

Revision outline

Physical geography: Water and Carbon Cycle

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| Specification content | | Possible exam/revision questions | Self assessment |
| Systems in physical geography: Systems concepts and their applications to the water and carbon cycles.  Inputs-outputs, energy, stores/components, flows/transfers, positive/negative feedback, dynamic equilibrium. | | **Outline an example of positive feedback in the water cycle. [3 marks] *AS Level 2018***  **Explain the concept of dynamic equilibrium in relation to the water cycle. [4 marks] *A Level SAM*** |  |
| Global distribution and size of major stores of water – lithosphere, hydrosphere, cryosphere and atmosphere. | | **Using Figure 1 and Figure 2, analyse the nature of these global stores of fresh water. [6 marks] *AS Level SAM 2***  Using the data from Table 1.1, describe the distribution of the Earth’s water (4 marks) *Hodder Workbook* |  |
| Processes driving change in the magnitude of these stores over time and space, including flows and transfers: evaporation, condensation, cloud formation, causes of precipitation and cryospheric processes at hill slope, drainage basin and global scales with reference to varying timescales involved. | | **Explain the role of cryospheric change in the water cycle. [4 marks] *2018 A Level***  **‘The size of major stores of water change over time more because of human activity than natural variation.’ To what extent do you agree with this statement? [20 marks] *AS 2018***  What are the major processes responsible for change in the magnitude of global water cycle stores over time and space? *Oxford*  Figure 1.7 shows the predicted change in global rainfall intensity by the end of the twenty-first century. Using Figure 1.7, analyse this predicted change. (6 marks) *Hodder Workbook* |  |
| Drainage basins as open systems – inputs and outputs, to include precipitation, evapotranspiration and runoff; stores and flows, to include interception, surface, soil water, groundwater and channel storage; stemflow, infiltration overland flow, and channel flow. Concept of water balance. | | **Outline the process of infiltration as a flow of water within a drainage basin system. (3 marks) *AS Level Paper 1 June 2019***  **Outline flows within the water cycle operating on a hill slope. (4 marks) A Level Paper 1 June 2019**  Describe the different ways that water can enter a river channel. (5 marks) *Hodder Workbook*  **Using Figure 1, analyse the water balance data for the city of Potsdam. [6 marks] *A Level SAM 2***  Study a completed version of Figure 1.3. With the aid of Fig 1.3, describe the drainage basin hydrological cycle and the processes that operate in it. (6 marks) *Hodder Workbook* |  |
| Runoff variation and the flood hydrograph. | | **Using Figure 2 and your own knowledge, assess the natural and human induced causes of the 2005 flood in Carlisle. [6 marks] *A Level SAM***  **Complete Figure 1 by adding the data shown in Figure 2 below, and then analyse the impact of the rainfall upon the discharge. [6 marks] *AS SAM***  **Using Figure 2a, Figure 2b and your own knowledge, assess the potential impact of changing vegetation cover upon the runoff in this area. (6 marks) A Level Paper 1 June 2019**  Complete Table 1.3 by describing how changes in the named physical factors might change the shape of a storm hydrograph. Give a brief explanation. (10 marks) *Hodder Workbook*  Complete Table 1.4 by describing how changes in the human factors shown might change the shape of a storm hydrograph. Give a brief explanation, (8 marks) *Hodder Workbook*  Assess how the following factors cause variation in runoff: type and intensity of precipitation, climate, soil water, rock type, human activities (such as reservoirs, land use change and urbanization) *Oxford*  **Evaluate the importance of the human and natural factors affecting river discharge over time. [20 marks] *AS SAM 2*** |  |
| Changes in the water cycle over time to include natural variation including storm events, seasonal  Changes and human impact including farming practices, land use change and water abstraction. | | **‘The size of major stores of water change over time more because of human activity than natural variation.’ To what extent do you agree with this statement? [20 marks] *AS 2018***  **Using Figure 2 and your own knowledge, assess the natural and human induced causes of the 2005 flood in Carlisle. [6 marks] *A Level SAM***  **Outline potential impacts of farming practices upon the water cycle. [3 marks] *AS SAM***  **Evaluate the view that human activity is having a greater impact than natural factors on the water cycle. [9 marks] *AS SAM*** |  |
| 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 the impact of precipitation upon drainage basin stores and transfers and implications for sustainable water supply and/or flooding. | | **With reference to a river catchment that you have studied, assess the potential impact of human activity upon the drainage basin. [20 marks] *2017 AS Level***  With reference to a river catchment you have studied, assess the extent to which runoff depends on natural variation in the water cycle rather than human activity. (20 marks) *Hodder Workbook*  As part of your course you have studied a drainage basin at a local level. Describe the impact of precipitation upon the water stores and transfers in that drainage basin and explain the implications for either a sustainable water supply and/or flooding. (20 marks) *Hodder Workbook*  **Assess the potential causes and impacts of changes to the water balance within a tropical rainforest that you have studied. [20 marks] *2018 A Level*** |  |
