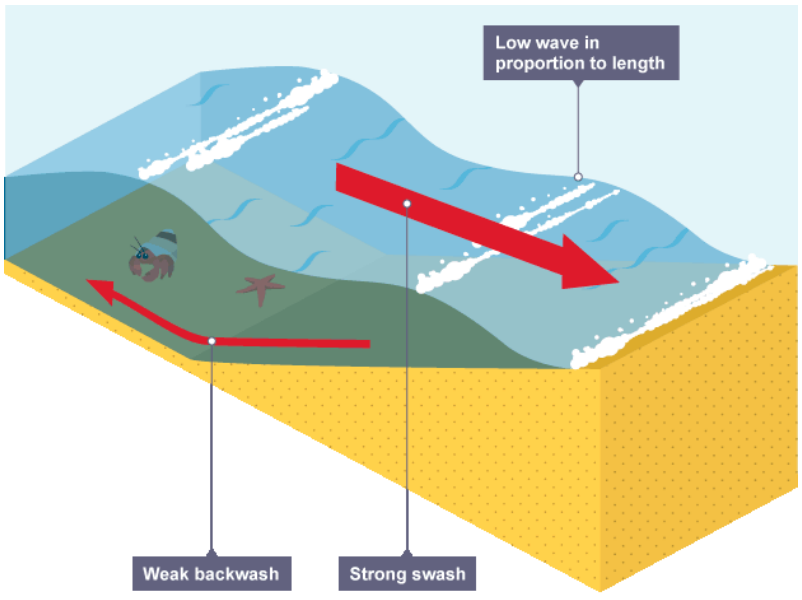
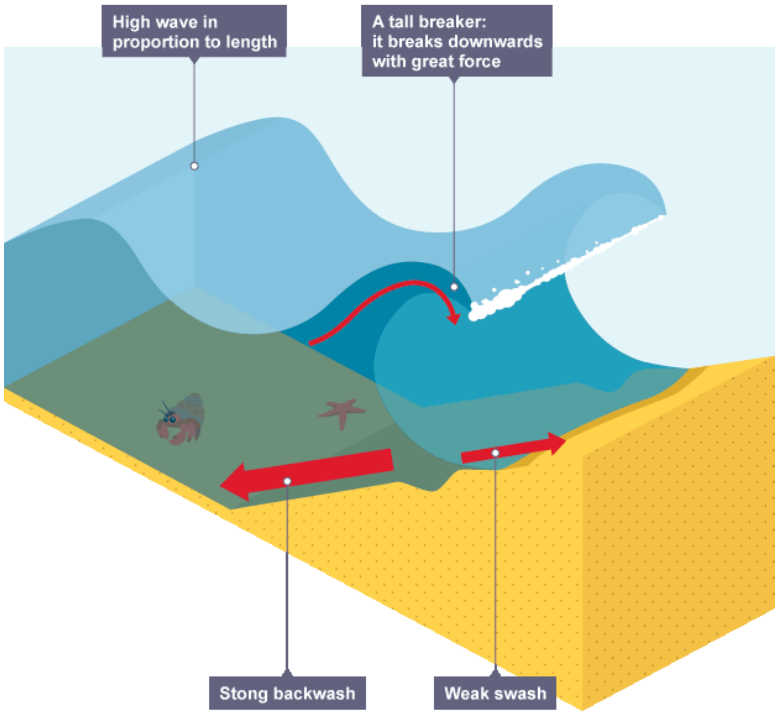
EMMANUEL COLLEGE
THE GEOGRAPHY DEPARTMENT
GCSE Geography – Curriculum Year 11

Autumn Term 1		
UK Physical Landscapes- Coastal Processes and Landscapes		
How do coastal processes and systems change and how do people interact with them at a range of scales?		
Source of knowledge	**AQA GCSE Geography Textbook pg 92 to 113** **T: Drive Geography KS4 folder for teaching resources (powerpoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	**<u>Coastal landscapes in the UK</u>** The coast is shaped by a number of physical processes. When the wind blows over the sea, it creates waves. The size and energy of the wave depends on certain factors: • the fetch - how far the wave has travelled • the strength of the wind • how long the wind has been blowing for **<u>Wave types and characteristics</u>** There are two different types of wave - **constructive** and **destructive**. They can affect the coastline in different ways. When a wave reaches the shore, the water that rushes up the beach is known as the swash. The water that flows back towards the sea is known as the backwash. The energy of the swash and backwash determine the type of wave. *Constructive wave* - a powerful wave with a strong swash that surges up a beach  	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1. Describe the effects of weathering and mass movement on a cliffed coastline. 2. How do the processes of erosion and deposition lead to the formation of distinctive landforms at the coast? 3. What are the advantages & disadvantages of hard engineering at the coast?

The characteristics of a constructive wave are:

- strong **swash** and weak **backwash**
- the strong swash brings sediments to build up the beach
- the backwash is not strong enough to remove the sediment
- the waves are low and further apart

Destructive wave - a wave formed by a local storm that crashes down onto a beach and has a powerful backwash



The characteristics of a destructive wave are:

- weak **swash** and strong **backwash**
- the strong backwash removes sediment from the beach
- the waves are steep and close together

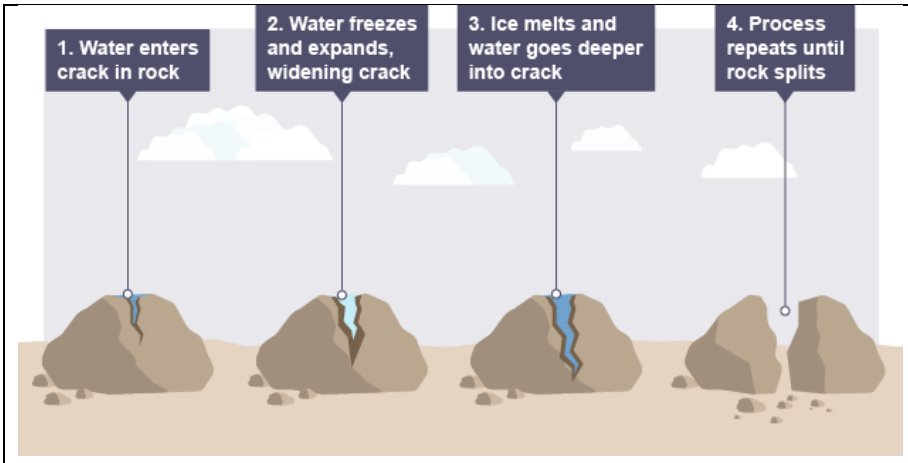
Coastal processes

Weathering

Exposed rocks along the coastline can be broken down by the processes of weathering.

Mechanical(physical) weathering - physical disintegration or break up of exposed rock without any change in its chemical composition, i.e. freeze–thaw.

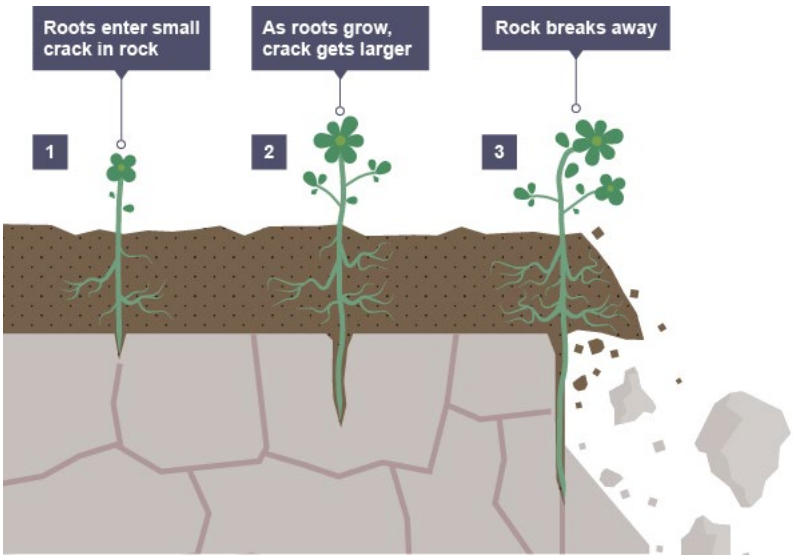
Freeze-thaw weathering occurs when rocks are **porous** (contain holes) or **permeable** (allow water to pass through).



1. Water enters cracks in the rock.
2. When temperatures drop, the water freezes and expands causing the crack to widen.
3. The ice melts and water makes its way deeper into the cracks.
4. The process repeats itself until the rock splits entirely.

Chemical weathering – the decomposition (or rotting) of rock caused by a chemical change within that rock. Rainwater and seawater can be a weak acid. If a coastline is made up of rocks such as limestone or chalk, over time they can become dissolved by the acid in the water.

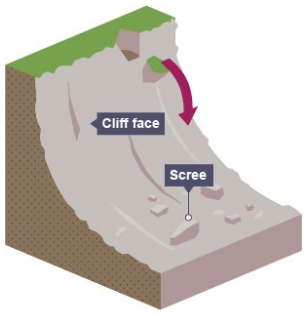
Biological weathering - a type of weathering caused by flora and fauna, such as plant roots growing in cracks in the rock or animals burrowing into weak rocks.
Roots burrow down, weakening the structure of the rock until it breaks away.



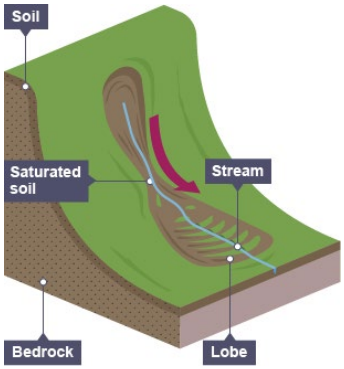
1. Plant roots can get into small cracks in the rock.
2. As the roots grow, the cracks become larger.
3. This causes small pieces of rock to break away.

<u>Mass movement</u>
Another way material can be moved on the coastline is through mass movement. Mass movement is the downhill movement of sediment that moves because of gravity. There are four different types of mass movement:

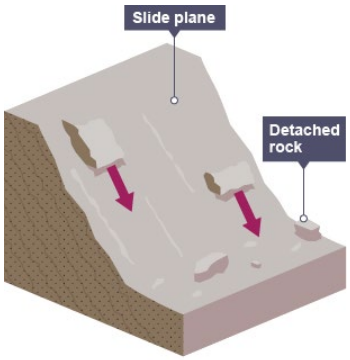
Rockfall - a fragment of rock breaks away from the cliff face, often due to freeze-thaw weathering.



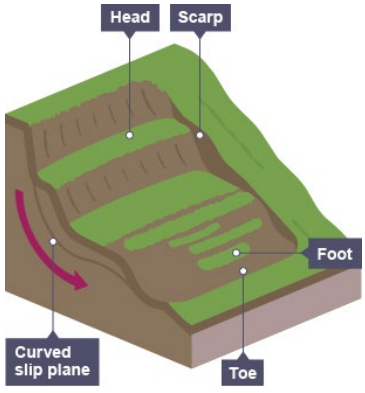
Mudflow - when saturated soil and weak rock flow down a slope.



Landslide - the movement of rock, earth or debris down the slope of a hill. Also known as a landslip.



Rotational slip - slump of saturated soil and weak rock along a curved surface.



<u>Erosion</u>

Erosion is the wearing away of rock along the coastline. Destructive waves are responsible for erosion on the coastline. There are four types of erosion:

- **Hydraulic action** - this is the sheer power of the waves as they smash against the cliff. Air becomes trapped in the cracks in the rock and causes the rock to break apart.
- **Abrasion** - this is when pebbles grind along a rock platform, much like sandpaper. Over time the rock becomes smooth.
- **Attrition** - this is when rocks that the sea is carrying knock against each other. They break apart to become smaller and more rounded.
- **Solution** - this is when sea water dissolves certain types of rocks. In the UK, chalk and limestone cliffs are prone to this type of erosion.

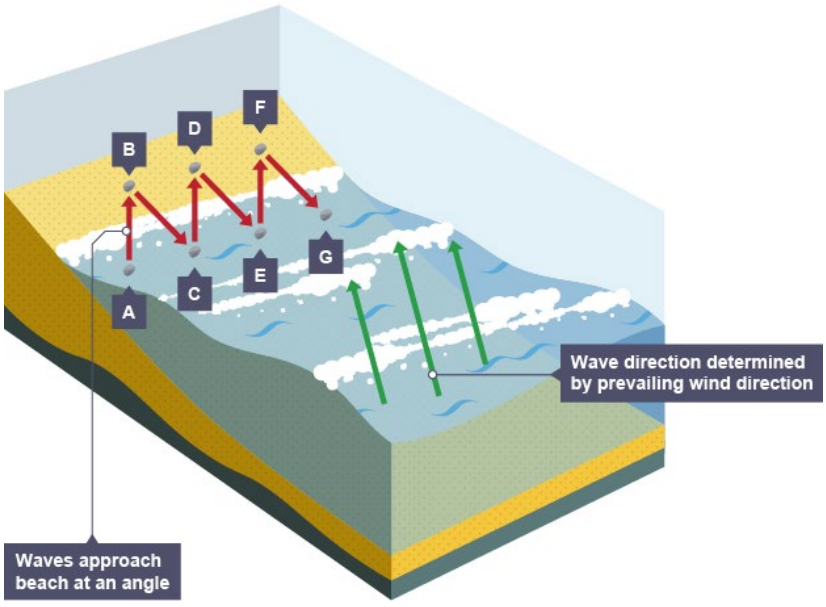
Transportation

The processes of erosion, mass movement and weathering break down and remove material from the coast. The eroded material is then transported along the coastline by the sea in one of four different ways.

