economy

- In 2015, 2.12 million visited.
- (1.1 million cruise ship visitors)
- Tourism contributes 24% of GDP and will increase to 38% by 2025.
- 220,000 jobs rely on tourism.
- Companies e.g. Thomas Cook pay tax, government improves roads etc



### Multiplier effect

- Jobs from tourism have meant more money has been spent in shops etc. A snowballing of economic activity.
- Government has invested in infrastructure to support tourism, new cruise ship port in the North

### Development Problems

- ⊗ Tourists don't spend much money outside the cruise ships!
- ⊗ Road 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.
- ⊗ Air pollution from the tourist coaches and increased air traffic

## Case Study: Economic Development in Nigeria



### Location & Importance

Nigeria is a NEE in West Africa. Nigeria is just north of the Equator. Nigeria is the most populous country in Africa (184 million). Economic growth based on oil exports., produces 3% worlds oil



### Influences upon Nigeria's development

#### Political

Independent from colonial rule (UK), which followed instability and civil war between 1967-1970. From 1999, the country became stable with free and fair elections. Stability has encouraged global investment from China and USA.

#### Social

Nigeria is a multi-cultural, multi-faith society (2 main religions- Christianity and Islam) Although mostly a strength, diversity has caused regional conflicts from groups such as the Boko Haram terrorists.

#### Cultural

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

#### Industrial Structures

Once mainly based on farming, 50% economy now manufacturing and services. A thriving manufacturing industry is increases foreign investment and employment, taxes invested in improving schools and healthcare.



### The role of TNCs

TNCs e.g. Shell very important + 65,000 directly employed \$4.32bn to Nigerian government 250,000 indirect jobs Shell built health clinics BUT: ⊗ Oils spills massively reduced fishing yields ⊗ Profits go to HICs!



### Changing Relationships

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

### Environmental Impacts

Oil spills devastated swamps and its ecosystems in Niger delta 70% of forest have been cut down. This also increases CO<sup>2</sup> emissions. Squatter settlements in cities e.g. Lagos

### Aid & Debt relief

Life expectancy 52, 60% pop ≥ \$1 day Solar cookers international, solar cookers to pasteurise water and cook food so reducing diseases and increasing life expectancy Water aid access to clean water

### Effects of Economic Development

Life expectancy has increased from 46 to 53 years. Schooling years has increased from 7 to 9.

## Case Study: Economic Change in the UK



### UK in the Wider World

UK has one of the largest economies. Hue political, economic and cultural influences (TV/ movies). 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: groups of scientific and technical businesses on a site.
 

- Access to transport routes and Highly educated workers.(near unis)
- Staff benefit from attractive working conditions.

 Cambridgeshire Science park- more environmentally sustainable industry Recycling facilities- mobile phones, paper class, plastic etc CamShare- 11% car share 132 cycle spaces and free showers + free electric bike hire

### Change to a Rural Landscape: Cambridgeshire

#### 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

Rail: £50 billion HS2 improve connections between key UK cities.
 

- ⊕ increase GDP by £15bn ⊕ expensive ⊕ people forced to move homes
- Air: Heathrow third runway ⊕ jobs ⊕ UK economy ↑ ⊕ air/noise pollution
- Road: A303 Superhighway South West (tunnel below Stone Henge) ⊕ congestion ⊕ threatens Stone Henge
- Sea: Liverpool 2 port ⊕ ↑ jobs ⊕ ↑ Northern economy ⊕ multiplier effect ⊕ cost ⊕ dredge environment
- Rail: Cross Rail, Reading- London ⊕ increase passenger capacity ⊕ reduce crushes on tubes ⊕ massively delayed ⊕ over budget by £600million



### UK North/South Divide

- Wages are lower in the North. - Health is better in the South. The government is aiming to support a Northern Powerhouse project to resolve regional differences. Media City Salford: specific investment in one location. Hundreds of jobs, BBC jobs. HS2 to connect London and Northern cities!

## 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

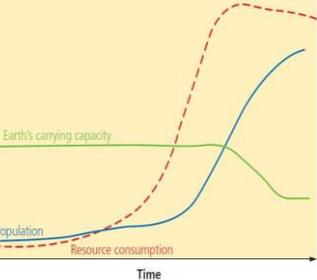
Resources such as food, energy and water are what is needed for basic human development.

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 <b>LICs</b> and <b>NEEs</b> develop further, they require <b>more energy</b> for industry.</li> <li><b>LICs</b> and <b>NEEs</b> want similar lifestyles to <b>HICs</b>, 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**

**Consumption** – The act of using up resources or purchasing goods and produce.

**Carry Capacity** – A maximum number of species that can be supported.

**Resource consumption exceeds Earth's ability to provide!** 

### 3. Changing Technology and Employment

- The demand for resources has driven the **need for new technology** to reach or gain more resources.
- More people in the **secondary and tertiary industry** has increased the **demand for resources** required for electronics and robotics.

