

KESTEVEN AND SLEAFORD HIGH SCHOOL

Geography Scheme of Learning

Year 10 – Term 6: Unit 1 – Living with the physical environment/UK Physical Landscapes/River Landscapes

Intent – Rationale

Living with the physical environment is about physical processes and systems, how they change, and how people interact with them at a range of scales and in a range of places. River landscapes focuses on how the shape of a river valley changes as it goes downstream, the distinctive fluvial landforms that result from different processes and the different management strategies that can be used to protect river landscapes from the effects of flooding.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
<ul style="list-style-type: none"> • Year 7 – T6 Physical landscapes • Year 8 –T4 Rivers and Water management • Year 10 – Coastal Landscapes in the UK 	<ul style="list-style-type: none"> • Year 12/13 – Water Cycle and water insecurity • Year 12 – Coastal Systems
What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
<p>Science – water cycle and concepts of gravitational potential energy and kinetic energy.</p>	<ul style="list-style-type: none"> • SMCS: SP2,4 • BV: - • Careers: GB4 a), b), e), g), h), i); role of hydrologists, engineers, planners and actuaries in flood monitoring and management jobs.
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?

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- Wideworld Magazine
- Horrible Geography – Raging Rivers

FROM THE LIBRARY

Flood-550

Flooding and Drought-551

GCSE Essential Word Dictionary-910

Geographical Enquiries-910

Interpreting The Landscape-910

Living Geography: Rivers-910

- Calculating distances using 1:50,000 and 1:25,000 maps
- Interpreting flood hydrographs
- Assessing the costs and benefits of flood management schemes

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Geography Scheme of Learning

Year 10 – Term 6

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- How rivers and their valleys change downstream
- How rivers erode, transport and deposit material and create distinctive landforms
- How physical and human factors can increase the risk of flooding
- What the costs and benefits are of hard and soft engineering to prevent flooding
- The key characteristics of the River Tees and its landforms, and the Boscastle Flood Management scheme
- How to interpret a flood hydrograph and interpret river landscapes using an O.S. map

Apply

- Interpret hydrographs and predict when flooding is likely
- Analyse maps/diagrams/photos to suggest where flood risk will be high and/or where flood defences could be placed
- Understanding of processes to explain the formation and change of river landforms
- Interpretation of photos and diagrams to explain the formation of river landforms

Extend

- Predict future changes in river landscapes
- Evaluate the different contribution of fluvial and sub-aerial processes when creating river landforms
- Use technical vocabulary to explain the formation of river landforms e.g. thalweg, pools & riffles, knick point, flocculation
- Evaluate the impacts of flood management schemes

What subject specific language will be used and developed in this topic?

What opportunities are available for assessing the progress of students?

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Abrasion

Rocks carried along by the river wear down the river bed and banks.

Attrition

Rocks being carried by the river smash together and break into smaller, smoother and rounder particles.

Cross profile

The side to side cross-section of a river channel and/or valley.

Dam and reservoir

A barrier (made on earth, concrete or stone) built across a valley to interrupt river flow and create a man-made lake (reservoir) which stores water and controls the discharge of the river.

Discharge

The quantity of water that passes a given point on a stream or river-bank within a given period of time.

Embankments

Raised banks constructed along the river; they effectively make the river deeper so it can hold more water. They are expensive and do not look natural but they do protect the land around them.

Estuary

The tidal mouth of a river where it meets the sea; wide banks of deposited mud are exposed at low tide.

Flood

Occurs when river discharge exceeds river channel capacity and water spills out of the channel onto the floodplain and other areas.

Flood plain

The relatively flat area forming the valley floor on either side of a river channel, which is sometimes flooded.

Flood plain zoning

Assessment will take 3 main forms:

1. In starters, plenaries and during the lessons – formative assessment to reinforce prior knowledge e.g. word searches, bingo, memory recall, definition matches etc.
2. For homeworks -tasks that require students to research new knowledge (e.g. river landforms along the River Tees) or apply existing knowledge to exam-style Qs (e.g. Qs from CGP book)
3. Summative assessments – past exam paper Qs in test or exam conditions, either as end-of-unit tests or in Y10 or Y11 formal exams.

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This attempts to organise the flood defences in such a way that land that is near the river and often floods is not built on. This could be used for pastoral farming, playing fields etc. The areas that rarely get flooded would therefore be used for houses, transport and industry.

Flood relief channels

Building new artificial channels which are used when a river is close to maximum discharge. They take the pressure off the main channels when floods are likely, therefore reducing flood risk.

Flood risk

The predicted frequency of floods in an area.

Flood warning

Providing reliable advance information about possible flooding. Flood warning systems give people time to remove possessions and evacuate areas.

Fluvial processes

Processes relating to erosion, transport and deposition by a river.

Gorge

A narrow, steep sided valley, often formed as a waterfall retreats upstream.

Hard engineering

Involves the building of entirely artificial structures using various materials such as rock, concrete and steel to reduce, disrupt or stop the impact of river processes.

