****

**Knowledge Rich Curriculum Plan**

Geography Y11



| **Unit : The Living World** | | | |
| --- | --- | --- | --- |
| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* |
| **Introduction to ecosystems** | * Ecosystems exist at a range of scales and involve the interaction between biotic and abiotic components. * Biotic: Living * Abiotic: Non-Living * Food chains show the flow of energy between producers and consumers in an ecosystem. * Food webs are a more complex, and show multiple food chains. * A UK example of a small scale ecosystem is the pond on Sherdley Park. | Ecosystem  Biotic  Abiotic | Links to Science curriculum of producers and consumers  Links to Ks3 topic of ecology, ecosystems and expanding threats. |
| **Large scale ecosystems** | * A biome is a large area characterized by its vegetation, soil, climate, and wildlife. * Biome distribution is influenced by latitude, and in particular the formation of low and high pressure belts which influence precipitation patterns. * Areas under low pressure belts = high precipitation = forests e.g. Taiga Forest * Areas under high pressure belts = arid = low vegetation zones e.g. Hot Desert | Biome | * Biomes in Africa, Ks3. * Ecosystems exist at a range of scales and involve the interaction between biotic and abiotic components. |
| **Tropical rainforest characteristics** | * Are very wet with over 2,000 mm of rainfall per year. * Are very warm with an average daily temperature of 28°C. The temperature never drops below 20°C and rarely exceeds 35°C. * The rainforests have 4 distinct layers: Forest floor, under canopy, canopy and emergent layer. | Emergent | * Areas under low pressure belts = high precipitation = forests e.g. Taiga Forest. |
| **Tropical rainforest nutrient cycling and adaptation** | * Nutrients are stored in biomass, soil and the litter layer. * The litter layer is dead and decaying organic matter. * Rainforest soil is low in nutrients due to leeching (high rainfall) and high uptake from biomass/vegetation. * Adaptation: Changes in animal/vegetation to fit the climate of a location. * Vegetation adaptations include drip tip leaves and buttress roots. * Animal adaptations include camouflage and long arms on monkeys. | Biomass  Litter | * Are very wet with over 2,000 mm of rainfall per year. * Are very warm with an average daily temperature of 28°C. The temperature never drops below 20°C and rarely exceeds 35°C. |
| **Value and Destruction of Tropical Rainforests** | * Rainforests provide useful goods, such as food and medicines to people. * Rainforests provide useful services such as climate regulation. * The Amazon rainforest is primarily being deforested due to cattle ranching. * Other causes of deforestation include road building, mineral extraction, energy and logging. | Goods and Services  Cattle Ranching | * Humans can have negative impacts on ecosystems, such as plastic in the ocean. * Nutrients are stored in biomass, soil and the litter layer. |
| **The impacts of rainforest destruction** | * At a local scale, soil erosion can lead to increased Amazonian flooding as sediment enters the river. * At a local scale, vegetation removal can lead to biodiversity loss and extinction. * At a global scale, global warming will accelerate. * The global impacts are more significant than the local impacts, as climate change will impact local in addition. | Soil Erosion  Extinction | * Rainforests provide useful goods, such as food and medicines to people. * Rainforests provide useful services such as climate regulation. * The Amazon rainforest is primarily being deforested due to cattle ranching. * Other causes of deforestation include road building, mineral extraction, energy and logging. * Nutrients are stored in biomass, soil and the litter layer. |
| **Location and characteristics of hot deserts** | * Hot deserts have total annual rainfall below 250 centimetres per year. * This is caused by the dominance of belts of high atmospheric pressure existing at these latitudes. * Most hot deserts are found near the Tropics of Cancer and Capricorn, between 15-30° north and south of the Equator. * The soil is often sandy or rocky and unable to hold much water. Winds are often strong, and dry out plants. * The extreme nature of desert environments means that plants and animals must adapt to survive. Plants and animals are regularly exposed to extreme temperatures and drought conditions. They must also cope with extensive water loss. * People are dependent upon their animals in deserts, for food, milk and as use as pack animals. For example, the Beja people use camels in North East Africa through Sudan, Egypt and the Sahara Desert. | High Pressure | * Areas under high pressure belts = arid = low vegetation zones e.g. Hot Desert * Adaptation: Changes in animal/vegetation to fit the climate of a location. |
