4: Rivers and coasts

Syllabus ref.	Learning objectives	Suggested teaching activities
2.2 Rivers	Explain the main hydrological characteristics and processes which operate within rivers and drainage basins	Learners draw a pie chart to show the sources of water on earth to introduce the hydrological cycle. What do they notice about fresh water? (Link to 3.6.) Provide learners with a diagram on the global hydrological system and discuss. **(I)** Focus on the drainage basin part of this diagram and introduce the concept of 'a system' (see: www.bbc.co.uk/scotland/education/int/geog/rivers/drainage/index.shtml). Could exemplify with reference to a simple and familiar system like the human body. Learners define key words 'input', 'output', 'store' and 'transfer', and add to key word glossary. **(I)** Learners label a diagram to show the drainage basins system with key characteristics and inputs, stores, transfers and outputs. Colour code the labels to show which are 'inputs', 'flows', 'stores' and 'outputs'. **(I)** Complete card sorting activity to define each one. Whole class discussion on the factors affecting processes within a drainage basin – can be revisited when discussing the causes of flooding later – learners record factors and description in a table. Learners can use drainage basin diagram to show information in a new format – produce a systems diagram for a drainage basin. **(I)** Illustrate key features of the drainage basin such as watershed, confluence and tributary with photographs and locate examples on a map using grid references. Learners also sketch and label drainage basin features from a photograph. Update key word glossary with new terms. Opportunity for skills activity: describing the relief and drainage of an area. **(I)** This could also incorporate how height is shown on a map. Learners label diagram to show the long profile of a river and label each section. The following links provide information on rivers: www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/background_rivers_rev1.shtml www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_profiles_rev1.shtml www.geography.learnontheinternet.co.uk/topics/river.html www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_profiles_video.shtml Define 'source' and 'mouth' and add to key word glossary. Provide a diagram of the Bradshaw model – learners work in

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		pairs to describe the main changes that occur with distance downstream – width, depth, and speed of flow/velocity, etc. (see: www.geography-fieldwork.org/riverfieldwork/downstream_changes/stage1.htm). Explanations for these changes will be studied as part of the next section. Begin to annotate the long profile diagram to show characteristics of each stage. **(I)** **Map work opportunity:** looking at stream patterns, drainage density and gradients or sizes of streams. This link provides ideas for the whole unit: www.sln.org.uk/geography/rivers_and_coasts.htm
	Demonstrate an understanding of the work of a river in eroding, transporting and depositing	Introduce the key words 'erosion', 'transport' and 'deposition' and add to key word glossary. Learners can illustrate these by drawing a simple cartoon to show the processes in a familiar context. **(I)** Learners complete card sorting activity to define the four processes of erosion – 'corrosion', 'corrasion','hydraulic action' and 'attrition'. Discuss the difference between 'vertical' and 'lateral erosion' and define key words. Draw and fully annotate a diagram to show the four types of transportation and the link to the size of the material – 'traction', 'saltation', 'suspension' and 'solution'. **(I)** Define 'load' and show photographs to show how the size and shape of load will change downstream – learners describe changes and work in pairs to suggest reasons for this. In pairs, discuss why and under what conditions a river might deposit material and note down ideas – discuss and confirm in whole class discussion. Learners annotate previous long profile diagram to show where erosion, transport and deposition take place in a river. **(I)** Revisit Bradshaw model diagram and whole class discussion as to why width, depth and speed change with distance downstream – learners answer questions to explain the changes**. (I)** Learners could also be provided with data to show changes downstream – draw graphs, river and valley cross sections, describe and explain changes, produce scatter graphs to show the relationship between data sets – write up as a mini investigation. Alternatively, this information could be collected through fieldwork – see note below. Use the following links: www.geography.learnontheinternet.co.uk/topics/river.html www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_processes_rev1.shtml

