Subject	Year	Term
Geography	13	1

Topic

Water and Carbon

Content + skills (Intent)

Prior Learning (Topic)

KS1/KS2-

key physical features, including:, forest, sea, ocean, river, soil, valley, vegetation

physical geography, including: climate zones, biomes and vegetation belts, rivers, and the water cycle

KS3 at Balcarras Year 7 Help we are going under – basic concepts of the water cycle and rivers, Year 7 think today enjoy tomorrow early introduction into carbon footprint and global warming, Year 8 – Deforestation links to carbon cycle, Year 9 – Ecosystems topic (with understanding of soils and carbon cycle) and Clean Water for concepts of water and usage/pollution issues.

KS4 at Balcarras Year 10 Hazards section on extreme weather and climate change link to both carbon and water cycles, Year 10 Physical Landscapes, rivers and processes links to water cycle, Year 11 topic of Resources covers concepts linked to carbon in energy use, and water topic regarding supply,

KS5 at Balcarras

This section of our specification focuses on the major stores of water and carbon at or near the Earth's surface and the dynamic cyclical relationships associated with them. These are major elements in the natural environment and understanding them is fundamental to many aspects of physical geography.

This section specifies a systems approach to the study of water and carbon cycles. The content invites students to contemplate the magnitude and significance of the cycles at a variety of scales, their relevance to wider geography and their central importance for human populations. The section offers the opportunity to exercise and develop geographical skills including observation, measurement and geospatial mapping skills, together with data manipulation and statistical skills including those associated with and arising from fieldwork

Future Learning (Topic) Geographical skills across all A-level topics. This is a core topic so there can be synoptic links made to all other topics at A-level. Links here between carbon and wildfires for example.

Cross curricular-Sciences, environmental science

How will knowledge and skills be taught? (Implementation)	How will your understanding be assessed & recorded (Impact)
Key Themes: Water and carbon cycles as natural systems The water cycle Global distribution and size of major stores of water – Processes driving change Drainage basins as open systems – Concept of water balance. Runoff variation and the flood hydrograph. Changes in the water cycle over time The carbon cycle Global distribution, and size of major stores of carbon Changes in the carbon cycle over time. The carbon budget and the impact of the carbon cycle upon land, ocean and atmosphere, including global climate. Water, carbon, climate and life on Earth The key role of the carbon and water stores and cycles in supporting life on Earth with particular reference to climate. Human interventions in the carbon cycle designed to influence carbon transfers and mitigate the impacts of climate change. Quantitative and qualitative skills Students must engage with a range of quantitative and relevant qualitative skills, within the theme water and carbon cycles. Students must specifically understand simple mass balance, unit conversions and the analysis and presentation of field data. Case studies **Case study** of a tropical rainforest setting to illustrate and analyse key themes in water and carbon cycles and their relationship to environmental change and human activity. **Amazon Rainforest** **Case study** of a river catchment(s) at a local scale to illustrate and analyse the key themes above,engage with field data and consider	Provide SHORT and FREQUENT re-call tests in a low-stakes environment – mix of formative and summative Pupils will receive a past paper question booklet which covers all previous exam questions available to us. These will be regularly set, fed back/marked Continual low-stakes formative testing in lessons through verbal questioning This topic will be covered within the Year 12 and Year 13 formal mock exams - summative feedback. A level record sheet, Progress analysis, data shared in interim reports and formal reports and parents evening.

the impact of precipitation upon drainage basin stores and transfers and implications for sustainable water supply and/or flooding. **River Exe**

The A-Level course comprise of lessons where content is taught (teacher led), directed questioning and adaptive teaching. Pupil notes are made (often through 'flip learning' ahead of the next lesson). Exam technique is integrated (see opposite box) via PPQs, plus there is an expectation of wider reading and keeping up with current issues/affairs. We aim to include pupil centred/led learning through group work, peer learning/assessment. We also include fieldwork, GIS and numeracy/ computing skills where possible.