| **Western Desert: Challenges** | * The Western Desert extends over 200,000 square kilometres and is located in the southwest of the USA. * Water supply Issues: Precipitation levels in the Western Desert are very low at around 55mm per year, and evaporation rates are high. * To meet demand the Hoover Dam was constructed on the Colorado River to provide water for drinking and irrigation. * Inaccessibility: Many roads are unpaved. * Access in the Western Desert is limited to major cities such as Chicago and Las Vegas. * Extreme Temperatures: Temperatures can reach 49 degrees, making agriculture difficult. Extreme temperatures also lead to water shortages | Challenge | * Development refers to the wealth, health and education of individuals in a place. * Hot deserts have total annual rainfall below 250 centimetres per year. |
| **Western Desert: Opportunities** | * Mineral extraction: Rare elements used in the manufacture of hi-tech goods such as mobile phones are mined in the Mojave Desert; Copper mined in the Sonoran Desert. * Energy In the Sonoran Desert, enough solar energy is being produced to power 100,000 homes. Due to the long hours of sunshine, there is massive potential for the generation of solar energy. A dam has been constructed on Lake Mead which generates HEP. * Tourism is a significant industry in the Western Desert. Many tourists visit natural attractions such as the Grand Canyon. Las Vegas attracts over 31 million visitors every year. | Tourism  Opportunity | * The Western Desert extends over 200,000 square kilometres and is located in the southwest of the USA. |
| **Threats in hot desert environments: The Sahel** | * Desertification: The process by which [fertile](https://www.google.com/search?rlz=1C1GCEB_enGB1032GB1032&sxsrf=AB5stBiTHCkTrBcf5Y6JvsSkS3ydLyfg3w:1689268169865&q=fertile&si=ACFMAn_otZSKbpzAqD_RvWk4YSL-ted7-4ED9IJCmrDt5-F0jSMb_Z28Ghxf6JPnsk1xX24d635osLSQsWeLynNxqoAd_NR10g%3D%3D&expnd=1) land becomes desert. * Deforestation/Cattle Grazing reduce vegetation cover, which leads to soil erosion. * Climate change leads to drought, which leads to soil erosion. * In 2014 the UN stated that 20million people in the Sahel region of Africa faced hunger and required $2 billion in food aid due to desertification. * People have to migrate out of these desertified areas and often end up in shanty towns at the edge of big cities or in refugee camps. | Desertification | * Desert temperatures can reach 49 degrees, making agriculture difficult. * At a local scale, soil erosion can lead to increased Amazonian flooding as sediment enters the river. |
| **Solutions to hot desert threats** | * The ongoing goal of the project is to restore 100 million hectares of degraded land and capture 250 million tonnes of carbon dioxide by 2030. * 15 per cent of the wall was complete with significant gains made in Nigeria, Senegal and Ethiopia. * The vegetation binds soil to prevent wind and water erosion, whilst encouraging biodiversity. * This prevents the land from becoming infertile. * The project is not considered a huge success, as by 2023 it was still not at 25% completion. | Infertile | * Desertification: The process by which [fertile](https://www.google.com/search?rlz=1C1GCEB_enGB1032GB1032&sxsrf=AB5stBiTHCkTrBcf5Y6JvsSkS3ydLyfg3w:1689268169865&q=fertile&si=ACFMAn_otZSKbpzAqD_RvWk4YSL-ted7-4ED9IJCmrDt5-F0jSMb_Z28Ghxf6JPnsk1xX24d635osLSQsWeLynNxqoAd_NR10g%3D%3D&expnd=1) land becomes desert. * In 2014 the UN stated that 20million people in the Sahel region of Africa faced hunger and required $2 billion in food aid due to desertification. * People have to migrate out of these desertified areas and often end up in shanty towns at the edge of big cities or in refugee camps. |

| **Unit 2: Physical landscapes in the UK** | | | |
| --- | --- | --- | --- |
| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* |
| **Physical processes along the coast: Erosion** | * Destructive waves: Stronger backwash than swash = erosion. * Constructive waves = Stronger swash than backwash = deposition. * Coastlines are eroded via the power of waves. There are three main types of erosion. * Marine Erosion – hydraulic power, abrasion and attrition. * Weathering processes *–* mechanical, chemical. * Mass movement – sliding, slumping and rock falls. | Erosion  Weathering  Mass Movement | * Erosion is the gradual breakdown of rock. |