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		www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_processes_video.shtml **Fieldwork opportunity:** investigating changes in a river downstream to include measurements of channel width, depth, velocity, size and shape of bed load.
	Describe and explain the formation of the landforms associated with these processes	Recap long profile diagram and the three stages of a river. Learners analyse photographs to show the shape of the river valley in cross section at each of these stages – annotate to show main characteristics or produce appropriately labelled sketches. **(I)** Learners identify and describe river valleys from a map extract using key terminology as suggested in the syllabus. **(I)** Provide learners with diagrams to show the formation of a river valley – they work in pairs to sequence the diagrams and then match explanations to each diagram to explain the formation of a river valley. Learners repeat these activities to describe the features of and explain the formation of a waterfall. Learners independently research the formation of potholes, write up and feedback to the whole class. **(I)** **Fieldwork opportunity:** measuring valley profiles with varying distance downstream. **Map work opportunity:** identifying and describing valleys on a map extract. Provide some data to show the varying depths across a meander. Learners draw a cross section. Label key characteristics – fastest flow, outside, erosion, river cliff, inside, slow flow, river beach, shallow, etc. In pairs, discuss the reasons for the variation in river depth across a meander. Learners draw fully annotated sketches to show a river cliff and a river beach – describe and explain their formation. Learners produce a presentation to describe and explain the formation of an oxbow lake, delta, levees and flood plain – for each there should be a fully labelled photograph, named example, annotated diagrams and an explanation of how the feature is formed. **(I)** All diagrams should be well annotated and appropriate reference made to examples (not case studies) for river landforms. **Map work opportunity:** identifying and locating features on a map extract(s). Learners could also measure river gradients at different stages. Learners describe the form of a river at different stages and

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		how it changes with distance downstream. **(I)** **Fieldwork opportunity:** measuring a cross section through a meander, field sketches and photographs of river features. The following links will be useful here: Rivers: www.geography.learnontheinternet.co.uk/topics/river.html River landforms: www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_landforms_rev1.shtml River landforms (video): www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_landforms_video.shtml Rivers and water: www.bbc.co.uk/education/topics/zncqxnb
	Demonstrate an understanding that rivers present hazards and offer opportunities for people	Learners define 'flood' and add to key word glossary. Learners draw a flood hydrograph, add labels, define key words and answer questions to interpret what it shows. **(I)** Link back to previous work – contrasting drainage basins – discuss the characteristics of a drainage basin that is more likely to flood – show contrasts between the two as a table. Learners plot and describe a flood hydrograph (see: www.bbc.co.uk/scotland/education/int/geog/rivers/hydrographs/) for a river that has flooded – use this to introduce causes. **(I)** Learners brainstorm the causes of flooding and show as a mind map – colour code into physical and human factors. Choose two physical and two human factors and explain how they cause flooding in more detail – focus on development of ideas. Whole class discussion of the causes of flooding and river erosion. **(I)** (See river flooding and management: www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_flooding_management_rev1.shtml). Show photographs of the effects of various river floods – discuss in pairs the hazards that this presents for people. **Extension activity:** Learners write headlines and short newspaper articles to show the range of effects. Repeat for river erosion. **(I)** Provide cards showing the advantages offered by a river, delta and floodplain – learners sort them into categories – some may go into more than one category. Reinforce with photographs. Write up as a short report – advantages of each

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		ensuring that ideas are fully developed. **(I)**
	Explain what can be done to manage the impacts of river flooding	Select a type of river management and show a photograph – learners ask questions that they want to be answered – what, where, when, why, who is affected, etc. Whole class discussion (see: www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_flooding_management_rev1.shtml). Introduce ways in which rivers can be managed – could be a card sorting activity – categorise into soft and hard engineering. For each, learners write a short description of how each reduces the flooding hazard with possible advantages and disadvantages. Learners could be provided with a scenario – a river that has flooded and a budget - they have to decide how the river hazard is going to be managed. Decision-making activity in groups followed up by a justification of their choice of scheme. This could also be followed up by a role-play – different viewpoints on the chosen scheme. **Extension activity:** Should rivers be allowed to flood? Learners present and explain their ideas. **(I)**
2.2 Case study	Know a case study of the opportunities presented by a river, the hazards associated with it and their management	Learners should know a case study of the opportunities presented by a river, the hazards associated with it and their management. (Named river – can be LEDCs or MEDCs context). Name and locate river – learners draw labelled sketch map with appropriate named places. Provide stimulus information about the benefits provided by the river (and floodplain/delta if appropriate) – learners write up as an advertisement – reasons to live in this location. Photos and video clips of flood events and erosion – learners write up as newspaper article with appropriate development of ideas and place-specific information. Can use more than one case to illustrate hazards. Named examples of how the flood is managed (short term aid and longer term responses) with a description of the scheme and an explanation of how it has managed the hazard – short presentation to the class. The following links will be useful here: Rivers: www.geography.learnontheinternet.co.uk/topics/river.html River flooding and management issues: www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_flooding_management_rev1.shtml
2.3 Coasts	Demonstrate an	Show learners photographs of different coastlines to set the scene – define the term ‘coast’ and add to key word