## Food in the UK

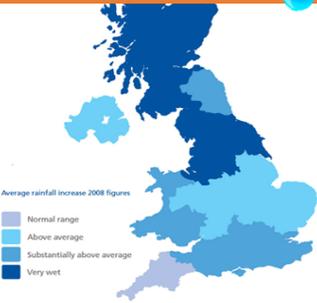
Growing Demand 	Impact of Demand 
<ul style="list-style-type: none"> <li>The UK imports about 40% of its food. This increases people's <b>carbon footprint</b>.</li> <li>There is growing demand for greater choice of <b>exotic foods</b> needed all year round.</li> <li>Foods from abroad are more affordable.</li> <li>Many food types are unsuitable to be grown in the UK.</li> </ul>	<p><b>Foods can travel long distances (food miles). Importing food adds to our carbon footprint.</b></p> <ul style="list-style-type: none"> <li>+ Supports workers with an income</li> <li>+ Supports families in LICs.</li> <li>+ Taxes from farmers' incomes contribute to local services.</li> <li>- Less land for locals to grow their own food.</li> <li>- Farmers exposed to chemicals.</li> </ul>
Agribusiness 	Sustainable Foods 
<p>Farming is being treated like a <b>large industrial business</b>. This is increasing food production.</p> <ul style="list-style-type: none"> <li>+ Intensive farming maximises the amount of food produced.</li> <li>+ Using machinery which increases the farms efficiency.</li> <li>- Only employs a small number of workers.</li> <li>- Chemicals used on farms damages the habitats and wildlife.</li> </ul>	<p><b>Organic foods that have little impact on the environment and are healthier have been rising. Local food sourcing is also rising in popularity.</b></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 <b>grow their own food</b>.</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	<p>2009  2020 </p> <table border="1"> <tr> <td>Oil</td> <td>Gas</td> <td>Renewable</td> </tr> <tr> <td>Nuclear</td> <td>Coal</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. 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>	<p><b>Nuclear</b></p> <p>New plants provide job opportunities.</p> <p>Problems with safety and possible harm to wildlife.</p> <p>Nuclear plants are expensive.</p>
	<p><b>Wind Farm</b></p> <p>Locals have low energy bills.</p> <p>Reduces carbon footprint.</p> <p>Construction cost is high.</p> <p>Visual impacts on landscape.</p> <p>Noise from wind turbines.</p>

## 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

### C.S. Oil extraction, Alaska



#### 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.



#### Advantages

1. **Brings in huge amounts of money to the state.**: \$6 billion is earned a year from drilling oil, taxes from oil companies can be invested in improving community facilities such as schools therefore improving life for the inhabitants.
2. **It would create more jobs.**: 1 in 3 jobs in Alaska are linked to the oil industry. More jobs would be created, which pay higher salaries and drives the multiplier effect so it benefits other industries such as local shops in Alaska.
3. **It would further lessen foreign oil dependence.**: 20% of US oil is imported from other countries so increasing drilling in Alaska would reduce dependence, so they would be more energy secure so they could lessen the amount of money spent on imports dramatically.

#### Disadvantages

1. **It would ruin natural habitats**: Some of the wildlife that lives in Alaska can only be found there such as Polar bears. By drilling for oil, their habitats would be reduced or become completely unliveable which would reduce species numbers so it would impact the food chain and food web and could cause some species to become completely extinct.
2. **Permafrost and active soil layer**: the top layer of soil melts in the summer, meaning machinery and buildings can sink therefore it is more expensive to build equipment to stop that from happening which would increase the cost of the oil produced.
3. **Inaccessibility** : in winter it is too dangerous to travel on ice roads, so air is the only way in so it makes working all year round unlikely therefore profits will drop in winter months.



### Local Scheme – LIC, Micro HEP in Chambonmontera ,Peru

#### What?

Micro HEP plant part costing \$51,000 funded by Japan & the Local residents.  
Makes use of steep slopes (Andes) and high rainfall to generate electricity.  
Low Maintenance and running costs  
Provides cheap electricity to the people of the village.

#### Why?

Nearly ½ population live on less than \$2 a day  
Low level of economic output & development.  
Village very isolated

#### So what?

Provides renewable energy for lighting, students can do school work after dark improving grades.  
New items such as fridges can be used in homes to store food for longer improving diet and life expectancy.  
Reduced rural to urban migration, so more people are staying in the village.  
Reduced the risk of flooding by regulating the slow of water.

#### However:

It has a life of 25 years so will need extra investment/resources possibly from outside the village in the future.

### 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.