| **Landforms of erosion** | * Hard rock is more resistant to erosion than soft rock, causing differential erosion to occur. * This leads to the formation of headlands and bays e.g. Flamborough head. * Some headland rocks have faults/folds which cause weakness in the rock. This allows hydraulic power to occur, resulting in the formation of cave, arch, stacks and stumps. * Where a wave cut notch occurs, cliff collapse can lead to the formation of a wave cut platform. | Hydraulic Power | * Coastlines are eroded via the power of waves. There are three main types of erosion. * Marine Erosion – hydraulic power, abrasion and attrition. |
| **Landforms of deposition** | * The eroded material is moved along a coastline via transportation. * Longshore drift is the movement of sediments along a coast by waves that approach at an angle to the shore but then the swash recedes directly away from it. This moves sediment. * Longshore drift can lead to the formation of spits and bars, when a headland changes shape. * Constructive waves build up beaches as they have a strong swash and a weak backwash. * Driftwood can lead to sand build up, and embryo dune formation. Vegetation takes hold, and the roots bind the sand to create sand dunes. | Longshore Drift | * Hard rock is more resistant to erosion than soft rock, causing differential erosion to occur. * Constructive waves = Stronger swash than backwash = deposition. |
| **Coastal Management** | * Erosion and flooding can be prevented by hard engineering – sea walls, rock armour, gabions and groynes. * Groynes trap sediment from longshore drift, to build up the beach and prevent erosion. * Hard engineering tends to be expensive, visually unappealing and environmental damaging, but, is vital is high value land area. * It can also be prevented via soft engineering – flood warnings and preparation, flood plain zoning, planting trees and river restoration. * Soft engineering is more sustainable, but, not suitable for areas of high land value. * Managed retreat is the final option for coastal management. | Hard Engineering  Soft Engineering | * Hard rock is more resistant to erosion than soft rock, causing differential erosion to occur. * Longshore drift is the movement of sediments along a coast by waves that approach at an angle to the shore but then the swash recedes directly away from it. This moves sediment. |
| **Holderness Coast Case Study** | * Soft boulder clay is found for much of the coastline = fast rate of erosion. * Strong prevailing wind from North sea encourages longshore drift south, and also creates strong destructive waves. * Flamborough Head (Headland) = Hard chalk so slower erosion rate. * Sediment transported to spurn head via LSD. * Bridlington is protected by a 4.7 km long sea wall. * Hornsea is protected by a sea wall, groynes and rock armour. * There has been an increase in erosion at Great Cowden because of the groynes used in Mappleton. This has led to farms being destroyed by the erosion and the loss of 100 chalets at the Golden Sands Holiday Park. * This has led to conflict between residents about where defences should be located * Some sea defences negatively impact tourism and reduce the amount of money coming in to the area. | Boulder Clay | * Erosion and flooding can be prevented by hard engineering – sea walls, rock armour, gabions and groynes. * Groynes trap sediment from longshore drift, to build up the beach and prevent erosion. * Hard engineering tends to be expensive, visually unappealing and environmental damaging, but, is vital is high value land area. |
| **The River Valley** | * The long profile shows the gradient and changing shape of a river. * A river valley changes shape as it is altered by erosion and deposition. * The upper course has steep sided valleys and a narrow channel. * The middle course has flatter sides and is wider. * The lower course is the widest section of the river | Long Profile | * Marine Erosion – hydraulic power, abrasion and attrition. |
| **Landforms of erosion** | * Rivers are eroded by the 4 main processes of hydraulic action, abrasion, attrition and solution. * V shaped valleys are formed by lateral erosion. * Interlocking spurs occur when a river flow meets more resistant rock, and bends. * Waterfalls form where layers of hard and soft rock are eroded at differential rates, resulting in collapse and gorge formation. | Lateral Erosion | * Marine Erosion – hydraulic power, abrasion and attrition. * A river valley changes shape as it is altered by erosion and deposition. * The upper course has steep sided valleys and a narrow channel. |