- *Solution* - when minerals in rocks like chalk and limestone are dissolved in sea water and then carried in solution. The load is not visible.
- *Suspension* - small particles such as silts and clays are suspended in the flow of the water.
- *Saltation* – where small pieces of shingle or large sand grains are bounced along the sea bed.
- *Traction* – where pebbles and larger material are rolled along the sea bed.

Longshore drift

Sediment is carried by the waves along the coastline. The movement of the material is known as longshore drift. Waves approach the coast at an angle because of the direction of prevailing wind. The swash will carry the material towards the beach at an angle. The backwash then flows back to the sea, down the slope of the beach. The process repeats itself along the coast in the zigzag movement.



Deposition

When the sea loses energy, it drops the material it has been carrying. This is known as deposition. Deposition can occur on coastlines that have constructive waves.

Factors leading to deposition include:

- waves starting to slow down and lose energy
- shallow water
- sheltered areas, e.g. bays
- little or no wind

Coastal erosion landforms

Landform - a physical feature of the Earth's surface.
Distinctive coastal landforms are the result of rock type, structure and the physical processes of erosion.

Headlands and bays

Cliffs along the coastline do not erode at the same pace. When a stretch of coastline is formed from different types of rock, headlands and bays can form.

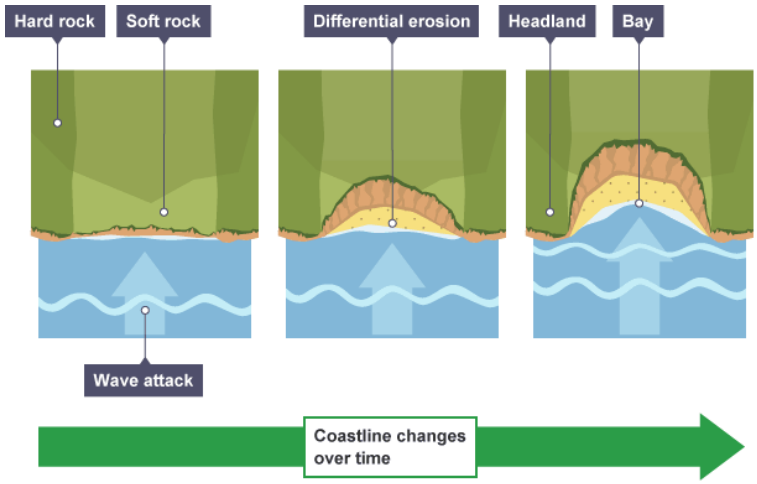
Headland – a rocky coastal promontory (high point of land) made of rock that is resistant to erosion: headlands lie between bays of less resistant rock where the land has been eroded by the sea.

Bay - a wide coastal inlet, often with a beach, where areas of less resistant rock have been eroded by the sea.

Formation of headlands and bays

Bands of soft rock such as clay and sand are weaker therefore they can be eroded quickly. This process forms **bays**. A bay is an inlet of the sea where the land curves inwards, usually with a beach. Hard rock such as chalk is more resistant to the processes of erosion. When the softer rock is eroded inwards, the hard rock sticks out into the sea, forming a headland.

Erosional features such as wave-cut platforms and cliffs can be found on headlands, since they are more open to the waves. Bays are more sheltered with constructive waves which deposit sediment to form a beach.



Cliffs and wave-cut platforms

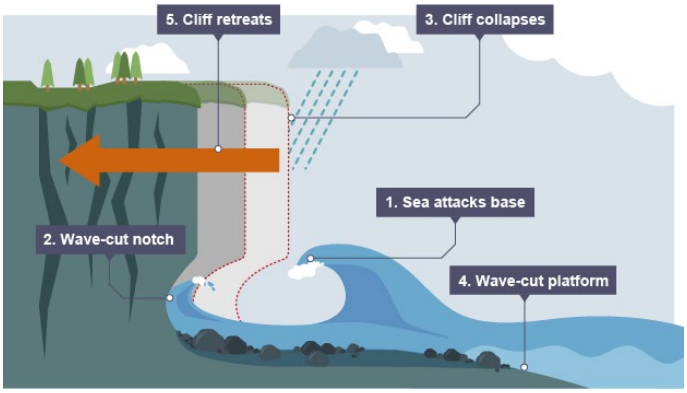
Cliff - a steep high rock face formed by weathering and erosion.

Wave-cut platform – a rocky, level shelf at or around sea level representing the base of old, retreated cliffs.

Formation of cliffs

Cliffs are shaped through **erosion** and weathering. Soft rock erodes quickly and forms gentle sloping cliffs, whereas hard rock is more resistant and forms steep cliffs.

Formation of wave-cut platforms



A wave-cut platform is formed when the following occurs:

1. The sea attacks the base of the cliff between the high and low water mark.
2. A wave-cut notch is formed by erosional processes such as abrasion and hydraulic action - this is a dent in the cliff usually at the level of high tide.
3. As the notch increases in size, the cliff becomes unstable and collapses, leading to the retreat of the cliff face.
4. The backwash carries away the eroded material, leaving a wave-cut platform.
5. The process repeats. The cliff continues to retreat.

Caves, arches, stacks and stumps

Caves, arches, stacks and stumps are erosional features that are commonly found on a **headland**.

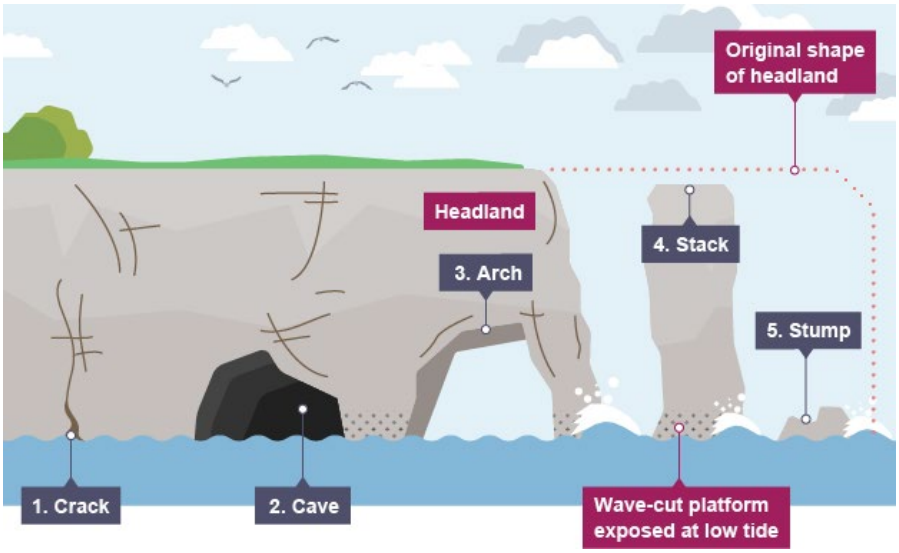
Cave – a large hole in a cliff caused by waves forcing their way into cracks in the cliff face

Arch – a wave-eroded passage through a small headland. This begins as a cave which is gradually widened and deepened until it cuts through

Stack – isolated pillar of rock left when the top of an arch has collapsed

Stump – the rock that is left behind after a stack erodes and collapses

Formation of caves, arches, stacks and stumps



1. **Cracks** are widened in the headland through the erosional processes of hydraulic action and abrasion.
2. As the waves continue to grind away at the crack, it begins to open up to form a **cave**.
3. The cave becomes larger and eventually breaks through the headland to form an **arch**.
4. The base of the arch continually becomes wider through further erosion, until its roof becomes too heavy and collapses into the sea. This leaves a **stack** (an isolated column of rock).
5. The stack is undercut at the base until it collapses to form a **stump**.

Coastal depositional landforms

When water loses its energy, any sediment it is carrying is deposited. The build-up of deposited sediment can form different features along the coast.

Beaches

Beach - a zone of deposited material that extends from the low water line to the limit of storm waves

Dune - deposit of sand which has been blown inland by onshore winds

Formation of beaches

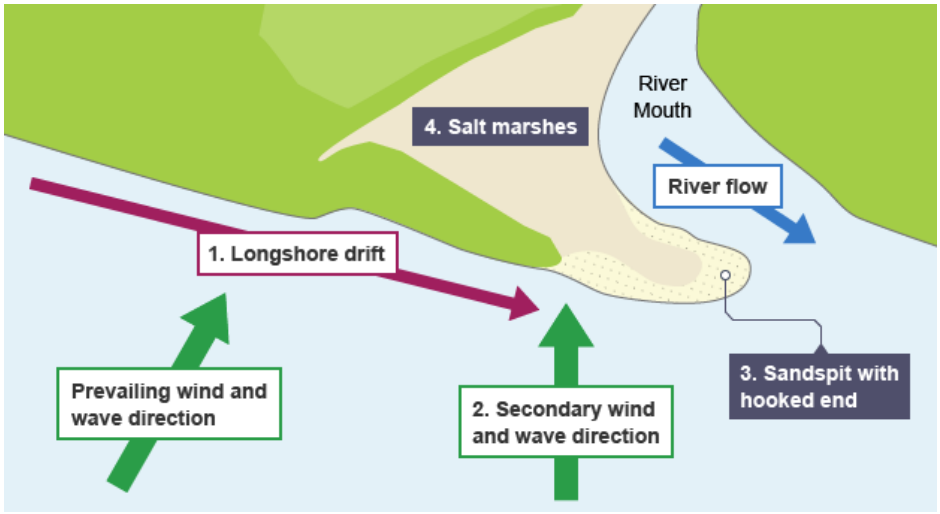
Beaches are made up from eroded material that has been transported from elsewhere and then deposited by the sea. For this to occur, waves must have limited energy, so beaches often form in sheltered areas

like bays. Constructive waves build up beaches as they have a strong swash and a weak backwash.

Sandy beaches are usually found in bays where the water is shallow and the waves have less energy. Pebble beaches often form where cliffs are being eroded, and where there are higher energy waves.

Spits

Spit - an extended stretch of sand or shingle jutting out into the sea from the land. Spits occur when there is a change in the shape of the landscape or there is a river mouth.



Formation of Spits

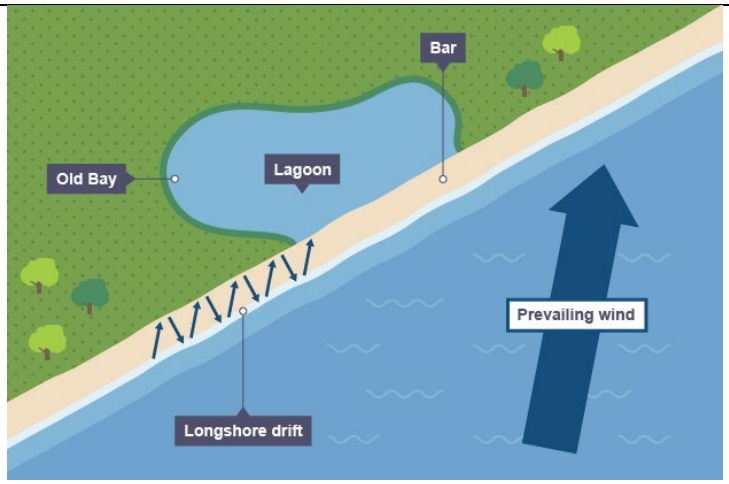
This is how spits are formed:

1. Sediment is carried by **longshore drift**.
2. When there is a change in the shape of the coastline, deposition occurs. A long thin ridge of material is deposited. This is the spit.
3. A hooked end can form if there is a change in wind direction.
4. Waves cannot get past a spit, therefore the water behind a spit is very sheltered. Silts are deposited here to form salt marshes or mud flats.

Bars

Bar - where a spit grows across a bay, a bar can eventually enclose the bay to create a lagoon

Formation of Bars



Two headlands join together when a spit grows across a bay. This landform is known as a bar. They can trap shallow lakes behind the bar, these are known as lagoons. Lagoons do not last forever and may be filled up with sediment.

Case Study of a section of the UK coastline

Students will study the coastline around Swanage in Dorset (or similar) to identify its major landforms of erosion and deposition (*e.g. Swanage Bay to Lulworth Cove)*

Details can be found on pg 102 to 105 of the student textbook.

Coastal Management Strategies

Coastal management strategies that are used to defend coastal environments can be divided into three different approaches: hard engineering, soft engineering and managed retreat. Hard engineering management involves using artificial structures, whereas soft engineering management and managed retreat are more sustainable and natural approaches to manage coastal erosion.