| **Specification content** | **Possible exam and revision questions** | | |
| **The Carbon Cycle**   * Global distribution and size of major stores of carbon – lithosphere, hydrosphere, cryosphere biosphere, atmosphere. * Factors driving change in the magnitude of these stores over time and space, including flows and transfers at plant, sere and continental scales. Photosynthesis, respiration, decomposition, combustion, burial, compaction, carbon sequestration in oceans and sediments, weathering. * Changes in the carbon cycle over time, to include natural variation (including wild fires, volcanic activity) and human impact (including hydrocarbon fuel extraction and burning, farming practices, deforestation, land use changes). * The carbon budget and the impact of the carbon cycle upon land, ocean and atmosphere, including global climate. | ***Outline the process of photosynthesis in the carbon cycle. [3 marks] AQA 2017 AS Paper 1***  ***Outline the process of decomposition in the carbon cycle. (4 marks) A Level Paper 1 2020***  ***How far do you agree that changes to the carbon cycle will lead to increasingly severe storm events? [9 marks] AQA 2017 AS Paper***  ***Assess the relative importance of carbon sequestration and fossil fuel combustion on major stores of carbon. (9 marks) AQA AS Paper 1 June 2019***  ***Assess the impact of farming practices on the carbon budget. (20 marks) A Level Paper 1 2020***  Assess the extent to which rising global temperatures may result in a positive feedback cycle of yet more higher carbon content in the atmosphere (20 marks) Cambridge textbook.  Explain the concept of dynamic equilibrium in relation to the carbon cycle at the scale of the lithosphere. (4 marks) Oxford  Describe the key stores within the carbon cycle and the transfers between them as a local scale (4 marks) Oxford  Outline the processes by which natural variation in the carbon cycle occurs. (6 marks) Oxford  Evaluate the view that changes in the global carbon cycle are a threat to Antarctica. (9 marks) Hodder | | |
| **Water, Carbon, Climate and Life on Earth**   * The key role of the carbon and water stores and cycles in supporting life on Earth and particular reference to climate. The relationship between the water cycle and carbon cycle in the atmosphere. The role of feedbacks within and between cycles and their link to climate change and implications for life on Earth. * Human interventions in the carbon cycle designed to influence carbon transfers and mitigate the impacts of climate change. | ***Using Figure 2 and your own knowledge, assess the predicted impact of climate change upon life in this region. (6 marks) A Level Paper 1 2020***  ***Assess the extent to which there are inter-relationships between processes in the water cycle and factors driving change in the carbon cycle. [20 marks] AQA Specimen Assessment Material - A level***  ***To what extent does an understanding of feedback systems in the carbon cycle help with attempts to mitigate the impacts of climate change? (20 marks) A Level Paper 1 June 2019***  Is carbon sequestration a recent human innovation or a natural process? (6 marks)  Evaluate the relative importance of natural and human factors in driving change in the carbon cycle over time. (20 marks) Oxford | | |
| **Case Study 1**  Case study of a tropical rainforest setting to illustrate and analyze key themes in water and carbon cycles and their relationship to environmental change and human activity.  **Case Study 2**  Case study of a river catchment(s) at a local scale to illustrate and analyze the key themes above, engage with field data and consider the impact of precipitation upon drainage basin stores and transfers and implications for sustainable water supply and/or flooding. | ***To what extent do you agree that human activity is responsible for permanent changes to the carbon cycle in tropical rainforests? [20 marks] AQA Specimen Assessment Material – AS level***  ***With reference to a river catchment that you have studied, assess the potential impact of human activity upon the drainage basin. [20 marks] AQA 2017 AS Paper***  ***‘Human activity has a significant impact on flows of water in tropical rainforests.’ With reference to a tropical rainforest you have studied, to what extent do you agree with this view? (20 marks) AQA AS Paper 1 June 2019***  With reference to an area of rainforest you have studied, assess the extent to which the water and carbon cycles in that area may be related to attempts at global governance. (20 marks) Hodder  With reference to a river catchment you have studied, to what extent do different land surfaces within the drainage basin affect both the infiltration rates and the channel flows? (20 marks) Hodder | | |