| **Landforms of erosion and deposition** | * Material from the upper course are transported down the river via traction, saltation, suspension and solution. * Meanders form through a combination of erosion and deposition. * Where the current is fastest, erosion occurs, and where it is slowest, deposition occurs. * Over time, the river bend continues to form an ox-bow lake. | Transportation  Deposition | * Rivers are eroded by the 4 main processes of hydraulic action, abrasion, attrition and solution. * The middle course has flatter sides and is wider. |
| **Landforms of deposition** | * When the river current slows, it loses energy and deposits material. * Levees develop as a river floods and deposits sediments either side of the channel. * Flood plains occur via lateral erosion, and the deposition of sediments. * Estuaries form where tidal currents slow the river, causing deposition and the building of mud flats and salt marshes. * These river landforms can be identified on OS maps. | Deposition | * Material from the upper course are transported down the river via traction, saltation, suspension and solution. * The lower course is the widest section of the river |
| **Flooding and Flood Risk** | * Flooding occurs when surface run off is too fast, and lots of water enters the river at once. * Human causes of flooding include deforestation (less interception of rainwater and faster surface run off) and urbanisation (concrete = impermeable = faster surface run off). * Physical causes include high precipitation events (E.g. Somerset 2015) and rock type. * Flood events can be shown on a storm hydrograph. The shorter the lag time on a hydrograph, the greater the flood risk. | Surface Run off | * At a local scale, soil erosion can lead to increased Amazonian flooding as sediment enters the river. * The Somerset 2015 floods were an example of extreme weather in the UK. |
| **Flood Management** | * Like coasts, rivers can be managed via hard and soft engineering. * Hard engineering options include dams and reservoirs, embankments and river straightening. * Soft engineering options include flood warnings and afforestation. * The Bridgewater Tidal Scheme is aiming to protect 15,000 by spending £128m. * The scheme will prevent economic losses, and protect business. * The scheme will also protect roads from flooding which allow emergency services to contact rescue attempts. | Afforestation | * Flooding occurs when surface run off is too fast, and lots of water enters the river at once. * Hard engineering tends to be expensive, visually unappealing and environmental damaging, but, is vital is high value land area. * Soft engineering is more sustainable, but, not suitable for areas of high land value. |

| **Unit 3: Fieldwork** | | | |
| --- | --- | --- | --- |
| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* |
| **Physical Fieldwork: Enquiry and Location** | * Our enquiry question is “To what extent is the Ainsdale Sand Dunes Nature Reserve a typical sand dune ecosystem?” * Sand dune succession theorises how vegetation changes across a sand dune. * We choose Ainsdale because it is an appropriate distance from school, so could collect enough data within time frame. It has appropriate footpath to the sand dunes, to reduce risk of injury. Showed sand dunes, as per google maps. * We used systematic sampling to reduce bias. * We pre-determined a transect line, and took regular measurements every 50m. * The strategy failed, due to obstacles in the way of the transect line. | Sampling  Appropriate | * Longshore drift is the movement of sediments along a coast by waves that approach at an angle to the shore but then the swash recedes directly away from it. This moves sediment. * Driftwood can lead to sand build up, and embryo dune formation. Vegetation takes hold, and the roots bind the sand to create sand dunes. |