Misconceptions

The distribution of water and carbon stores
Pupils misinterpret where the stores are and the amount of water and carbon stored. Particular care will be required to teach this correctly and iron out any misconceptions (atmosphere v lithosere for example or missing out ocean store for carbon)
Timescales of change are quick
Pupils make mistakes in the timescales of change in the stores/flows/transfers of water and carbon and will need to be prepared to be challenged to consider long time frames when in the past they only look at short ones such as a flood event v's a ice age
That the drainage basin and the hill slope cycle are the same thing.
Important to support pupil learning for scale in this topic
Feedback and the difference between positive and negative feedback in the water and carbon cycle
Pupils can get this incorrect and need to be careful – especially when thinking about melting permafrost in the arctic – being a example of positive feedback

How can parents help at home?

Support with homework and revision techniques for graded assessments. Discuss current affair issues by watching/reading the news. Download the BBC or Guardian news app and set to environmental notifications to receive the most update articles. Watching relevant documentaries e.g. David Attenborough, wildlife/environments

Places to explore

Watch this
BBC Life at 50 degrees, episodes Return of the river and Nigeria Burning available on iplayer
Climate change:The facts on iplayer (https://www.bbc.co.uk/iplayer/search?q=climate+change)
Our Planet: Freshwater (Netflix)
Earth's Great Rivers (BBC iPlayer)
Managing Rivers and Preventing Flooding: https://youtu.be/AX1i5uJ50qM

Listen to this
The global water crisis https://www.wri.org/insights/podcast-solutions-global-water-crisis

Check this out
Before the Flood (Netflix)
The boy who harnessed the wind – Netflix
Working in the 'green sector' https://www.bbc.co.uk/news/science-environment-58549135
Research the Paris Summit 2015 agreement and subsequent global policies, evaluate the effectiveness of this.

Conversation Starters/essay titles
Changes to water and carbon cycles are human induced.
Assess which factors are the most influential at driving change in the water/carbon cycle
Farming practices at a local scale can affect stores and transfers of carbon and should be a focus for management.
Assess the regional and global impact of the Arctic becoming a net carbon source in the future.
Deforestation of tropical rainforests causes irreversible damage to carbon and water cycles and management of this is futile.

Helpful further reading/discussion – see also subject VLE pages

Reading

Non fiction

Net Zero: How We Stop Causing Climate Change by Dieter Helm

Climate change and the road to NET-ZERO: by Dr Mathew Hampshire-Waugh

How bad are bananas? by Mike Berners Lee

Academic reading

The Global Energy Challenge: Environment, Development and Security
by Caroline Kuzemko (Author), Andreas Goldthau (Author), Michael Keating (Author

The Water and Carbon Cycles by Andrew Davis and Garrett Nagle

H2O: A Biography of Water by Philip Ball

Farms, family farms, farmland distribution and farm labour:what we know today by the Food and Agriculture Organisation

Fiction

Orphans of the Tide by Straun Murray
Tsunami Girl by Julian Sedgwick and Chie Kutsuwada
Somerset Tsunami by Emma Carroll
Robin Hood: Drones, Dams & Destruction by Robert Muchamore
Flash Flood by Chris Ryan
Flood Child by Emily Diamand
Floodworld by Tom Huddleston

Vocabulary Lists

Speaking like a geographer (Splag)

Water Cycle
Evaporation
Condensation
precipitation
Atmosphere
Lithosere
Hydrosphere
Biosphere
Cryosphere
Drainage basin
Feedback and systems
Dynamic equilibrium
Carbon Cycle
stores and flows,
interception,
surface runoff
soil water,
groundwater
channel storage;
stemflow,
infiltration
overland flow,
channel flow.
Water balance.
Runoff
flood hydrograph.
Carbon budget
Photosynthesis,
respiration,
decomposition,
combustion,
carbon sequestration
Enhanced Greenhouse Effect
Mitigation

Careers Links

Working for the Environment Agency

https://environmentagencycareers.co.uk/

Careers in humanitarian roles to support water scarcity eg Water Aid Working for an NGO

Developing Green planet – green careers links https://www.bbc.co.uk/bitesize/tags/z2hvydm/green-careers/1