Hard Engineering Strategies

Hard engineering involves building artificial structures which try to control the natural processes at the coast. Each engineering strategy has its advantages and disadvantages.

Sea Walls

Concrete walls that are placed at the foot of a cliff to prevent erosion. They are curved to reflect the energy back into the sea.

Advantages

- Effective at protecting the base of the cliff.
- Sea walls usually have promenades so people can walk along them.

Disadvantages

- Waves are still powerful and can break down and erode the sea wall.
- Expensive - approximately £2,000 per metre.

Rock armour

Large boulders placed at the foot of a cliff. They break the waves and absorb their energy.

Advantages

- Cheaper than a sea wall and easy to maintain.
- Can be used for fishing.

Disadvantages

- They look different to the local geology, as the rock has been imported from other areas.
- The rocks are expensive to transport.

Gabions

Rocks are held in mesh cages and placed in areas affected by erosion.

Advantages

- Cheap - approximately £100 per metre.
- Absorbs wave energy.

Disadvantages

- Not very strong.
- Looks unnatural.

Groynes

Wooden or rock structures built out at right angles into the sea.

Advantages

- Builds a beach - which encourages tourism.
- They trap sediment being carried by longshore drift.

Disadvantages

- By trapping sediment it starves beaches further down the coastline, increasing rates of erosion elsewhere.
- They look unattractive.

<u>Soft Engineering Strategies</u>

Soft engineering does not involve building artificial structures, but takes a more sustainable and natural approach to managing the coast. Each strategy has its advantages and disadvantages for use.

Beach nourishment

Sand is pumped onto an existing beach to build it up.

Advantages

- Blends in with the existing beach.
- Larger beaches appeal to tourists.

Disadvantages

- Needs to be constantly replaced.

- The sand has to be brought in from elsewhere.

Beach Reprofiling

The sediment is redistributed from the lower part of the beach to the upper part of the beach.

Advantages

- Cheap and simple.
- Reduces the energy of the waves.

Disadvantages

- Only works when wave energy is low.
- Needs to be repeated continuously

Dune nourishment

Marram grass planted on sand dunes stabilises the dunes and helps to trap sand to build them up.

Advantages

- Relatively cheap.
- Maintains a natural-looking coastline.

Disadvantages

- Can be damaged by storm waves.
- Areas have to be zoned off from the public, which is unpopular.

<u>Managed Retreat</u>

Managed retreat is the controlled flooding of low-lying coastal areas. If an area is at high risk of erosion, managed retreat could be an option. It usually occurs where the land is of low value, for example farm land.

Advantages

- This is a cheap option compared to paying for sea defences.
- Creates a salt marsh which can provide habitats for wildlife and a natural defence against erosion and flooding.
- Salt marshes are diverse ecosystems supporting many species.

Disadvantages

- Land is lost as it is reclaimed by the sea.
- Landowners need to be compensated - this can cost between £5,000 - £10,000 per hectare.

<u>Case Study of a coastal management scheme in the UK</u>

Students will study the coastal management scheme in Lyme Regis, Dorset (or similar) to show:

- why the scheme was required
- key details of the management strategy used
- the resulting effects and conflicts brought by the strategy

Details can be found on pg 110 & 111 of the student textbook.

	(Examples of alternative case studies:.Holderness coast, Studland Bay, Barton on Sea, Walton on the Naze, Medmerry – West Sussex)	
Vocabulary	Shingle - a **beach** which is covered with pebbles or small- to medium-sized stones (as opposed to fine sand). Lagoon – an area of calm sea water that is separated from the ocean by a line of rock or sand. Salt Marsh - important natural habitats often found in sheltered river estuaries behind spits where there is very little flow of water	
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	

Autumn Term 2 & Spring Term 1		
Urban Issues and Challenges – The Urban World		
How do human processes and systems change spatially and temporally at a variety of scales?		
Source of knowledge	**AQA GCSE Geography Textbook pg 148 to 163** **T: Drive Geography KS4 folder for teaching resources (PowerPoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	**The Urban World** *Urban Growth* - the increase in the area covered by cities The world's population is growing rapidly and was estimated to have reached 7.7 billion people in August 2019. The highest rates of population growth are occurring in low income countries (LICs), such as Zimbabwe, Malawi and Niger. Some countries are experiencing population decline, for example Japan, Russia and Ukraine. Today more than 50% of the world's population live in urban areas. **Causes of urban growth** The population of cities usually changes in one of two ways: 1. *Natural increase* (or decrease) - this is the difference between the number of births and the number of deaths. 2. *Migration* - this is the movement of people into or out of the city. More and more people are leaving rural areas and moving to cities. This is called rural to urban migration. People move because of push and pull factors. *Push factors* are things that make people want to leave rural areas and *pull factors* are the things that attract people to the city. *Possible push factors* • unemployment • lower wages	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1. Evaluate the reasons why there is such a low rate of urbanisation in rich countries and why some show evidence of counter-urbanisation. 2. 'A city of great contrasts.' Explain why this fact makes it difficult for Rio de Janeiro to overcome its economic challenges.

- crop failure
- poor living conditions
- poor health and education services
- few facilities
- natural disasters
- civil war

Possible pull factors

- more jobs
- higher wages
- better living conditions
- better education and health services
- better facilities
- less chance of natural disasters

The emergence of mega-cities

Megacity - an urban area with a total population of more than ten million people

The number of megacities is increasing. There are now 34 megacities in the world (February 2019). The table below shows the top 10 most populated megacities.

Rank	Megacity	City Population *(in millions)*
1	Tokyo, Japan	37.4
2	Delhi, India	28.5
3	Shanghai, China	25.5
4	Sao Paulo, Brazil	21.6
5	Mexico City, Mexico	21.5
6	Cairo, Egypt	20.0
7	Mumbai, India	19.8
8	Beijing, Chinga	19.6
9	Dhaka, Bangladesh	19.2
10	Osaka, Japan	19.2

Many urban areas are growing rapidly, which causes a range of opportunities and challenges. Urban planning is important to ensure that the opportunities are maximised and the challenges are minimised.

A case study of a major city in an LIC or NEE

LIC (Low Income Country) – a country with a GNI per capita lower than $1045 (Source: World Bank, 2013)

NEE (Newly-Emerging Economy) - a country that has begun to experience high rates of economic development, usually along with rapid industrialisation

GNI per capita – Gross national income per person. The value of a country's income, divided by the number of people in that country.

3. Discuss whether the inhabitants of the favelas or the city authorities have gained the most from the attempts to improve the conditions of the poor in Rio de Janeiro.

Industrialisation - the large-scale introduction of manufacturing, advanced technical enterprises, and other productive economic activity into an area, society, country, etc.

Students will study the city of **Rio de Janeiro**, Brazil (or similar). Brazil is an example of a newly emerging economy (NEE). Each year thousands of people move to the city of Rio de Janeiro from rural areas. People move there because the city has lots of pull factors. People think that the city will provide lots of **opportunities** such as:

- **social** - better housing and services, eg healthcare and education
- **economic** - more jobs and higher wages
- **environmental** - better living conditions with a safer environment (less chance of natural disasters)

People who move think that they will have a better quality of life. Unfortunately, cities such as Rio de Janeiro face lots of challenges and the people who move there do not always have a better quality of life. Some of the **challenges** they may face include:

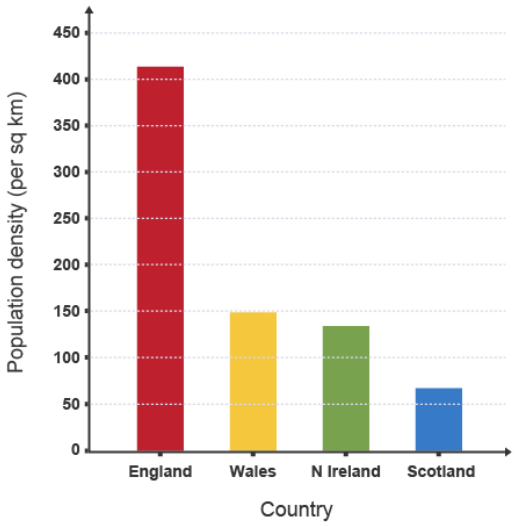
- **social** - poor housing conditions and crime
- **economic** - low wages or unemployment
- **environmental** - polluted drinking water and a lack of sanitation

Students will cover the following information about Rio de Janeiro:

- the location and importance of the city, regionally, nationally and internationally
- causes of growth there (natural increase & migration)
- how urban growth in Rio de Janeiro has created opportunities:
  - *<u>social opportunities</u>: improved access to services including health, education, water supply & energy*
  - *<u>economic opportunities</u>: how urban industrial areas around the city of Rio de Janeiro can be a stimulus for economic development.*
- how urban growth has created challenges in Rio de Janeiro:
  - *managing urban growth*: *slums, squatter settlements*
  - *providing clean water, sanitation systems and energy for a growing population*
  - *providing sufficient access to public services - health and education*
  - *reducing unemployment & crime e.g. pacifying police units*
  - *managing environmental issues across the city: waste disposal, air and water pollution, traffic congestion*
- An example of how urban planning is improving the quality of life for the urban poor e.g. Rio de Janiero – *Rocinha Self-help Schemes/Favela Bairro Project Slum Dwellers International (SDI)*

Specific details can be found on pg 152 to 163 of the student textbook.

	Squatter settlements *Squatter settlement* - an area of (often illegal) poor-quality housing, lacking in services like water supply, sewerage and electricity A problem of rapid **rural to urban migration** is the development of squatter settlements. In Rio de Janeiro, there are up to 1000 of them. The squatter settlement of **Rocinha is the largest in Rio de Janeiro and** is now estimated to be home to over 225 000 people. Squatter settlements are unplanned and usually have the following characteristics: • overcrowded, noisy and smelly • houses are made from cardboard, wood, corrugated iron, plastic sheeting and metal from oil drums • lack of sanitation, clean drinking water and open sewers • pollution and disease are common • thousands of workshops and people employed in the informal job sector Improving squatter settlements Squatter settlements can be improved through urban planning. In **Brazil**, squatter settlements have been improved through self-help schemes. This is when residents improve their own home with the support of the local authority. For example, the local authority may provide cheap building materials or a loan for residents to purchase them. Residents make all the improvements to their homes themselves. In some Brazilian squatter settlements, site and service schemes have been used to improve them. A site and service scheme is when the local authorities provide the land for a house to be built on. The local authority also supply basic services to the land such as water supplies, drainage pipes and an electricity connection. Building the house is the responsibility of the resident, and is often done with the help of friends and neighbours in their community.	
Vocabulary	Favela – the name given to squatter settlements in Brazil Economic opportunities – chances for people to improve their standard of living through employment and earning a regular income Social opportunities – chances for people to improve their quality of life i.e. access to education, health care, etc. Pollution - the presence of chemicals, noise, dirt or other substances which have harmful or poisonous effects on an environment Sanitation – measures designed to protect public health, such as providing clean water and disposing of sewage and waste properly. Traffic congestion – when there is too great a volume of traffic for roads to cope with, and traffic slows to a crawl.	
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	
Spring Term 1		
Urban Issues and Challenges – Urban Change in the UK & Urban Sustainability		
How do human processes and systems change spatially and temporally at a variety of scales?		

Source of knowledge	**AQA GCSE Geography Textbook pg 164 to 191** **T: Drive Geography KS4 folder for teaching resources (powerpoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	**<u>Urban Change in the UK</u>** Urban areas in the UK have experienced significant change and face many social, economic and environmental opportunities and challenges, including regeneration and urban sustainability. *Regeneration* – improving run down areas by improving the housing and the environment *Urban regeneration* - reversing the urban decline by modernising or redeveloping, aiming to improve the local economy <u>Urban distribution in the UK</u> In August 2019, the population of the UK rose to over 67.5 million people. London is the UK's largest city and Birmingham is its second largest city. The bar chart below shows population density in the UK. Scotland has the lowest population density at 68 people per km^2 whereas England has the highest population density at 413 people per km^2.  <u>A case study of a major city in the UK</u> Students will study the city of **Bristol** (or similar). Students will cover the following information about Bristol: • the location and importance of the city in the UK and the wider world • Bristol is the largest city in the south-west of England, with a population of approximately 440,500. As a city it has strong connections with other countries in the world as a result of its ethnic diversity and past and present industrial links. • impacts of national and international migration on the growth and character of Bristol • how urban change in Bristol has created opportunities: - *social*: cultural opportunities (e.g. Bristol Old Vic, Tobacco Factory, Colston Hall), leisure & recreation (e.g. two professional	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1. Describe how environmental changes can improve the quality of life for the people of Bristol. 2. 'The regeneration of the Temple Quarter of Bristol is a success.' Discuss. 3. Explain why planners must consider more than just the environment to achieve urban sustainability.

football teams, rugby union team, Gloucestershire County Cricket), shopping (e.g. Cabot Circus, open street markets)
- *economic*: employment through growth of high-tech industries (e.g. aerospace industry, the Defence Procurement Agency (part of the Ministry of Defence) , Aardman Animations)
- *environmental*: urban greening (e.g. Queen Square, Podbury Wharf nature reserve), integrated transport systems (e.g. Rapid Transit Network linking buses to Park and Ride facilities, improvements to rail network)

- how urban change has created challenges:
- *social and economic*: urban deprivation, inequalities in housing, education, health and employment (e,g, comparison of Filwood and Stoke Bishop areas of the Bristol)
- *environmental*: areas of dereliction (e.g. Stokes Bishop and Perry's Carriage Works building), building on brownfield sites (e.g. Bristol Harbourside, Finzel's Reach, Temple Meads), waste disposal & atmospheric pollution

- the impact of urban sprawl on the rural-urban fringe and the growth of commuter settlements (e.g. Bishop Stoke and Harry Stoke).
- An example of an urban regeneration project (the Bristol Temple Quarter) to show:
- the reasons why this area needed regeneration
- the main features of the project (e.g. Temple Meads Station redevelopment, Paintworks, The Engine Shed, Temple Studios, Bristol Arena)

Specific details can be found on pg 166 to 185 of the student textbook.