Hydraulic action

The force of the river against the banks can cause air to be trapped in cracks and crevices. The pressure weakens the banks and gradually wears it away.

Hydrograph

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A graph which shows the discharge of a river, related to rainfall, over a period of time.

Interlocking spurs

A series of ridges projecting out on alternate sides of a valley and around which a river winds its course.

Lateral erosion

Sideways erosion by a river on the outside of a meander channel. It eventually leads to the widening of the valley and contributes to the formation of the flood plain.

Levees

Embankment of sediment along the bank of a river. It may be formed naturally by regular flooding or be built up by people to protect the area against flooding.

Long profile

The gradient of a river, from its source to its mouth.

Meander

A pronounced bend in a river.

Ox-bow lake

An arc-shaped lake which has been cut off from a meandering river.

Precipitation

Moisture falling from the atmosphere - as rain, hail, sleet or snow.

Saltation

Particles bouncing down the river bed.

Soft engineering

Involves the use of the natural environment surrounding a river, using schemes that work with the river's natural processes. Soft engineering is usually much cheaper and offers a more sustainable option as it does not interfere directly with the river's flow.

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<p>Solution Soluble particles are dissolved into the river.</p> <p>(Channel) straightening Removing meanders from a river to make the river straighter. Straightening the river (also called channelising) allows it to carry more water quickly downstream, so it doesn't build up and is less likely to flood.</p> <p>Suspension Fine solid material held in the water while the water is moving.</p> <p>Traction The rolling of boulders and pebbles along the river bed.</p> <p>Vertical erosion Downward erosion of a river bed.</p> <p>Waterfall Sudden descent of a river or stream over a vertical or very steep slope in its bed. It often forms where the river meets a band of softer rock after flowing over an area of more resistant material.</p>	
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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
1. Drainage Basins and River Profiles	What is a drainage basin? How do the long and cross profiles of a river change downstream?	Why do long and cross-profiles change downstream?	Starter: look at images of rivers and decide where in a river course they are found. Explanation of drainage basins – draw annotated diagram to show features. Explanation of long profile – diagram and explain changes as a river goes downstream.

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			<p>Explanation of cross-profiles – students suggest how they change downstream, then explain the changes. Oxford p115 – Qs to consolidate.</p> <p>Plenary: match terms to definitions</p> <p>Homework: CGP p39</p>
2. River Processes	What are the key fluvial processes?	Where in a river do the different processes take place?	<p>Starter: here are the definitions, what are the words?</p> <p>Recap vocab from last lesson.</p> <p>Recall key processes and sub-types from the Coasts topic using whiteboards: weathering, erosion and transportation.</p> <p>Revise the terms and use video clips to consolidate understanding:</p> <p>https://timeforgeography.co.uk/videos_list/rivers/river-erosion-processes/</p> <p>https://timeforgeography.co.uk/videos_list/rivers/river-transport-processes/</p> <p>Gap fill – factors affecting rates of erosion.</p> <p>Handout of key terms – to be learnt.</p> <p>Plenary: photo interpretation – which processes can you see evidence of? P116-117 Oxford.</p>
3. River landforms created by erosion: v-shaped valleys, interlocking spurs, waterfalls and gorges.	What are the landforms created by erosion?	How do waterfalls change over time and space?	<p>Starter: river processes gap fill or crossword</p> <p>Explain formation of v-shaped valleys and interlocking spurs – annotated diagrams.</p> <p>Explain formation of waterfalls and gorges:</p> <p>https://www.youtube.com/watch?v=ue2gcyT4fc4 then draw annotated diagram to explain.</p> <p>Plenary: bingo key terms</p>
4. River landforms created by erosion and deposition:	How do meanders and ox-bow lakes form?	How and why do meanders change over time?	<p>Starter: photo – what features can you spot?</p> <p>Define meander and ox-bow lake</p>

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<p>meanders and ox-bow lakes.</p>			<p>Teacher explanation of meander processes and ox-bow lake formation. Video clips to support: http://www.bbc.co.uk/education/clips/zy7yggk7 meander processes http://www.bbc.co.uk/education/clips/zgtrkqt ox-bow lake formation Could go outside/in hall to illustrate how water moves faster on outside bend. Students complete sheet to show sequence of formation and write explanations using technical vocabulary. Then explain pools and riffles and Qs1a&b p 121 Oxford. Pumpkin Video– Coastal processes and landforms Plenary: review answers</p>
<p>5. River landforms created by deposition: floodplains, levees and estuaries.</p>	<p>How do floodplains, levees and estuaries form?</p>	<p>How does meander migration contribute to the formation of floodplains?</p>	<p>Starter: meanders – true or false? Explanations of how floodplains and levees form – draw annotated diagrams. Discuss meander migration and lateral erosion. Explanation of what an estuary is and how formed. Annotated diagram. Students make playdough river landforms to consolidate knowledge. Plenary: match cards – river processes</p>
<p>6. River mapwork skills N.B. This lesson content could be integrated in to the previous 3 lessons rather than a stand-alone lesson. The time required</p>	<p>What do river landforms look like on O.S. maps?</p>	<p>Can I predict how landforms will change over time?</p>	<p>Starter: river features: upper, middle or lower course? Mapwork Skills: Draw a cross-profile of a V-shaped valley: <i>Essential Mapwork Skills</i> – page 10 – read through. Page 69 - draw a cross section from 840330 to 860330 (i.e. along the 33 line). <i>Mapwork Skills</i>: p70-71 Q 1 and Q4 (meanders)</p>

