**Topic 5: Water Cycle and Water Insecurity PLC**

**SELF ASSESSMENT**

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| **Element of the course** |  |  |  |
| **1. What are the processes operating within the hydrological cycle from global to local scale?** |  |  |  |
| Describe the global hydrological cycle as a closed system driven by solar energy and gravitational potential energy. |  |  |  |
| Define the different inputs, outputs, stores and flows within the cycle. |  |  |  |
| Understand and explain the relative importance and size (percentage contribution) of the water stores (oceans, atmosphere, biosphere, cryosphere, groundwater and surface water) and annual fluxes between atmosphere, ocean and land. |  |  |  |
| Understand the global water budget limits water available for human use and water stores have different residence times; some stores are non-renewable (fossil water or cryosphere losses) |  |  |  |
| Define the terms: inputs (precipitation patterns and types: orographic, frontal, convectional) flows (interception, infiltration, direct runoff, saturated overland flow, throughflow, percolation, groundwater flow) and outputs (evaporation, transpiration and channel flow). |  |  |  |
| Explain how these (terms) are linked processes in the hydrological cycle. |  |  |  |
| Explain how physical factors affect the relative importance of inputs, flows and outputs (climate, soils, vegetation, geology, relief) in drainage basins. |  |  |  |
| Discuss the disruption caused by humans, by accelerating processes (deforestation; changing land use) and creating new water storage reservoirs or by abstracting water, in the drainage basin cycle. (See: Amazonia) |  |  |  |
| Interpret and understand water budgets (annual balance between inputs (precipitation) and outputs (evapotranspiration) and how they affect soil water and availability. |  |  |  |
| Know that water budgets are influenced by climate type (See: tropical, temperate, polar examples). |  |  |  |
| Analyse river regimes to show annual variation of discharge of a river and result from the impact of climate, geology and soils as shown in regimes from contrasting river basins. (See: Yukon, Amazon, Indus). |  |  |  |
| Interpret storm hydrographs affected by physical features of drainage basins (size, shape, drainage density, rock type, soil, relief and vegetation) as well as human factors (land use and urbanisation). Refer to the role of planners in managing land use. |  |  |  |
| **2. What factors influence the hydrological system over short- and long-term timescales?** |  |  |  |
| Describe and explain the causes of drought (meteorological (short-A14term precipitation deficit, longer trends, ENSO cycles and hydrological). |  |  |  |
| Discuss the contribution human activity makes to the risk of drought: over-abstraction of surface water resources and ground water aquifers. (See: Sahelian drought; Australia). |  |  |  |
| Evaluate the impacts of drought on ecosystem functioning (wetlands, forest stress) and the resilience of these ecosystems. |  |  |  |
| Describe and explain the meteorological causes of flooding, including intense storms leading to flash flooding, unusually heavy or prolonged rainfall, extreme monsoonal rainfall and snowmelt. |  |  |  |
| Describe and explain the human causes (of exacerbation) of flood risk (changing land use, mismanagement of rivers using hard engineering). |  |  |  |
| Evaluate the environmental impacts of flooding (soils and ecosystems). (See: UK 2007/2012). |  |  |  |
| Evaluate the socio-economic impacts of flooding (economic activity, infrastructure and settlement) See: UK 2007/2012). |  |  |  |
| Describe how climate change affects processes (inputs, outputs) within hydrological cycle. Refer to trends in precipitation and evaporation. |  |  |  |
| Describe and explain how climate change affects stores and flows, size of snow and glacier mass, reservoirs, lakes, amount of permafrost, soil moisture levels as well as rates of runoff and stream flow. |  |  |  |
| Understand climate change can result from short-term oscillations (ENSO cycles), as well as global warming, increases the uncertainty in the system, which causes concern over the security of water supplies. Refer to future drought and future flood risk). |  |  |  |
| **3. How does water insecurity occur and why is it becoming such a global issue for the 21st century?** |  |  |  |
| Describe the growing mismatch between water supply and demand. |  |  |  |
| Explain how this has led to a global pattern of water stress (below 1,700 m³ per person) and water scarcity (below 1000m³ per person). |  |  |  |
| Describe the physical causes of water insecurity (See: climate variability, salt water encroachment at coast). |  |  |  |
| Describe the human causes of water insecurity (See: over abstraction from rivers, lakes and groundwater aquifers, water contamination from agriculture, industrial water pollution).  |  |  |  |
| Describe and explain the pressure on finite water sources from rising demand (increasing population, improving living standards, industrialisation and agriculture).  |  |  |  |
| Explain why the pressure is increasingly serious in some locations and that it is leading to increasing risk of water insecurity. Refer to future water scarcity. |  |  |  |
| Understand the causes of (and global pattern of) physical water scarcity and economic scarcity. |  |  |  |
| Explain why the price of water varies globally. |  |  |  |
| Discuss the importance of water supply for economic development (industry, energy supply, agriculture) and human wellbeing (sanitation, health and food preparation); the environmental and economic problems resulting from inadequate water. |  |  |  |
| Discuss the potential conflicts that may occur between users within a country, and internationally over local and trans-boundary water sources (See: Nile, Mekong). Refer to roles of stakeholders. |  |  |  |
| Examine the pros and cons of the techno-fix of hard engineering schemes to include water transfers, mega dams and desalination plants. (See: Water transfers in China). |  |  |  |
| Understand and comment on the value of more sustainable schemes of restoration of water supplies and water conservation (smart irrigation, recycling of water). (See: Singapore). Refer to contrasting attitudes to water supply. |  |  |  |
| Evaluate Integrated drainage basin management for large rivers. (See: Nile, Colorado). |  |  |  |
| Evaluate water sharing treaties and frameworks (United Nations Economic Commission for Europe (UNECE) Water Convention, Helsinki and the Water Framework Directive and Hydropower, Berlin). |  |  |  |

**SELF ASSESSMENT TEACHER ASSESSMENT**

**To improve your grade you should…**

**Your strengths in this activity are…**

**PM (Progress Made?)**

**PF (Progress Forward?)**