Environmental challenges

Dereliction - derelict buildings from the manufacturing industry are common in inner city areas.

Building on greenfield sites - this results in the loss of more green space and may make urban sprawl worse. However **building on** brownfield sites - this will improve a derelict site as the space is reused for a new development.

Waste disposal - a large urban population produces a lot of household and commercial waste which creates challenges for how to manage and dispose of this waste.

Atmospheric pollution - with more people in a city, there are more vehicles on the road, leading to atmospheric pollution.

Urban Sustainability

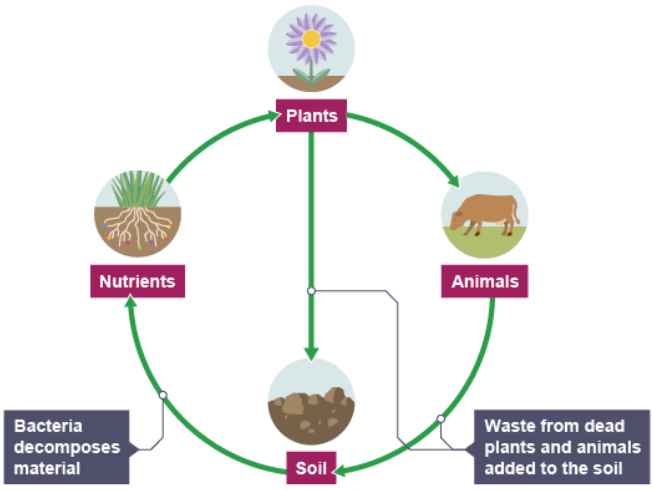
Urban sustainability – a town or city organised without over reliance on the land or resources of surrounding rural areas and using renewable energy

	Urban areas can be made more sustainable by encouraging: • **water conservation** - dual flush toilets in businesses and homes, collecting rainwater for gardens and the use of water meters in properties • **energy conservation** - insulating businesses and homes, use of double and triple glazing in buildings, use of low-energy lighting and appliances • **waste recycling** - recycling of household and commercial waste, adopting a 'reduce, reuse, recycle' policy, using 'grey' water to flush toilets in public buildings • **creating green spaces** - increasing the number of parks and planting more trees e.g. Queen Elizabeth Park in London <u>A case study of a sustainable city</u> Urban sustainability requires management of resources and transport. Students will study the following information about the city of **Freiburg,** Germany (or similar). • Features of sustainable urban living in Freiburg: - water and energy conservation (e.g. sustainable water supply and widespread use of renewable energy) - waste recycling - creating green spaces around the city • Urban transport strategies that are used to reduce traffic congestion. Specific details can be found on pg 186 to 191 of the student textbook.	
Vocabulary	High-tech industry - high-technology such as computer software and engineering manufacture Integrated transport systems - different forms of transport are linked together to make it easy to transfer from one to another Urban greening – the process of increasing and preserving open space in urban areas, i.e. public parks and gardens Urban Sprawl - unplanned growth of urban areas into the surrounding rural areas Brownfield site - land that has been used, abandoned and now awaits reuse; often found in urban areas Greenfield site - the area of countryside around the edge of a city with strict planning controls to stop houses being built Dereliction - abandoned buildings and wasteland	
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	

Spring Term 2 & Summer Term 1

The Living World – Ecosystems & Tropical Rainforests

How do ecosystems change and how do people interact with them at a range of scales?

Source of knowledge	**AQA GCSE Geography Textbook pg 52 to 67** **T: Drive Geography KS4 folder for teaching resources (PowerPoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	<u>Ecosystems</u> *Global ecosystem (or biome)* - a large scale ecosystem, such as tropical rainforest, tundra or deciduous woodland *Ecosystem* - a community of plants and animals that interact with each other and their physical environment *Biotic* – components in an ecosystem that are living such as plants and fish *Abiotic* - components in an ecosystem that are non-living environmental factors such as climate (temperature and rainfall), soil, water temperature and light Ecosystems exist at a range of scales and involve the interaction between biotic and abiotic components. An ecosystem is a natural environment and includes the flora(plants) and fauna (animals) that live and interact within that environment. Flora, fauna and bacteria are the biotic or **living components** of the ecosystem. Ecosystems are dependent on the following abiotic or **non-living components**: • **climate** - the temperature and amount of rainfall are very important in determining which species can survive in the ecosystem • **soil** - the soil type is important as this provides nutrients that will support different plants • **water** - the amount of water available in an ecosystem will determine what plants and animals can be supported The biotic parts of the ecosystem have a complex relationship with the abiotic components - changing one will lead to a change in the other.  	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1.Using a named example, explain how change can have short-term and long-term effects on an ecosystem. 2. Describe and explain the main plant adaptations in a tropical rainforest environment. 3. 'The rainforest is more valuable when left intact than when destroyed.' Using a case study, use examples to support or challenge this view.

Changes to ecosystems

Ecosystems are very sensitive to change. The **living** and **non-living components** of the ecosystem can be altered by either **natural factors** or **human management**.

Changes to the ecosystem caused by **natural factors** include:

- drought
- flood
- fire
- disease

Changes to the ecosystem caused by **human management** include:

- introducing more fish (fish stocking)
- altering the drainage of the land which may influence the amount of water
- changing the pH level of the water
- altering the nutrient levels of the water if fertilisers are leached into the water resulting in eutrophication

Any of these changes can have a negative impact on the ecosystem and could result in the collapse of a food chain.

A case study of a small-scale ecosystem in the UK

Students are required to look at a small-scale ecosystem in the UK (e.g. hedgerow, woodland, sand dune, freshwater pond) to illustrate the concept of inter-relationships within a natural system, an understanding of producers, consumers, decomposers, food chain, food web and nutrient cycle.

Producer – an organism or plant that is able to absorb energy from the sun through photosynthesis

Consumer – organism that eats herbivores and/or plant matter

Decomposer – organisms such as bacteria or fungi that break down plant and animal material

Food chain – connections between different organisms (plants and animals) that rely upon one another as their source of food

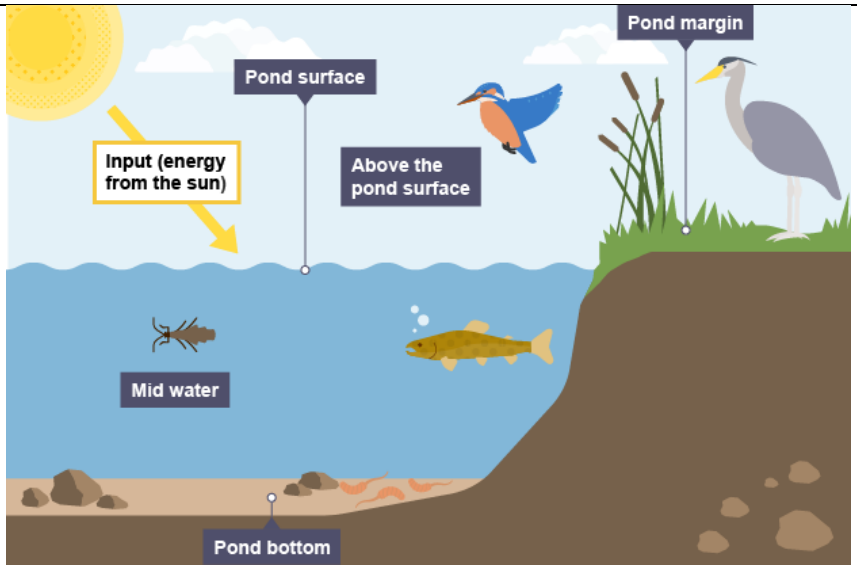
Food web – a complex hierarchy of plants and animals relying on each other for food

Nutrient cycle - on-going recycling of nutrients between living organisms and their environment

Freshwater pond ecosystem

The freshwater pond ecosystem is very common in the UK.

The interactions between the **living** and **non-living** components of the ecosystem are important.



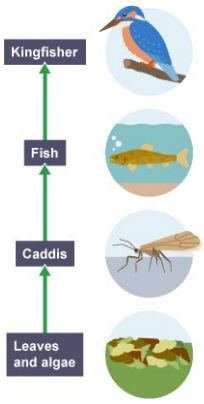
The freshwater pond ecosystem consists of the following:

1. **Pond bottom** - there is very little oxygen or light at the bottom of the pond. Decomposers and scavengers live here where they feed on dead material, e.g. water worms and rat-tailed maggots.
2. **Mid water** - fish are the main predators here. Food is found on the pond bottom or the pond surface. Animals here breathe through their skin or gills, e.g. stickleback fish, water fleas and dragonfly nymphs.
3. **Pond surface** - animals here breathe through their gills, skin or lungs. There is plenty of oxygen and light here. Animals found here include ducks, water boatmen, midge larvae and tadpoles.
4. **Pond margin** - plants provide a sheltered habitat for insects and smalls animals such as frogs. There is lots of light and oxygen so plants such as marsh marigold thrive.
5. **Above the pond surface** - birds such as kingfishers and insects like dragonflies are common here.

Freshwater pond food chain and food web

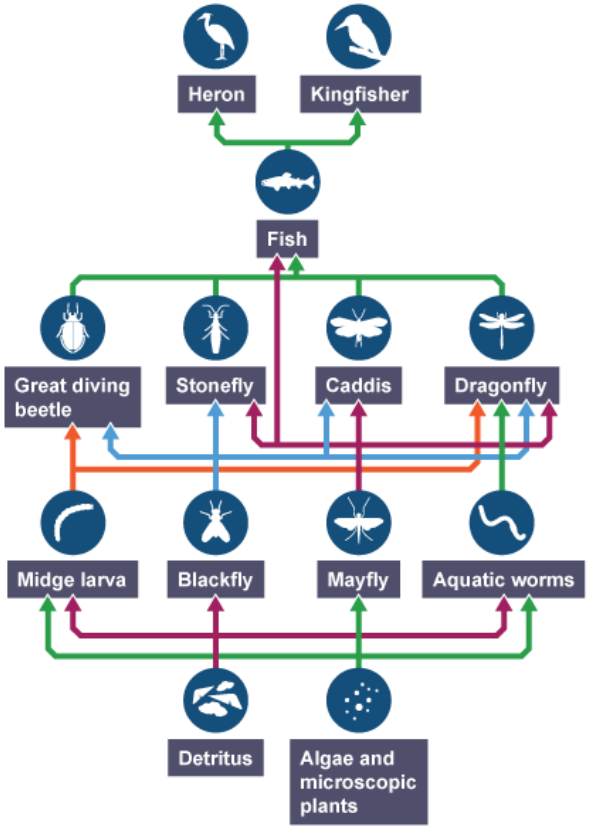
Food Chain

The freshwater pond ecosystem is finely balanced because of the food chain and the food web. A food chain shows how each living thing gets food. In a food chain, energy and nutrients are passed from one organism to the next. The producer provides the basic source of food which other organisms, the consumers, then feed on.