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would still be 4 lessons for all the landforms and mapwork.			<i>Mapwork Skills:</i> p72-73 Q 1a-d and Q2a-c (flood plains, levees and estuaries) Plenary: spot the landform
7. River landforms on the river Tees.	Where is the river Tees? How does the river Tees change as you go downstream? What are its key landforms like?	Can I apply understanding of river landforms to real examples to explain their formation?	Starter: find the river Tees in an atlas. Video: River Tees. Predict the changes that will occur before watching, then add information afterwards. In IT room or using an A3 template create a case study of the River Tees and its key landforms: include High Force waterfall & gorge, meanders, floodplains and levees near Darlington and the Tees estuary. Page 122-3 Oxford to help. Plenary: Discuss – to what extent does the river Tees illustrate the features normally associated with a river’s course from source to mouth?
8. River Floods and Drainage Basin processes	What causes flooding? What pathways does water take within a drainage basin?	What physical and human factors can increase flood risk?	Starter: picture of flood – students try to define it and suggest causes. Define flood – slow and rapid-onset floods. Suggest factors that cause or increase flood risk. Think about where rain goes when it lands in a drainage basin – different pathways. Complete drainage basin flows, stores and outputs definition sheet and flow diagram. Use the new vocabulary to explain the factors that increase flood risk identified earlier in lesson. Plenary: evaluate the importance of the different factors.
9. Flood hydrographs	What is a flood hydrograph? What factors affect the shape of a hydrograph?	How can a hydrograph be interpreted to assess flood risk?	Starter: imagine the river discharge is show as a line on a graph. What will happen if there is an increase in rainfall? Sketch ideas on whiteboards.

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			<p>Show key features of a hydrograph – line for discharge, bars for ppt, different scales used.</p> <p>Living graph exercise: use A3 sheet a) to add labels to b) to add statements to. Then stick in handout.</p> <p>Cut and stick activity – factors leading to flashy and subdued hydrographs.</p> <p>Plenary: complete this Q - ‘River flooding is a natural phenomenon.’ To what extent do you consider this statement to be true? (6)</p>
10. Flood management strategies: hard engineering	What are hard engineering strategies?	How sustainable are hard engineering strategies?	<p>Starter: suggest ideas for how river floods could be prevented.</p> <p>Define hard engineering – link back to coasts.</p> <p>Explain the concept of cost-benefit analysis (see Oxford p127)</p> <p>Explain different hard engineering strategies – students complete template which explains how they work and the key advantages and disadvantages.</p> <p>Mapwork Qs – Oxford p36. Complete the Qs and look for evidence of hard engineering strategies on the map.</p> <p>Plenary: discuss – to what extent are hard engineering strategies sustainable?</p>
11. Flood management strategies: soft engineering	What are soft engineering strategies?	How sustainable are hard engineering strategies?	<p>Starter: name the hard engineering strategy.</p> <p>Define soft engineering – link back to coasts.</p> <p>Explain different soft engineering strategies – students complete template which explains how they work and the key advantages and disadvantages.</p> <p>Complete the ‘Stretch yourself’ activity on p129 Oxford.</p> <p>Careers Link: outline the roles of local authorities, the Environment Agency, engineers and planners in managing flood risk. P129.</p>

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			Plenary: Activity 3 p129.
12. Reasons why Boscastle needed a flood management scheme	Where is Boscastle? What caused the 2004 flood? Why did it need a flood management scheme?	How can O.S. maps provide evidence for flood risk?	Starter: where is Boscastle? Locate on map. Mystery: why did Boscastle need a flood management scheme? Students sort cards to find out the causes and risk factors for flooding. Use O.S. maps to identify physical and human flood risk factors. Complete the table to explain the causes of the 204 flood. Page 142 Cambridge book helps. Plenary: what was the key cause?
13. Boscastle's flood management scheme	What did the management scheme involve? What issues were created by the scheme?	How sustainable is the flood management scheme?	Starter: recap key risk factors for flooding in Boscastle. Look at video clips to see impacts of the flood e.g. https://www.youtube.com/watch?v=SxweiRNiHbo Handout of key impacts. Read p144 Cambridge – what did the Environment Agency conclude were the key human factors that added to the flood risk? How could they be solved? Ideas. Stick in a copy of the flood defence scheme (p144) and write a summary of the key aspects of the strategy. Explain the economic, social and environmental issues associated with the scheme (Activity 9.6, Q3c&d p144). Plenary: how sustainable do you think the scheme is? Should it have been built?
14. End of unit assessment	How much have I understood about the River Landscapes topic?	What do I need to consolidate further?	