West Kirby Grammar School

Curriculum Map – Year 13 Physical Geography (2022-23)

Topic name	Term	Skills developed	Prior learning	Next link in curriculum
Topic 5: The Water Cycle and Water Insecurity. EQ1: What are the processes operating within the hydrological cycle from global to local scale? 5.1 The global hydrological cycle is of enormous importance to life on earth.	Autumn 1.	• Use of diagrams showing proportional flows within systems.	Y7 Glacial unit/cryosphere Y8 Weather & climate units.	
General intro into climate & weather: general circulation of the atmosphere / winds / ocean currents / Tropical Hadley cell weather / types of rainfall / polar front jet stream and depressions and anticyclones / droughts / anticyclonic blocking		• Difficult concepts – general circulation of the atmosphere. • Reading pressure synoptic charts • Understanding 2 dimensional 7 3 D models of weather frontal systems.	Y8 Weather and climate units (from 2025) Y10 general circulation & Biomes (weather hazards unit.	Contributes to the synopticity of Paper 3.
5.2 The drainage basin is an open system within the global hydrological cycle. To include an Amazonia case study as example of human influence.	Autumn 2	• Reading pressure synoptic charts • Understanding 2 dimensional 7 3 D models of weather frontal systems.	Y9 and 10 River unit Y11 Living things unit: Tropical Rainforest & dam construction	NEA potential re soils, weather,
5.3 The hydrological cycle influences water budgets and river systems at a local scale.		• Analysis and construction of Water Budget graphs. • Comparative analysis of river regime annual discharges. • Using comparative data, labelling of features of storm hydrograph	Y9 and Y10 River unit.	Y13 Carbon unit – soils NEA Potential re hydrology
EQ2: What factors influence the hydrological system over short- and long-term timescales? 5.4 Deficits within the hydrological cycle result from physical processes but can have significant impacts. ENSO and droughts in W. Africa and Australia.		• Use of large database to study the pattern and trends in droughts worldwide. • Interpretation of synoptic charts and weather patterns, leading to droughts.	Y8 Weather and climate units. Y10 Living World – drought in Sahel. Y11 resources unit SYNOPTIC Y12 globalisation	Y13 carbon cycle unit
5.5 Surpluses within the hydrological cycle can lead to flooding, with significant impacts for people. 1.1 UK Flood events Monsoon		• Use of large database to study the pattern and trends in floods worldwide. • Interpretation of synoptic charts and weather patterns, leading to floods.	Y9 & Y10 River unit Y10 &Y12 fieldwork in Cockermouth, Cumbria. Y8.3/8.5 Weather/climate Y9.5 climate change unit Y11 Living World	Y13 Potential NEA idea

5.6 Climate change may have significant impacts on the hydrological cycle globally and locally. FUTURES: projections of future drought and flood risk.		• Using diagrams to explain a complex issue - ENSO	Y7.5 Earth's resources. 8.3 & 8.5 Weather and climate Y9.5 climate change unit Y11 Living World – hot deserts	Y13 Carbon cycle
<u>EQ3: How does water insecurity occur and why is it becoming such a global issue now?</u> 5.7 There are physical causes and human causes of water insecurity. These affect projections of future water scarcity.		• Use of a global map to analyse world water stress and scarcity.	Y11 water resources unit Y10 general circulation & Biomes (weather hazards unit.	Y13 carbon cycle
5.8 There are consequences and risks associated with water insecurity. PLAYERS: The role of different players in the Nile and Mekong drainage basin.		• Interpretation of water poverty indexes using diamond diagrams different levels of development. • Identify seasonal variations in the regime of international rivers, the Mekong and assess impact of existing and potential dams.	Y11 Resources unit – water transfers in China	SYNOPTIC Y13 geopolitics in water wars. China.
5.9 There are different approaches to managing water supply, some more sustainable than others ACTIONS contrasting attitudes to water supply		• Understanding how government and global water sharing treaties, directives and conventions operate, especially the role of PLAYERS in reducing water conflict risk	Y9 Lagos Nigeria urbanisation Y11 resources unit: Water supply in Singapore	Y13 Geopolitical discussions and the role of superpowers
Topic 6: The Carbon Cycle and Energy Security <u>EQ1: How does the carbon cycle operate to maintain planetary health?</u> 6.1 Most global carbon is locked in terrestrial stores as part of the long-term geological cycle. Most results from the formation of sedimentary carbonate rocks (limestone) in the oceans and biologically derived carbon in shale, coal and other rocks. Geological processes, such as weathering or volcanoes, release carbon into the atmosphere	Spring	• Use of proportional flow diagrams showing carbon fluxes. • Use of geological rock samples.	Y12 enrichment geology for some is useful here. From 2024 the geology now undertaken in KS3 will aid understanding here.	
6.2 Biological processes sequester carbon on land and in the oceans on shorter timescales. Phyto-plankton sequester atmospheric carbon during photosynthesis; carbonate shells move into the deep ocean water, while some carbon is released through respiration by consumers or stored as dead organic matters in soils		• Soil fieldwork techniques	Soil catena study in y12 Lake District fieldwork	Some may undertake carbon content studies in soils for their NEA.