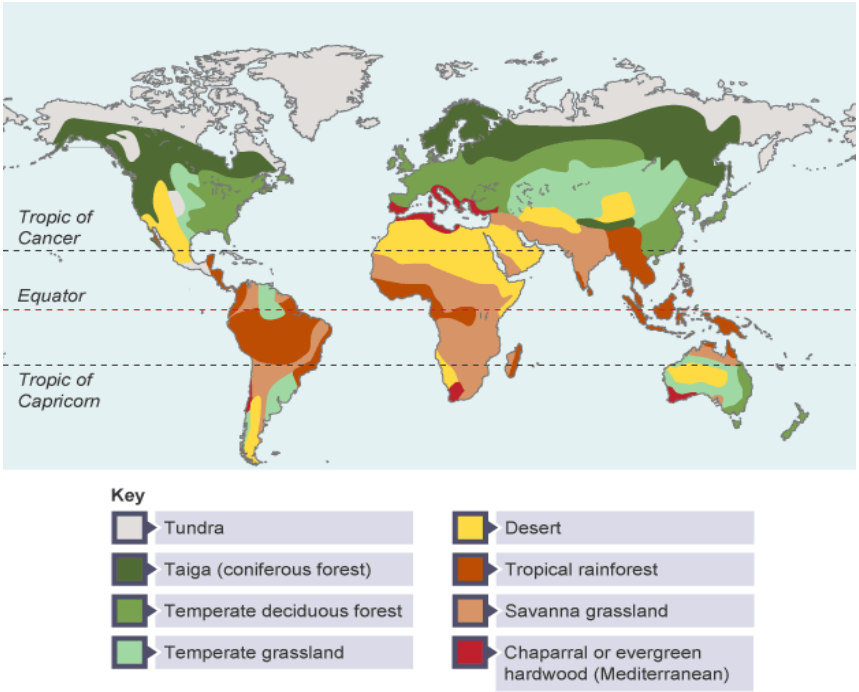
The food web

This includes all of the connections between producers and consumers in an ecosystem. The food web below shows how interconnected all of the different organisms are.



The global distributions of ecosystems

The distribution of large-scale ecosystems (biomes) is determined by climate. The map below shows the distribution of the **global ecosystems** or biomes.



Characteristics of biomes

- **Tundra** - found near the North and South poles. Very few plants and animals can survive here.
- **Taiga (coniferous forest)** - found in Scandinavia, Russia and Canada. Evergreen trees thrive in this cool temperate climate.
- **Temperate deciduous forest** - found across Europe and in the USA. These trees lose their leaves every year and thrive in mild and wet conditions known as a temperate maritime climate.
- **Temperate grassland** - found in Hungary, South Africa, Argentina and the USA. Consists of grass and trees that thrive in a temperate continental climate of moderate rainfall and mild conditions.
- **Chaparral or evergreen hardwood (Mediterranean)** - found around the Mediterranean Sea, around Perth and Melbourne in Australia and California in the USA.
- **Desert** - found near the Tropics of Cancer and Capricorn. Conditions here are very hot and dry. Plants and animals are specially adapted to survive in the harsh conditions.
- **Tropical rainforest** - found near the Equator. The climate is hot and humid and many different species can be found here.
- **Savanna grassland** - found mainly in central Africa, southern India, northern Australia and central South America. Long grasses and a few scattered trees are found in these hot and dry conditions.

Ecosystems change gradually between the Equator and the Poles. Latitude, air pressure and winds are important factors that determine the climate of a place.

Latitude

Latitude is one of the most important factors in determining global climate patterns.

In the lower latitudes, such as the **tropics**, temperatures are the **highest**. This is because the sun's rays travel a shorter distance to the Equator and are therefore more concentrated.

However, in the higher latitudes, such as the **polar** regions of the world, temperatures are **lowest**. This is due to the sun's rays travelling a longer distance and being spread over a wider area of the Earth's surface. When these rays approach the Earth, they do so at a sloping angle, resulting in lower surface temperatures.

High and low air pressure

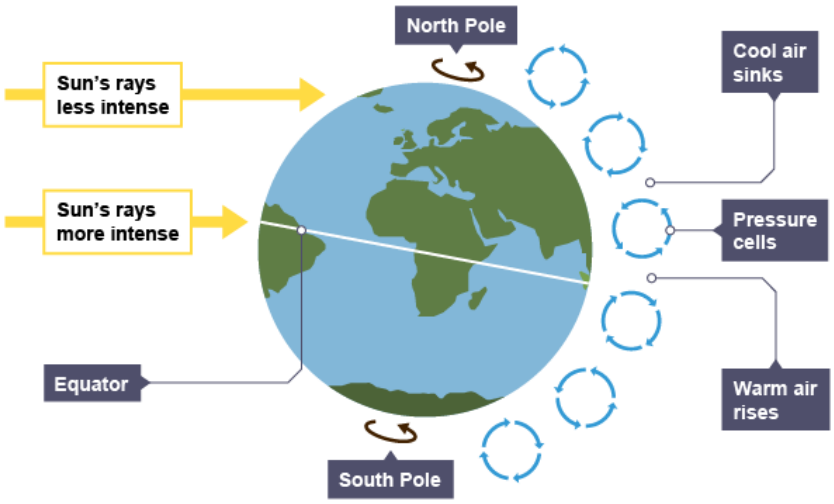
Differences in temperature lead to variations in air pressure around the world. **Low-pressure** areas are created when air **rises**. This is called low pressure because the weight of the air above the Earth's surface is lower than average. **High-pressure** areas are created when air **sinks**. This is called high pressure because the weight of the air is above average when it sinks to the Earth's surface.

Low-pressure areas are associated with **cloud** and **precipitation**(rainfall) because:

1. as the air rises it cools, condenses and forms clouds
2. the water droplets in the clouds increase in size
3. they eventually become too heavy to be held and fall as precipitation

The air above the **Equator** is very hot and rises, creating an area of **low pressure**. The Equator experiences high amounts of rainfall due to this rising air resulting in a warm and wet equatorial climate (eg Amazon and Congo tropical rainforests).

High-pressure areas are associated with dry, warm and settled weather conditions. This is because sinking air does not result in precipitation.



Winds

The air travels in the upper atmosphere and sinks at approximately 30° north and 30° south of the Equator. When the air sinks it creates an area of high pressure.

These **high-pressure** areas experience very **dry** and **warm** conditions resulting in a hot desert climate (eg the Sahara and Kalahari deserts). **Winds blow from areas of high to low pressure**, which transfers the air from where it is sinking to where it is rising. This continual transfer of wind maintains the pressure belts of high and low pressure which creates different global climatic zones.

Students are required to study **two** contrasting global ecosystems

Global Ecosystem Case Study 1 - Tropical Rainforests

Characteristics of tropical rainforests

Tropical Rainforest - global-scale ecosystem mainly found close to the Equator, characterised by high temperatures, high rainfall and huge biodiversity

Biodiversity - the variety of life in the world or a particular ecosystem

Tropical rainforests have distinct characteristics that support a wide variety of different species. This means that they have a high biodiversity. The biotic or living components of the ecosystem and the abiotic or non-living components

of the ecosystem depend on one another - a change in one leads to a change in the other.

Climate

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

Soil

- Most of the soil is not very fertile.
- A thin layer of fertile soil is found at the surface where the dead leaves decompose.
- It is red in colour because it is rich in iron.
- Due to heavy rainfall the nutrients are quickly washed out of the soil (a process also known as leaching).

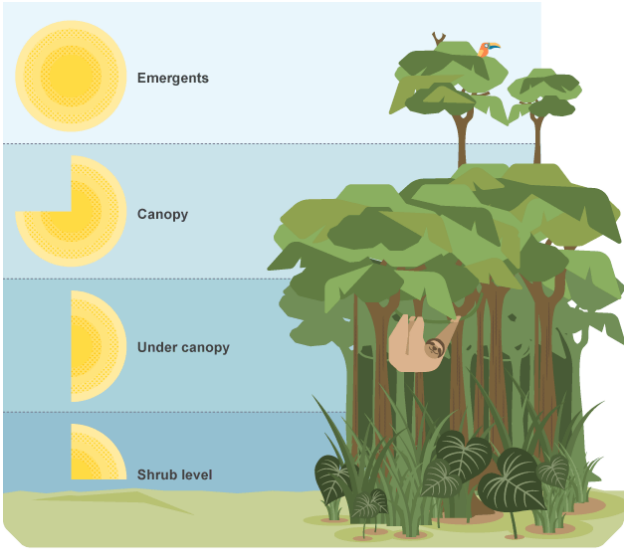
Plants and animals

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

Structure of a tropical rainforest

A tropical rainforest is made up of the following layers:

- ground level
- shrub layer
- under canopy
- (main) canopy
- Emergent



Canopy – the continuous layer of branches in a forest, which in tropical rainforests hosts the majority of plant and animal species

Emergent –a plant which is taller than the surrounding vegetation, especially a tall tree in a forest.

Rainforest Adaptations

Plant adaptations

The following adaptations allow plants to survive in the conditions of the rainforest.

- *Lianas* - these are woody vines that have roots in the ground but climb up the trees to reach the sunlight. Their leaves and flowers grow in the **canopy.**
- ***Tree trunks*** - these are tall and thin to allow trees to reach the sunlight. The bark on these trees is smooth to allow water to flow down to the roots easily.
- ***Drip tips*** - plants have leaves with pointy tips. This allows water to run off the leaves quickly without damaging or breaking them.
- *Buttress roots* - large roots have ridges which create a large surface area that help to support large trees.
- *Epiphytes* - these are plants which live on the branches of trees high up in the **canopy**. They get their nutrients from the air and water, not from the soil.

Animal adaptations

Many animals have adapted to the unique conditions of the tropical rainforests.

- *Sloth* - The **sloth** uses camouflage and moves very slowly to make it difficult for predators to spot.
- *Spider monkey* - The **spider monkey** has long, strong limbs to help it to climb through the rainforest trees.

- *Flying frog* - The **flying frog** has fully webbed hands and feet, and a flap of loose skin that stretches between its limbs, which allows it to glide from plant to plant.

- *Toucan* - The **toucan** has a long, large bill to allow it to reach and cut fruit from branches that are too weak to support its weight.

Threats to the tropical rainforest

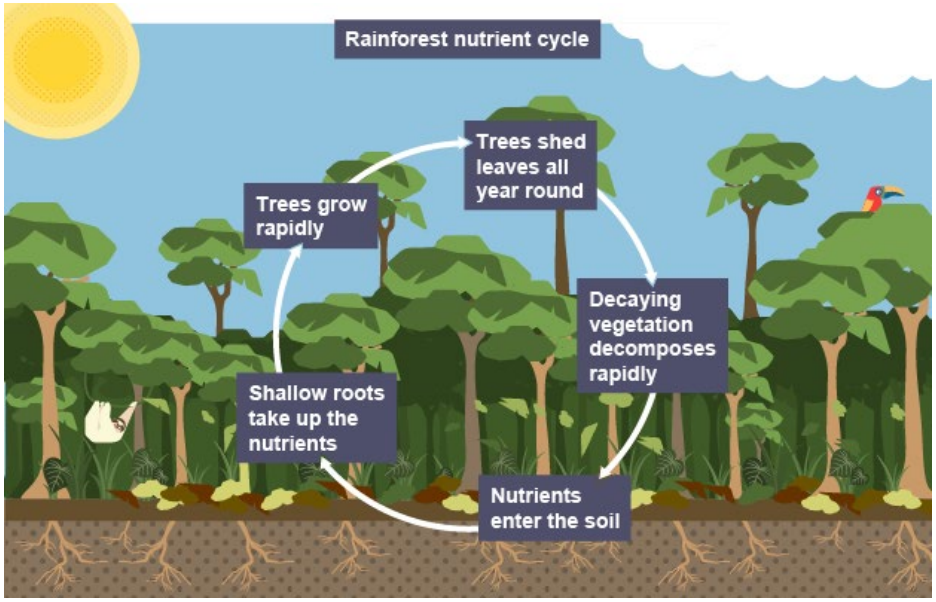
The tropical rainforests of the **Amazon Basin** face the threat of deforestation. Deforestation is happening due to the following reasons:

- **Farming** - large areas are cleared for pastoral farming. As the global demand for meat has increased many cattle farms have opened in the Amazon Basin for beef farming. Arable farming is also responsible for the loss of tropical rainforest as many farmers are clearing land to grow cash crops, such as soya beans.
- **Logging** - tropical rainforests are cut down so that valuable trees like mahogany can be accessed and sold for timber to make furniture. Other trees are cut down for making paper products.
- **Mining** - the Amazon Basin is rich in natural resources such as iron ore, copper, tin, aluminium, manganese and gold. This has led to the development of mines which results in the clearance of tropical rainforest. The Carajas mine in Brazil is the world's largest iron ore mine.
- **Roads** - the construction of access roads for farmers, loggers and miners results in large parts of the tropical rainforest being destroyed.
- **Hydroelectric power (HEP)** - The creation of HEP stations in the Amazon Basin has resulted in large areas of forest being flooded to create the reservoirs and dams. The flooding of the Balbina dam in Brazil resulted in the loss of 920 square miles of tropical rainforest.
- **Population** - population growth has resulted in the loss of tropical rainforest as land is cleared to build houses and infrastructure.

Impacts of tropical rainforest loss

The impacts of the deforestation of the Amazon Basin include the following:

- *Soil erosion* - Once the land is cleared of **rainforest vegetation** the soil is left bare. When it rains, the nutrients in the soil are washed away. The nutrient cycle stops because there are no plants or trees shedding leaves to replace the nutrients in the soil. The soil is no longer able to support plant life because it is **not fertile**. The roots of plants and trees no longer hold the soil together so it is easily eroded.



- *Loss of biodiversity* - Many different species of plants and animals die because of deforestation. As plants and animals are closely connected through the food web, deforestation this reduces the biodiversity, or variety of species found in the tropical rainforest.