| **Physical Fieldwork: Data Collection** | * Students will know that we collected both primary and secondary data, as outlined by the method below. * Vegetation Cover Survey * Used a quadrat to estimate % vegetation cover every 25m. * +Easy + quick to collect large data sets. Helps remove bias. * -Only one transect at a time. Estimation can be inaccurate. * Biodiversity Survey * Used a species chart to identify key species at each site. * +Easy + quick to collect large data sets. –Not all species were easy to identify, leading to inaccuracy. Additional app needed. * Wind Speed * Used an anemometer to measure wind speed. Held in air for 5 seconds, then read results. * +Allowed us to determine how weather affects the sand dunes. Specialised equipment = accurate data? * –Only collected one measurement. Different heights = different speeds so inaccurate. * Field Sketch * Drew a sketch at each site, and annotated key information. * +Could identify key features e.g. Dune slack. –Weather e.g. wind made it difficult to complete accurate sketches. * Google Images/Photographs: We found images of the sand dunes, and annotated key features. * Google Maps: Used satellite view to gather evidence of the dunes prior to attending | Primary and Secondary Data | * Our enquiry question is “To what extent is the Ainsdale Sand Dunes Nature Reserve a typical sand dune ecosystem?” * Sand dune succession theorises how vegetation changes across a sand dune. * We pre-determined a transect line, and took regular measurements every 50m. |
| **Physical Fieldwork: Data Presentation** | * Kite diagrams used to show vegetation survey results. * This allowed change to be seen over a transect line * Scatter graph used to show wind speed. These were easy to construct and showed correlation quickly. | Correlation | * Vegetation Cover Survey * Used a quadrat to estimate % vegetation cover every 25m. * +Easy + quick to collect large data sets. Helps remove bias. * -Only one transect at a time. Estimation can be inaccurate. * Wind Speed * Used an anemometer to measure wind speed. Held in air for 5 seconds, then read results. * +Allowed us to determine how weather affects the sand dunes. Specialised equipment = accurate data? * –Only collected one measurement. Different heights = different speeds so inaccurate |
| **Physical Fieldwork : Conclusion and Evaluation** | * The further from the sea, the greater the amount of vegetation. * The further from the sea, the greater the number of different species of vegetation (biodiversity). * This is a typical succession, aside from the human influence. * Where there was a dune slack, there was low wind speed, which would aid the growth of vegetation. * The conclusions were valid because: We collected a large data set, using multiple methods. Our data allowed us to answer the hypothesis , which shows that vegetation did change the further away from sea. Combination of both primary and secondary methods, to make conclusions more reliable. * Our conclusions were invalid because: -Human intervention (Pontins) meant that we could not see the final stage of sand dune succession, so the hypothesis was not met. Our sampling system was inaccurate, due to obstacles e.g. vegetation/sand. We only collected data on one day – representative of the whole year? E.g. vegetation may be higher in summer months. We only looked at one weather factor (wind) which may make conclusions inaccurate. * To improve our fieldwork enquiry we could: * Increase number of visits (to gain more representative data set) * Visit during multiple times of day/year , so could identify summer species. * Increase sample size e.g. more sites * Complete extra training on methods e.g. anemometer prior to visit, to increase accuracy. | Evaluation  Valid (Conclusion) | * Our enquiry question is “To what extent is the Ainsdale Sand Dunes Nature Reserve a typical sand dune ecosystem?” * Sand dune succession theorises how vegetation changes across a sand dune. |
| **Human Fieldwork: Enquiry and Location** | * Our enquiry question is: To what extent has urban regeneration in Liverpool had positive social, economic and environmental impacts. * Site of a £1bn regeneration project, which allows to answer enquiry question. * Appropriate distance from school, to allow large data set to be collected within the school day. * We used random sampling. * We divided dock into grids, using an OS map. * We pulled 4 ‘grids’ out of a hat to determine the site locations. | Regeneration | * Urban regeneration has been undertaken in Liverpool, to reduce the social, economic and environmental challenges facing the city. |