6.3 A balanced carbon cycle is important in sustaining other earth systems but is increasingly altered by human activities such as the combustion of fossil fuels. The concentration of atmospheric carbon, regulated by ocean and terrestrial photosynthesis, strongly influences the natural greenhouse effect, which in turn determines the distribution of temperature and precipitation. Soil health is influenced by stored carbon and is important for ecosystem productivity.		• Use of maps showing global temperature and precipitation distribution. • Use of synoptic charts • Awareness of soil types in fieldwork (Y12)	Builds on work on global climates and atmospheric circulation in Y12.	Revision and possibly contributes to Paper 3 synoptic paper.
<u>EQ2: What are the consequences for people and the environment of our increasing demand for energy?</u> 6.4 Energy security is a key goal for countries, with most relying on fossil fuels. Energy mix (domestic v foreign, renewable versus non-renewable) in consumption is important. Levels of development and access to resources is key, as are TNCs and OPEC in securing pathways and energy supplies.		• Graphical analysis of the energy mix of different countries, including change over time.	Y11 resource use (though not fully) on a global scale.	Revision and possibly contributes to Paper 3 synoptic paper.
6.5 Reliance on fossil fuels to drive economic development is still the global norm. Physical geography creates a mismatch between resource locations and demand areas. As a result, energy pathways (pipelines, transmission lines, shipping routes, road and rail) are a key aspect of security but can be prone to disruption. Unconventional fossil fuel energy resources are on the rise but have impacts on fragile environments.	Spring 2.	• Awareness of current debates in various media to gain a balanced view on controversial topics such as unconventional fossil fuel energy resources including fracking shale gas in UK; tar sands in Jordan and Canada; Russian gas pipelines, or Brazilian deep-water oil.	Y13 Superpowers	Revision and possibly contributes to Paper 3 synoptic paper. Also synoptic work with superpowers and energy pathways in Y13
6.6 There are alternatives to fossil fuels but each has costs and benefits. Renewable and recyclable energy could help decouple fossil fuel from economic growth; these energy sources have costs and benefits economically, socially, and environmentally and in their contribution, they can make to energy security. Radical technologies, including carbon capture and could possibly reduce carbon emissions		• Comparisons of emissions from different energy sources with awareness of current debates in various media to gain a balanced view on renewable and recyclable energy such as nuclear power, wind and solar as well as controversial topics such as biofuels in Brazil.	Y7.5 Earths resources (from 2024) Y9 climate change (from 2023)	Revision and possibly contributes to Paper 3 synoptic paper.

<u>EQ3: How are the carbon and water cycles linked to the global climate system?</u> 6.7 Biological carbon cycles (such as soil health and forests), and the water cycle, are threatened by human activity resulting in deforestation, afforestation or the conversion of grasslands to farmland. The same activity also impacts on Ocean acidification affecting coral reefs. While man made climate change may increase the frequency of drought due to shifting climate belts, impacting on the health of forests as carbon stores.		• Using GIS to map land-use changes such as deforestation over time. • Use GIS to investigate Amazonian drought events.	Y8 Africa – Kenya brief re coral reefs damage. Y11 work on Borneo as a comparison to Amazonia.	Revision and possibly contributes to Paper 3 synoptic paper.
6.8 There are implications for human wellbeing from the degradation of the water and carbon cycles. Forest loss is one, although evidence does suggest that forest stores are being protected and even expanded especially in HICs. Increased temperatures affect evaporation rates and the quantity of water vapour in the atmosphere with implications for precipitation patterns, river regimes and water stores be they glacial or in drainage basins. Ocean health deterioration affects tourism for many economies		• Analysis of climate model maps to identify areas at most risk from water shortages, floods in the future. • Ability to read synoptic charts started in Y12.	Y12 climate aspect of water cycle.	Revision and possibly contributes to Paper 3 synoptic paper.
6.9 Further planetary warming risks large-scale release of stored carbon, requiring responses from different players at different scales. This release varies from damaged peatlands and permafrost to forest die back and change to thermohaline circulation. Both adaptation strategies for a changed climate and re-balancing the carbon cycle through mitigation are both essential here.		• Plotting graphs of carbon dioxide levels, calculating means and rates of change.	Y10 Climate change hazard management – adaptation or mitigation.	Revision and possibly contributes to Paper 3 synoptic paper.