- *Climate change* - The trees and plants of the Amazon Basin absorb carbon dioxide during the process of photosynthesis. If there are fewer trees and plants, due to deforestation, then less carbon dioxide is removed from the atmosphere. In this way deforestation contributes to global warming and therefore climate change.

- *Economic development* - The creation of mines, farms and roads - which caused deforestation - has also led to economic development. The money created from these enterprises allows a country to generate foreign income, which can then be used to pay off debts or be invested in further development projects.

<u>Management of tropical rainforests</u>

Tropical rainforests can be managed in the following ways to reduce deforestation:

- **Logging and replanting** - selective logging of mature trees ensures that the rainforest canopy is preserved. This method allows the forest to recover because the younger trees gain more space and sunlight to grow. Planned and controlled logging ensures that for every tree logged another is planted.
- **Education** - It is important that local people, businesses and politicians understand the true value of the tropical rainforest. Once they understand the value of biodiversity, particularly in terms of tourism, they will be more likely to want to protect it from deforestation.

	• **Ecotourism** - this encourages sustainable tourism that creates jobs for local people whilst ensuring that the money generated is used to protect and conserve the tropical rainforest for future generations to enjoy. • **International agreements** - agreements to protect tropical rainforests have been made between different countries through debt-for-nature swaps. This is when a country which is owed money by another country cancels part of the debt if an agreement is made by the debtor country to ensure the conservation of its tropical rainforests. *Case study of sustainable management: Malaysia* The Malaysian government have implemented the following policies to ensure that the tropical rainforest can be conserved and enjoyed by future generations: • Public awareness of the value of tropical rainforests increased through education. • Local communities included and involved in forest conservation projects. • Use of alternative timber sources such as rubber trees was encouraged. • Selective logging of mature and commercially viable trees over a 40-year cycle to ensure that trees had time to re-establish themselves. This is known as a **Selective Management System**. • Ecotourism promoted and developed in tropical rainforest areas. • Permanent Forest Estates have been created by the government where no change of land use is allowed. • Creation of National Parks to protect biodiversity.	
Vocabulary	Deforestation - the cutting down and removal of forest Pastoral farming - a form of agriculture aimed at producing livestock, rather than growing crops. Examples include dairy farming, raising beef cattle, and raising sheep for wool. Hydroelectric power (HEP) – electricity generated by turbines that are driven by moving water Ecotourism - nature tourism usually involving small groups with minimal impact on the environment Debt reduction - countries are relieved of some of their debt in return for an agreement that they preserve and protect their natural environments Selective logging - sustainable forestry management where only carefully selected trees are cut down	
Assessment Focus	Year 10 annual exam and half termly assessment which both include a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	

Summer Term 1		
The Living World – Hot Deserts		
How do ecosystems change and how do people interact with them at a range of scales?		
Source of knowledge	**AQA GCSE Geography Textbook pg 68 to 77** **T: Drive Geography KS4 folder for teaching resources (powerpoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	<u>Global Ecosystem Case Study 2 - Hot Deserts</u> Hot deserts are an important ecosystem with distinct characteristics and adaptations. They provide opportunities for development but also cause challenges such as desertification. *Hot desert* – parts of the world that have high average temperatures and very low precipitation *Adaptations* – actions taken to adjust to natural events such as climate change, to reduce damage, limit the impacts, take advantage of opportunities, or cope with the consequences *Desertification* – the process by which land becomes drier and degraded, as a result of climate change or human activities, or both <u>*Characteristics of Hot Deserts*</u> Hot deserts are found near the **Tropics of Cancer and Capricorn.** The largest hot desert is the **Sahara** in Africa which spans the whole width of the continent. Hot deserts have an extreme climate and challenging environment. There is very little biodiversity in hot deserts because of the harsh climate. Few species are specialised enough to survive there. Plants and animals which do survive there have adapted to difficult conditions. The biotic or living components and the abiotic or non-living components of the hot desert rely on one another - a change in one will lead to a change in the other. <u>*Climate*</u> • The climate is very **hot**. Summer day time temperatures can exceed 40°C. However, at night the temperature can drop below 0°C. • The climate is very **dry** with less than 250 mm of rainfall a year. • Hot deserts have two distinct seasons: **summer**, when the temperature ranges between 35-40°C, and **winter**, when the temperature ranges between 20-30°C. <u>*Soil*</u> • Desert soils are thin, sandy, rocky and generally grey in colour. • Desert soils are very dry. When it does rain they soak up the water very quickly. • The surface of the soil may appear crusty. This is due to the lack of rainfall. As it is so hot water is drawn up to the surface of the soil by evaporation. As the water evaporates, salts are left behind on the surface of the soil.	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1. Explain, using examples, how hot deserts can provide opportunities for development. 2. Suggest at least two reasons why irrigation is important for future human development of a hot desert environment you have studied. 3. 'Desertificaton is largely caused by poor land management.' Use evidence to discuss this statement.

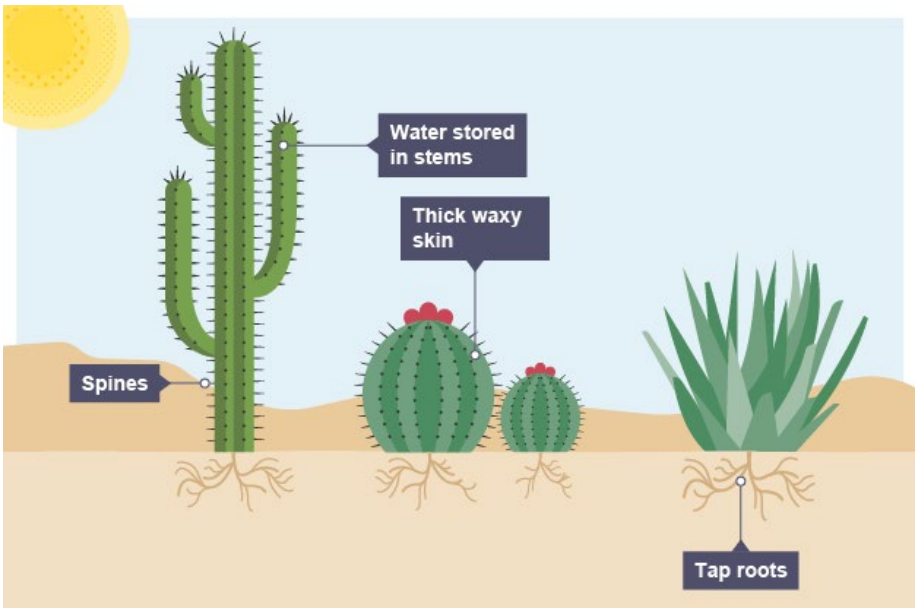
Evaporation - the process of water changing from liquid to vapour

Plants and animals

Hot deserts have distinct characteristics that allow certain species to thrive in such an extreme environment. Plants and animals have developed adaptations which allow them to survive in hot and dry conditions.

Plant adaptations

Plants with adaptations which allow them to live in hot and dry conditions are called xerophytic.



The following adaptations allow plants to survive in the hot desert environment:

- **Small leaves** - these ensure that less water is lost from the plant by transpiration because the leaf has a smaller surface area.
- **Tap roots** - these are long roots (7-10 metres long) that reach deep under the ground to access water supplies. The tap roots are much longer and bigger than the plant which is visible at the surface.
- **Spines** - some plants have spines instead of leaves, eg **cactuses**. Spines lose less water than leaves so are very efficient in a hot climate. Spines also prevent animals from eating the plant.
- **Waxy skin** - some leaves have a thick, waxy skin on their surface. This reduces water loss by transpiration.
- **Water storage** - some plants, known as **succulents**, store water in their stems, leaves, roots or even fruits. Plants which store water in their leaves and stems also have a **thick waxy skin** so that they lose less water by transpir

Hot Desert Case study: The Thar Desert, Rajasthan, India

The Thar Desert is located in northwest India. It is one of the major hot deserts of the world with the highest population density. Many people living in this desert are subsistence farmers but with increasing development opportunities, the human population is also growing. Due to population pressures this environment is increasingly under threat.

Subsistence farming – a type of agriculture producing only enough food and materials for the benefit of a farmer and their family

Development opportunities in a hot desert environment

Despite having an extreme climate, the Thar Desert can provide development opportunities. These include:

- **Mining** - the desert has valuable reserves of minerals such as feldspar, phospherite, gypsum and kaolin. These minerals are used to produce a range of things from cement to fertilisers and are therefore valuable. Limestone and marble are also quarried in the area. Limestone is used for building and producing cement, and marble is used in construction.
- **Energy generation** - energy is produced in the Thar Desert using solar panels. This energy is used to clean water supplies contaminated with salt (desalination). Wind energy is also used to generate electricity. A wind farm consisting of 75 wind turbines has the capacity to produce 60 megawatts (MW) of electricity.
- **Farming** - irrigation in the Thar Desert has made commercial arable farming viable. Producing crops such as wheat and cotton has created many jobs and generated income for the local economy.
- **Tourism** - the Thar Desert National Park attracts many visitors who want to see some of the 120 species found there. Tourists explore the desert with local guides on camels. Tourism is an important source of income and creates many jobs for local people. The multiplier effect of tourism creates many development opportunities.

Challenges of development in a hot desert environment

Development in the Thar Desert includes many challenges such as:

- **Extreme temperatures** - temperatures in the Thar Desert can exceed 50°C in the summer months. It is hard for people to farm, work in mines or as tourist guides during these months as it is simply too hot. This makes development difficult.
- **Water supply** - the supply of water to the Thar Desert is precious and limited. With only 120-240 mm of rain falling per year in the desert, water must be used sensibly and sustainably. Without water the development of mining, farming and tourism and therefore the economy would not be possible. Some parts of the desert have experienced over-irrigation, which has caused waterlogging of the ground. Here the excess water has evaporated, leaving a layer of salt on the surface making it difficult to grow crops.
- **Inaccessibility** - the desert covers a huge area of 200,000 sq km. Most of the desert is inaccessible due to the extreme environmental conditions

	and poor infrastructure. Beyond the city of Jaisalmer, development is limited. This has created a honeypot site for tourists in Jaisalmer but not beyond. Inaccessibility to many parts of the desert has led to greater differences between rich and poor. Desertification Areas on the fringe of hot deserts are at risk of desertification. Desertification is the process of land turning into desert as the quality of the soil declines over time. *Causes of desertification* The main causes of desertification include: • **Population growth** - the population in some desert areas is increasing. In places where there are developments in mining and tourism, people are attracted by jobs. An increased population is putting greater pressure on the environment for resources such as wood and water. • **Removal of wood (deforestation)** - in developing countries, people use wood for cooking. As the population in desert areas increases, there is a greater need for fuel wood. When the land is cleared of trees, the roots of the trees no longer hold the soil together so it is more vulnerable to soil erosion. • **Overgrazing** - an increasing population results in larger desert areas being farmed. Sheep, cattle and goats are overgrazing the vegetation. This leaves the soil exposed to erosion. • **Soil erosion** - this is made worse by overgrazing and the removal of wood. Population growth is the primary cause of soil erosion. • **Climate change** - the global climate is getting warmer. In desert regions conditions are not only getting warmer but drier too. On average there is less rain now in desert regions than there was 50 years ago. *Strategies to reduce desertification* Desertification can be reduced by adopting the following strategies: • **Planting more trees** - the roots of trees hold the soil together and help to reduce soil erosion from wind and rain. • **Improving the quality of the soil** - this can be managed by encouraging people to reduce the number of grazing animals they have and grow crops instead. The animal manure can be used to fertilise the crops grown. Growing crops in this way can improve the quality of the soil as it is held together by the roots of plants and protected from erosion. This type of farming is more sustainable. • **Water management** - water can be stored in earth dams in the wet season and used to irrigate crops during the dry season. This is an example of using appropriate technology to manage water supplies in the desert environment. *Appropriate technology* – technology suited to the needs, skills, knowledge and wealth of local people and their environment.	
Vocabulary	Extreme temperatures - temperatures that present challenges for people, animals and plants living in in certain environments Sustainability - actions that meet the needs of the present without reducing the ability of future generations to meet their needs	

	Infrastructure – the basic equipment and structures (such as roads, utilities, water supply & sewage) that are needed for a country or region to function properly Honeypot site - a location attracting a large number of tourists who, due to their numbers, place pressure on the environment and local people. Honeypots are very often used by cities or countries to manage their tourism industry. Overgrazing - feeding too many livestock for too long on the land, so it is unable to recover its vegetation	
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	
Summer Term 2 (continued in Autumn Term 1 of Year 11)		
The Challenge of Resource Management – Resource Management in the UK		
How are global resources distributed and managed?		
Source of knowledge	**AQA GCSE Geography Textbook pg 256 to 263** **T: Drive Geography KS4 folder for teaching resources (powerpoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	**<u>The significance of resources</u>** *Resources* - a stock or supply of something that has value or a purpose Resources are things that people use. Some resources are essential for survival, whilst others are needed to maintain a standard of living. Food, water and energy are resources that help maintain social and economic wellbeing. Their production/consumption isn't equally spread between countries. The UK has reserves of each resource type. *<u>Food</u>* People cannot live without **<u>food</u>**. The average person needs to consume between 2,000 and 2,500 calories per day. The actual number of calories needed depends on factors such as gender, age, height and level of activity. Eating too few calories causes weight loss and a lack of energy. People who do not have enough food to eat find it difficult to work. If there are too many people in a country who are unable to work, then that country will lose a lot of money. Consuming too many calories causes weight gain. People who eat too much can also find it difficult to work. *<u>Water</u>* People cannot live without water. **<u>Water</u>** makes up about two thirds of a person's body. We need it for our body to function, e.g. to absorb nutrients and get rid of waste. Each person should drink between 1.6 and 2 litres of water a day. The actual amount of water needed depends on factors such as the air temperature and the type of activity that a person undertakes each day. Water is also used to keep ourselves clean and healthy, and is also needed to grow food and for industry. In drier countries or drier seasons, irrigation enables crops to grow. Industry uses water in many ways, such as cleaning, cooling and as a raw material in production.	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1. Describe the global inequality in the supply and consumption of either food, water **<u>or</u>** energy. 2. Evaluate the issue of large-scale water transfers in the UK. 3. Explain why the UK's energy mix will include both renewable and non-renewable sources in the future.