| **Human Fieldwork: Data Collection** | * We used both primary and secondary data collection methods. * Pedestrian Count: we counted the number of pedestrians that walked past at each site, for 5 minutes. * +Easy + quick to collect large data sets. Showed dock popularity. * -Hard to ‘define pedestrian’ e.g. baby. Some people may have walked past twice. * Environmental Quality Survey * Used a Likert scale to rate each location on key environmental factors. * +Easy + quick to collect large data sets. Allowed environmental factor data collection. * –Subjective (based on opinion). Categories not detailed enough = error. * Land Use Survey * Walked around site and shaded the correct land use onto a map e.g. Retail, food/drink. * +Allowed insight into economic activity. Large data set of whole dock area. * –Difficult to classify some land uses when not clear. Did not take into account the residential land use, as this was on the 2nd and 3rd floor. Our survey was only ground floor = inaccurate opinion/incomplete data set. * Google Images Photographs * +allowed us to see the area before regeneration (could not do that during primary study) * Pictures could be edited/filtered/outdated, giving an inaccurate view. * Albert Dock Official Visitor Numbers * +Provided quantitative data that we were unable to collect ourselves. * Added additional layer of detail to inquiry * -Data only continued until 2019, so out of date. | Environmental Quality | * We conducted both primary and secondary methods for the physical fieldwork enquiry. |
| **Human Fieldwork: Data Presentation** | * Radar Chart * We used a radar chart to present data for the environmental quality survey. * +Allows presentation of multiple variables (3 or more). * Allowed easy comparison between sites. * -Negative scores could ‘distort’ the graph. * Bar Chart * We used a bar chart to present the data from our pedestrian count. * +Allowed easy comparison between sites. * +Easy to construct and read data (compared to a table) * -Does not show any trends directly. * -Does not show reasons for trends. | Trend | * We completed a range of primary and secondary methods that generated large data sets. * We presented the data gained via our physical fieldwork enquiry. |
| **Human Fieldwork: Conclusion and Evaluation** | * We concluded the following from our fieldwork * Regeneration has had clear ECONOMIC AND SOCIAL benefits. Evidence of economic activity throughout, and limited evidence of social challenges. * Environmental area has improved, in comparison to the secondary data pictures we saw before. There is less dereliction as a result of regeneration. * Due to busy tourist site, water quality/air pollution was high in some sites. * Environmental quality was strong in some sites, but not all. * Our conclusions were valid because: * +Multiple primary and secondary data sets. * +Large data set collected = reliable * +Data allowed hypothesis to be answered * Our conclusions were invalid because: * Only visited on one morning during winter. This is not representative of the area all year round = more data needed. * -Methods were subjective, so highly based on opinion. This may make it difficult for the fieldwork data results to be repeated. * -Criteria on environmental quality survey was limited e.g. no section for water quality. * -Data collection only in morning. Not representative. * To improve our fieldwork we could: Increase the number of categories on our environmental quality survey. Add descriptions for each category, to reduce subjectivity. Collect data at more than 4 sites. Collect data at multiple times during the day. Repeat the fieldwork on a different day and average the results. Include a multi level land use survey, not just the ground floor (more data!) | Conclusion and Evaluation | * Our enquiry question is: To what extent has urban regeneration in Liverpool had positive social, economic and environmental impacts. * The conclusion and evaluation process is the same as the physical fieldwork enquiry. |

| **Unit 4: The Challenges of Resource Management** | | | |
| --- | --- | --- | --- |
| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* |
| **Resource Inequalities** | * Food, water and energy are fundamental to human development. * Resource inequality exists, where not all people have equal access to these. * LIC’s have lower consumption due to less technology and wealth. | Resource Inequality | * Human development refers to the wealth, health and education of a place. |
| **Food in the UK** | * The UK has growing demand for high-value food exports from low income countries and all-year demand for seasonal food and organic produce. * Food is creating a larger carbon footprints due to the increasing number of ‘food miles’ travelled, so some are moving to source food locally instead. * Agribusiness: involves the application of business skills to agriculture or food production. This means that farms are run as big businesses which attempts to increase food production by using lots of inputs such as fertilisers or labour saving machines. * Agribusiness is increasing in the UK to meet food demand and keep costs low. | Agribusiness  Organic  Carbon Footprint | * Food, water and energy are fundamental to human development. * Resource inequality exists, where not all people have equal access to these. |