Energy

Biofuels - a fuel that is made from living things or their waste

Energy has many uses. It heats homes and offices, cooks our food and powers transport. Much of the energy that is used is in the form of electricity. This is called secondary energy - primary energy sources, such as fossil fuels or the wind, have been used to generate it.

Energy affects both food supplies and industry. Mining and growing biofuels required to generate energy takes up valuable farmland, which reduces the amount of food available to eat. And if energy is more expensive or in short supply, then it costs more to produce and transport food. This is passed on to consumers through an increase in the price of food.

Inequalities in the supply and consumption of resources

There are inequalities in the global distribution of resources. The balance between the supply and demand for resources affects a country's wealth and security.

Food security and food insecurity

Food security - uninterrupted availability of food sources at an affordable price.

Food deficit – when a country or region does not have enough food available to feed everyone in the population

Food security is when people have enough nutritious and affordable food to eat. Food insecurity is when people go hungry or are malnourished.

Wealthier countries import food and subsidise farming to make food more affordable. This creates a food surplus and there is plenty to go around. Poorer countries have a **food deficit**. They struggle to grow enough to feed people and cannot afford to subsidise farming or import more food.

Water surplus and water deficit

Water surplus - when the supply of water is greater than demand for water

Water deficit - when demand for water is greater than supply

There is a fixed amount of water on the planet. Some is stored in the oceans and ice caps and some circulates as the water cycle. The amount of water available in an area is dependent on factors such as rainfall, temperature and population.

- Higher rainfall leads to more water. Some places can have too much rainfall, which leads to flooding.
- Higher temperatures cause evaporation. If water evaporates, then less is available for people to use.
- Higher populations use more water. This means there is less available to share around.

Areas of **water surplus** have more water than they need. Excess water flows along rivers and out into the sea, but can become a problem if it floods the land. Areas of **water deficit** have too little water.

Energy security and energy insecurity

Energy security - uninterrupted availability of energy sources at an affordable price

High income countries (HICs) and new emerging economies (NEEs) consume a lot of energy. The people living in these countries are usually linked to a national electricity grid. They use a lot of technology in their lives and have a high standard of living. Factories in NEEs also use energy to manufacture products. Low income countries (LICs) use less energy. Many people living in LICs are not connected to an electricity grid, but rely on primary energy sources, such as fuel-wood or animal dung.

Some countries produce large supplies of energy. They may have fossil fuel reserves or access to other energy sources, such as geothermal heat. Other countries are dependent upon imported fuel. Fuel prices are set by the exporting countries and so those importing fuel often have to pay high prices.

Places that have energy security produce a high percentage of the energy that they consume. Places that have energy insecurity consume more than they produce. Energy security is determined by the balance between the amount of energy produced in that country and energy imported from abroad.

Food, Water & Energy Resources in the UK

Food resources in the UK

There is enough food to feed everyone on the planet, but globally there are still 1 billion people experiencing food insecurity. Food supply and consumption are not evenly distributed.

The UK does have food security. Around 40% of the UK's food has been imported and much of it has been processed.

The growing demand for food imports

Trans-national corporation – a company that has operations (factories, offices, research & development, shops) in more than one country

In the past, people ate food that was in season, e.g. cabbages and leeks in the winter and tomatoes and cucumbers in the summer. Nowadays, people in wealthier nations can eat any type of food at any point in the year. Heated greenhouses allow crops to grow out of season and cold storage allows food to be transported from other parts of the world. Trans-national corporations(TNCs) work in several different countries, processing food and exporting it across the globe.

The demand for organic produce

Organic produce - food produced without the use of chemicals such as fertilisers and pesticides

Organic foods are grown without using any chemicals. They use natural fertilisers, such as animal manure, and natural predators instead of chemical pesticides. The consumption of organic produce has risen in the UK as fewer people are prepared to eat food that has been sprayed with harsh chemicals.

When farmland is converted to become organic, yields initially drop, but then they can improve to similar levels as non-organic crops. Organic farms are environmentally sustainable, in that they don't use artificial chemicals. Some people believe that organic farming is unsustainable as it can lead to a greater use of land area.

Water resources in the UK

Around 80% of the global population experience water insecurity. Water supply and consumption are not evenly distributed. The UK has an overall water surplus although there are variations in the amount of rainfall across the country, for example places in the west receive much more rainfall than those in the east. There are also variations in the population density, e.g. the south east has a much higher population density than Wales, which is in the west.

Water transfer schemes

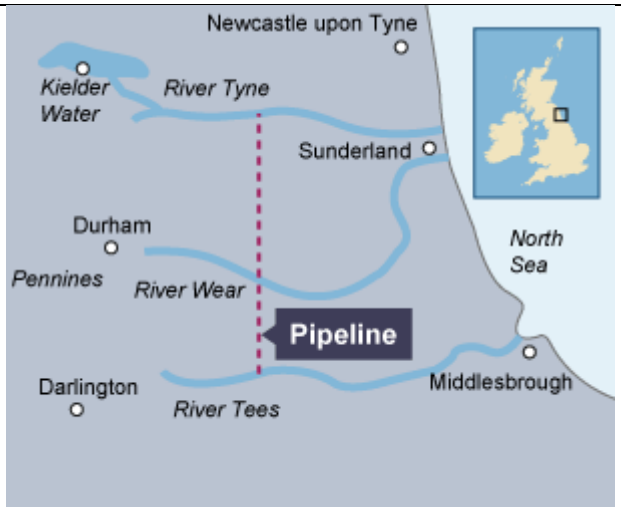
Water transfer - matching supply with demand by moving water from an area with water surplus to another area with water deficit

In the UK, there are systems in place to transport water from areas of surplus to areas of deficit. These are called water transfer schemes and they can be found in many parts of the UK. One example is Kielder reservoir in Northumberland. Kielder is located in an area of high land and so the rainfall there is higher than many surrounding areas. Rainwater that collects in Kielder reservoir is transported southwards and released into rivers that flow to the cities and towns of Newcastle-upon-Tyne, Sunderland, Durham, Darlington and Middlesbrough.

The changing demand for water

In the past, people used far less water. Water use has increased as more people wash cars, take longer showers and water their gardens. The average person uses around 150 litres of cleaned and treated water every day. Farming and industry also use large quantities of water.

Only a proportion of the UK's total water use comes from within the country. Imported products, like food and cotton, use up water resources in the countries where they are grown. The UK's water footprint is a measure of the total water used both within the UK and in other countries through imported products.



The UK government has also considered creating a national water grid. This would work in a similar way to the national electricity grid, but it would be used to link up the country's water supplies.

Energy resources in the UK

Energy mix - the range of energy sources of a region or country, both renewable and non-renewable

The mixture of primary energy sources used is called the energy mix. The energy mix of the UK consists mostly of gas, coal and nuclear fuel. The last oil-fired power station in the UK closed in 2015.

The growth of renewable energy

Fossil fuels - a natural fuel such as coal or gas, formed in the geological past from the remains of living organisms

Renewable energy - a resource that cannot be exhausted, e.g. wind, solar and tidal energy

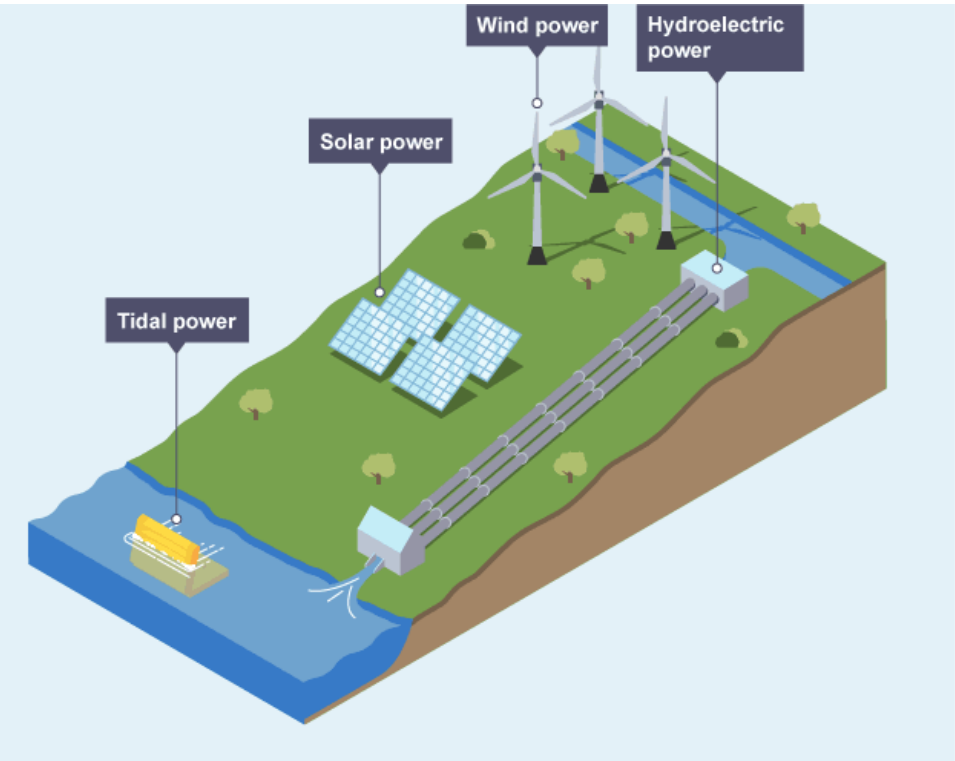
The UK has been reliant on fossil fuels for many years. Global supplies of fossil fuels were once thought to be running out. However, as technology improves, new supplies can be discovered and accessed more easily. There are huge, barely tapped reserves in South America, Africa and the Arctic.

It is estimated that gas will last another 50 years and coal another 112 years. Around 40% of the UK's gas supply currently comes from domestic supplies (the North Sea). However, UK supplies of fossil fuels could run out within just 5 years.

Renewable fuels make up less than 10% of the UK's energy mix. The government needs to increase this figure to 15% by 2020 to meet its European Union target. The UK has a lot of potential for generating renewable energy:

- Over 50% of all renewable energy generated in the UK comes from wind farms. Most of this is from onshore turbines, but the number of offshore turbines is increasing.
- The amount of UK electricity generated through hydroelectric power (HEP) has remained the same since 2012. This will not increase unless new dams are built.

- Less than 0.01% of UK energy is generated through tidal power. The UK is an island nation and could generate around 20% of its electricity using waves and tides.
- Solar panels are becoming more common, particularly on peoples' homes. The UK government think that 4% of our electricity could come from solar power by 2020.



Issues associated with energy exploitation

There are economic and environmental issues that are associated with the exploitation of energy sources:

Economic

Generating electricity costs a lot of money. There are initial costs, such as building power stations, dams and wind farms. There are also maintenance and running costs, such as buying fuel, repairing damage to structures and disposing of waste products. The government must balance these costs with other important things that the country must buy. They must also decide whether to invest in non-renewable or renewable options.

Environmental

Generating electricity has many environmental issues:

- Fossil fuel powered stations create emissions, noise from trains transporting coal, and waste products like ash. They have also been linked to high levels of radiation.
- The uranium used in nuclear power plants is highly radioactive and the waste products have to be kept away from people indefinitely.
- Renewable energies like wind and solar power can be considered visual pollution. Tidal power and HEP dams may affect marine ecosystems.

Vocabulary	

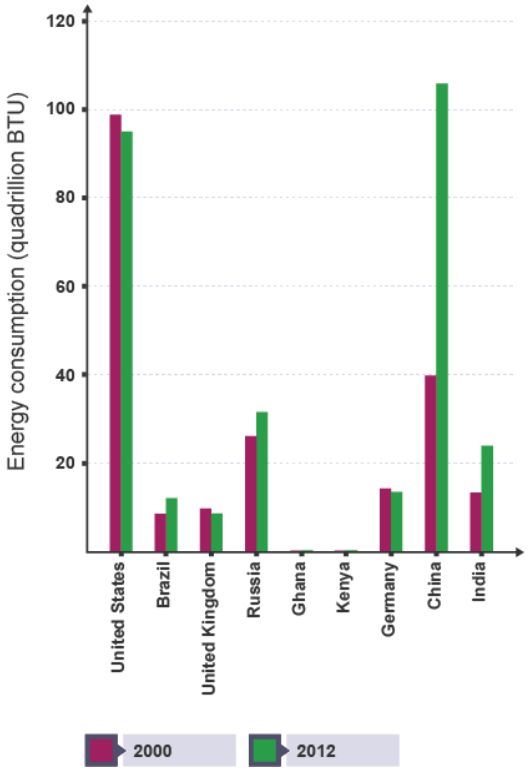
	Energy mix - the range of energy sources of a region or country, both renewable and non-renewable Food miles - the distance covered supplying food to consumers Energy conservation - energy consumption by using less energy and existing sources more efficiently
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)

Summer Term 2 (continued in Autumn Term 1 of Year 11)		
The Challenge of Resource Management – Energy Management		
How are global resources distributed and managed?		
Source of knowledge	**AQA GCSE Geography Textbook pg 288 to 299** **T: Drive Geography KS4 folder for teaching resources (powerpoints, video links etc.)** **DVDs in Head of Dept's office**	
Knowledge	**<u>Global Energy Management</u>** Global energy supply and consumption are unequal. There's a need to manage energy supplies and there are strategies that can be put in place to achieve this. Energy sustainability is a global concern. <u>*Global patterns of energy*</u> *Energy surplus* – when the supply of energy exceeds the demand for energy *Energy deficit* - when demand for energy exceeds the available supply of energy Global energy supply and consumption is not evenly distributed. Some places have an energy surplus, whereas others have an energy deficit. <u>*Global energy supply*</u> Different countries have the potential to exploit different amounts and types of energy. In general: • Saudi Arabia, Russia and the USA produce the most oil. Around 66% of global oil supplies are found in the Middle East. As technology improves, new supplies can be discovered and accessed more easily. There are huge, barely tapped reserves in South America, Africa and the Arctic. • The USA, Russia and China have the largest coal reserves. Around 70 countries have coal reserves and there is enough coal left to last for another 112 years. • Russia, Iran and Qatar have the largest natural gas reserves. At present, around 40% of the UK's natural gas comes from the North Sea, although production has decreased as profits have fallen. Globally, there is enough natural gas to last for around 50 years. • Australia, Kazakhstan and Russia have the largest uranium reserves. Uranium is a non-renewable resource used to generate nuclear power. Uranium reserves are expected to last for another 90 years.	Students will **apply** the knowledge by; Completing three exam-style extended writing questions, using the P-E-E-L paragraph structure; 1.Outline at least two reasons why many countries are experiencing energy insecurity. 2. Explain why the contribution of renewable energy to world energy production is likely to remain less than fossil fuel production. 3. Evaluate why changes in individuals' actions and in the built environment are necessary if energy use is to become sustainable.

The potential to generate renewable energy is determined by a country's location. Islands have the potential for wave power and tidal power, windy places can generate wind power, sunny countries can generate solar power, wet places with steep relief can generate hydroelectric power (HEP) and countries close to plate boundaries can generate geothermal power.

Global energy consumption

It is estimated that global energy consumption in 2040 will be 56% higher than in 2010. The growth in energy consumption will largely take place in developing countries.



Reasons for increasing energy consumption

Global energy consumption is rising. There are four main reasons for this:

1. Affluence – newly emerging economies (NEEs) like China are seeing the biggest growth in energy consumption. This is because the standard of living in these countries is improving and so more people are buying things like technology for the home and cars. Energy use in middle income countries (MICs) is high, but stable as populations are steady and new technologies help to conserve energy.
2. Population - global population is increasing. It reached 7 billion people in 2011 and it is estimated to reach 9.5 billion around 2050. Everyone uses energy and so this leads to a greater consumption of energy.
3. Technology - the development of new technologies means that more people are using energy. The use of mobile devices and computers has increased and these all require energy to power them.

4. Economic reasons - factories and offices are run using energy. As countries develop economically, they build more factories and offices for people to work in.

Factors affecting energy availability

There are several reasons why global energy supply is not even. Places that have less energy are disadvantaged as a result.

Factors affecting energy supply

Access to energy supplies is affected by:

- *Physical factors* - fossil fuels were formed millions of years ago. New supplies of fossil fuels are sometimes found, but only in places that have the right geology.
- *Cost of exploitation and production* - wages count towards the overall cost of energy production. This has led to some resources being unprofitable, e.g. the UK has coal supplies, but it is too expensive to exploit them. When the global price of oil increases, drilling becomes profitable in many harder to reach locations
- *Technology* - improvements in technology can open up new opportunities for energy use. Fracking is the process of extracting shale gas. The USA now carries out fracking, which has increased their energy supplies. Wind turbines and solar panels are becoming more efficient and so these are being used in more countries.
- *Political factors* - war can destroy energy resources or make them difficult to exploit. Corruption can mean that money is spent on things other than energy projects.

Impacts of energy insecurity

There are many different ways of defining energy security. In the UK, the government aims to ensure that consumers have access to the energy that they require, at prices that avoid volatility. Most countries that use this definition produce their own energy or import it from politically-stable countries.

Energy insecurity is the opposite of this. There are several impacts of energy insecurity, some of which these impacts are linked.

- *Exploitation of difficult and environmentally-sensitive areas* - countries like to find new sources of energy and this sometimes means that they use environmentally-sensitive areas. Fragile ecosystems can be put at risk as the desire for energy is greater than the desire for environmental protection.
- *Economic and environmental costs* - imported fuel is expensive. Exporting countries set the prices for fuel, leaving importing countries vulnerable. Some fuels cause a lot of pollution, e.g. coal causes smog and releases greenhouse gas when burnt. Mining for the raw materials for energy can also cause environmental problems with loss of habitats, noise and visual pollution.
- *Food production* - exploiting energy resources often uses valuable farmland. The growth of the biofuel market has also led to crops being grown as a fuel, rather than as food. This can cause food shortages and push food prices up as supply falls lower than demand.

- *Industrial output* - manufacturing relies on energy. When energy is in short supply, it costs more to buy. This makes manufacturing more expensive. Countries that experience energy insecurity usually have a lower industrial output.
- *Conflict* - energy insecurity can cause conflict. Dams are a good example of this. Rivers often flow through more than one country. If a country upstream builds a dam to generate hydroelectric power (HEP), then a country downstream will have less water.

Strategies to increase energy supply

As the global population continues to increase and existing fuel supplies begin to run out, countries will have to find ways to increase energy supplies.

Renewable energy

Renewable technologies offer a way to increase energy supplies, however they are often more expensive or less efficient at producing energy than fossil fuels. Therefore they often require government subsidies.

1. *Biomass* - this is recently-formed material derived from living things, e.g. chicken droppings. 'Energy from waste' plants burn biomass and non-recyclable rubbish to generate electricity. The UK has many 'energy from waste' plants, e.g. Allington Quarry in Maidstone, Kent.
2. *Hydroelectric power (HEP)* - HEP is generated when river water is trapped behind a dam and used to turn turbines. The UK generates 1.5% of its electricity this way. Most suitable locations for dam building have already been used.
3. *Wave power and tidal power* - the UK is an island nation, yet it generates very little energy using the sea. Wave energy harnesses the power of small movements on the surface of the sea. The technology is new and currently expensive. Tidal energy harnesses larger movements of the tides. There are plans for tidal lagoons to be built in the UK.
4. *Geothermal power* - this uses heat within the Earth to generate electricity. This is easier where geothermal heat is more accessible, e.g. Iceland. There are few suitable locations so geothermal energy is rare in many countries. Ground source heat pumps are a similar idea, but they use the heat from the Sun that is stored within the surface of the Earth.
5. *Solar power* - the UK government wants to increase the use of solar power by 2020. Solar panels can be fitted onto buildings or within fields. They turn sunlight into electricity. New technology is making solar panels able to generate electricity on cloudy days, which would be good for the UK.
6. *Wind power* - wind turbines convert air movements into electricity. In the UK wind speeds are consistent and so this is a good way to generate electricity. The UK generates more wind energy using turbines on the land (onshore). As an island nation, the UK could build more turbines in the sea (offshore) though these are more expensive than onshore turbines.

Non-renewable energy

Global energy use is still dominated by non-renewable energy. The use of non-renewable can be made more efficient. This could increase energy supplies as less fuel would be used.

1. *Fossil fuels* - coal and gas power stations can now re-use wasted heat. These are called combined-cycle systems. Re-using heat makes the most out of the fossil fuel. Also, some power stations now burn small amounts of biomass alongside fossil fuels. This is called co-firing and it makes the fossil fuel last longer. Fracking could exploit shale gas, which would increase supplies of fossil fuels.
2. Nuclear power - uranium fuel rods still have some uranium left within them after they have been used. Reprocessing recovers the uranium from spent fuel rods so that it can be reused. This doesn't create new supplies of uranium, but it does use the existing supplies more efficiently. This means that uranium supplies will last longer.

Case study of Fossil Fuel Extraction

Students' class work must include a case study which highlights how the extraction of a fossil fuel has both advantages and disadvantages. Students will study natural gas extraction in the Amazonian region of Peru. Details can be found on pg 294 & 295 of the student textbook.

(An alternative option is a case study of coal mining in Northumberland. Details available at https://www.bbc.co.uk/bitesize/guides/zxc2sg8/revision/4)

Energy sustainability

Some solutions to energy insecurity are more sustainable.

Sustainable energy supply – energy that can potentially be used well into the future without harming future generations

Carbon footprints

Carbon footprint – measurement of the greenhouse gases individuals produce, through burning fossil fuels.

Everyone uses energy, but if we all use less then we can reduce the amount needed. Energy use can be measured through carbon footprints. A bigger carbon footprint means that more energy is used and therefore more carbon is produced. Carbon footprints take into account:

1. *Goods and products* – energy is used to produce goods and so it is better to buy less. Owning electronic devices can be bad, especially if they're often left on standby rather than being switched off.

2. *Transport* – walking or using public transport is best, because travelling by car uses petrol or diesel per person. Aeroplanes use much more fuel than other forms of transport.
3. *Food miles* – buying local food can use less energy as food it is transported a shorter distance. However, sometimes food grown locally requires a lot of energy to produce because of the bright, warm conditions needed to grow food in huge greenhouses all-year round.

Energy conservation

Energy conservation – reducing energy consumption by using less energy and existing sources more efficiently.

Smart energy meter - A meter that sends readings to the electricity supplier and monitor household energy use.

New homes built in the UK have lots of energy-saving measures, like loft and wall insulation, radiator thermostats and smart energy meters that monitor energy use. This is because any homes that are built or rented out have an energy rating, where A-rated homes use the least energy and G-rated homes use the most.

Businesses and organisations like to be energy efficient because it saves money. Public buildings like schools and hospitals have to display an energy certificate to show how much energy they use.

Local councils encourage people to use sustainable methods of transport. This could be through providing public transport, creating cycle lanes or introducing congestion charging. London has all of these measures, plus an underground train network and a cycle hire scheme.

Better technology

Modern life is dependent upon the use of electrical items. The European Union (EU) has introduced a system that rates household appliances, like washing machines and dishwashers - A+++ items use the least electricity and D items use the most. This helps people to choose products that use less energy.

Many cars now use less fuel and some have batteries so that they can be charged using renewable electricity. The Vehicle Excise Duty (VED) is a tax for car owners. People who drive less energy efficient cars pay a higher VED.

Case study of local renewable energy scheme in an LIC or NEE

Students' class work must include an example which highlights how the installation of local renewable energy scheme helps to provide a sustainable supply of energy to a region of an LIC or NEE.

Students will study the Chambamontera micro-hydro scheme in the Andes Mountains of Peru. Details can be found on pg 298 & 299 of the student textbook.
Micro-hydro – a low cost, small scale hydro-electric power scheme that is often used in isolated or remote rural communities to provide an energy source

	(An alternative option is a case study of the use of solar panels in Kenya. Details available at https://www.bbc.co.uk/bitesize/guides/zxc2sg8/revision/6))	
Vocabulary	Congestion charging - The payment due if a private vehicle drives in a defined area during certain times of the week. Food miles – the distance covered by supplying food to consumers Fossil fuels - a natural fuel such as coal, oil or natural gas, formed in the geological past from the remains of living organisms Fracking – the process of extracting natural gas by breaking rock deep underground by injecting liquid under pressure so that many tiny cracks form.	
Assessment Focus	Half termly assessment which includes a range of question styles taken directly from GCSE Geography past exam papers for this specification (including multiple choice, short answer, geographical skills task and extended writing tasks with Spelling, Punctuation and Grammar marks)	