| **Water in the UK** | * Demand for water in the UK is increasing due to population growth and the rise in appliances e.g. washing machines. * UK water quality is reducing, due to increased pollution. * Scotland is an area of surplus, and the SE an area of deficit. This is due to precipitation rate and population size. * Water transfer schemes, such as the Kielder Dam, may be required to ensure everybody in the UK has a supply of water. | Surplus and Defecit | * Food, water and energy are fundamental to human development. * LIC’s have lower consumption due to less technology and wealth. |
| **Energy in the UK** | * The UK’s energy mix is changing – reliance on fossil fuels is still present but there is a growing significance of renewables and reduced domestic supplies of coal, gas and oil. * The closure of coal mines and factories has led to high unemployment, in particular in the North of England. * All energy sources have environmental costs, but that is lower for renewable energy. | Energy Mix | * Food, water and energy are fundamental to human development. * LIC’s have lower consumption due to less technology and wealth. |
| **Global Water Supply** | * There are distinct global patterns of water surplus and deficit, which relate to climate zones and wealth. * Economic water insecurity occurs when a location has high precipitation, but lacks the wealth or infrastructure to access it as safe drinking water. * Water consumption is increasing because of: economic development, rising population * The factors affecting water availability are: climate, geology, pollution of supply, over-abstraction, limited infrastructure, poverty. | Water Insecurity | * Scotland is an area of surplus, and the SE an area of deficit. This is due to precipitation rate and population size. * Demand for water in the UK is increasing due to population growth and the rise in appliances e.g. washing machines. |
| **Impacts of water insecurity** | * The impacts of water insecurity include: waterborne disease and water pollution, food production, industrial output, potential for conflict where demand exceeds supply. * Cholera is a large killer of children in central Africa. * Water conflict could occur in Northern Africa between Egypt and Sudan. | Waterborne Disease | * UK water quality is reducing, due to increased pollution. * LIC’s have lower consumption due to less technology and wealth. |
| **Solving Water Insecurity: Large Scale Solutions** | * Strategies to solve water insecurity include: diverting supplies and increasing storage, dams and reservoirs, water transfers and desalination. * Not all countries can use these strategies equally, as they are often high cost and energy intensive. * The Lesotho Highlands Water Project is an example of a large-scale water transfer scheme to show how its development has both advantages and disadvantages. * The LHWP provides £5m per month to Lesotho. * The LWHP displaced 20,000 people in it’s construction. | Water Transfer  Desalinisation | * Scotland is an area of surplus, and the SE an area of deficit. This is due to precipitation rate and population size. * Water transfer schemes, such as the Kielder Dam, may be required to ensure everybody in the UK has a supply of water. |
| **Solving Water Insecurity: Sustainable Solutions** | * The Wakel River Basin is located in the south of Rajasthan (North-West India). It is the driest and poorest part of India & largely covered by the Thar Desert. * The project has encouraged greater used of rainwater harvesting techniques to collect & store water. This benefits villages & families. * Methods include: Taankas- Underground storage systems about 3m in diameter & 3-4m deep. They collect water from roofs holding up to 20,000 litres. * Johed - Small earth dams capture rainwater which sinks into the ground and raises the water table. Wells can then collect this water. Five rivers that used to dry up once the Monsoon passed now flow all year! * In the UK, water can be managed sustainably via recycling greywater, conservation and rainwater harvesting. | Sustainable  Grey Water | * Strategies to solve water insecurity include: diverting supplies and increasing storage, dams and reservoirs, water transfers and desalination. * Not all countries can use these strategies equally, as they are often high cost and energy intensive. |