Strand Junior School Y4 Topic Plan

Rivers and Water Processes: The Course of The Thames

Subject: Geography [3 -UK]

River Deep, Mountain High

Delivery: Summer Term One

Duration: Approximately 6 weeks

NC ref: UK geography physical processes

Subject links: Science-Changes of state, water cycle

Overview: This topic explores how places came to be like they are through physical processes that change and shape the Earth's surface and landscapes. Moving from the general to the particular, the topic first defines rivers and their common features before studying the course of a particular river that we know well: the Thames. Content encompasses local and UK locational knowledge, the erosional processes central to the big idea of landscape formation and the interaction between human and physical activity evident in both pollution and river flooding. An accompanying science unit on changes of state develops understanding of the part played by rivers in the water cycle.

Overarching Question: **How do rivers shape the landscape?**

Why are they important for land and sea?

Substantive Concepts: waterway, watercourse, course of a river, flow, current, channel, meander, floodplain, valley, gorge, delta, process, erosion, deposition, physical feature, flood, fertile, body of water

Disciplinary Concepts

Change over time: rivers carving the landscape
Pattern: stages of a river
Interconnectivity: effect of human activity on flooding etc
Spatial variation: landscape features different stages of a river
Fieldwork: observational survey

Building Towards: How can we describe and explain the diversity of landscapes on our planet? How does human activity shape the environments we live in and vice-versa?

Possible Misconceptions:

- Direction of flow is confused as being from the sea
- Not all rivers have all features eg waterfalls etc
- Confusion over flooding only being 'bad'
- Confusion with county/country/countryside
- Existing deep channel filled by river water rather than carved by river.

Reach-back to previous learning

- Properties of rock- hardness [Y3]; frictional force
- Arctic frozen water/glaciers
- UK countries and seas locational knowledge

Paves the Way

- Tectonic processes that change the landscape over time
- Coastal erosion [Y5]
- UK counties [Y5]
- Differences with other bodies of water
- Science: water cycle

I: Foundational knowledge and understanding

- Locational knowledge: notable rivers [mostly UK, plus the most significant world rivers]; concept of counties; English counties/towns/ landscape on the course of the Thames
- The defining characteristics of rivers including the course of a river from source to mouth; features and terminology including channel, bed, bank, stream, tributary, confluence, meander, floodplain, estuary, delta, marsh.
- Erosional processes leading to landscape change over time: V-shaped valleys, waterfalls, gorges/canyons, meanders and ox-bow lakes.
- Local area Thames: historic and current significance of rivers in human settlement; tideway vs non-tidal river; environmental impact of human activity - pollution and water quality, TET
- The effect of flooding on settlement and vice-versa: the embankment and Thames Barrier
- The water cycle and the role rivers play in draining the land into the sea.

II: Dialectic: adding complexity through subject reasoning

- What is the difference between… eg a river and a lake?
- How is the Thames similar or different to other rivers?
- Why have people settled near rivers; what is the effect of human settlement on rivers?
- Is it right to alter the course of rivers to stop flooding?
- What role to rivers play in the water cycle?

III: Rhetoric: communication

Why are rivers so important?

- **How do they shape the landscape?**
- What role do rivers play in the water cycle?

PSHE	Living In the Wider World: environmental awareness, eco-friendly action: litter, pollution,	Core Subjects	Flooding data; measurement metre-squared

Teaching Sequence Enquiry Question		Conceptual narrative: progression of knowledge and understanding	Guided/independent practice Possible activities and application	Disciplinary focus concepts/skills
1	**What is a river?** Assessment of prior knowledge; views of a river starting with the familiar Thames at SotG	• Rivers are different to other **bodies of water**: the water in a river **'flows'** in one direction [**current**]; a river is a **waterway** that eventually **flows into the sea** [or a lake or another river but focus on sea for now] • The Thames is the longest river entirely in England ; it flows in an easterly direction into the North Sea/ English Channel. Other UK rivers flow [**discharge]** into the seas/ocean around Britain.	• Picture based discussion identifying and exploring difference in bodies of water eg river/canal; sea/ocean Q: what is it/is it not? Define through contrast. • Location of major UK rivers and the seas where they discharge. *Q: Where is the Thames? Here, there and elsewhere*	• scale: the Thames at a local, regional, and national scale. • mapping and direction skills
2	**What are the characteristic features of a river?** **Is this the same for all rivers?** Overview of rivers	• Rivers flow from **source** to **mouth**, **draining** the surrounding land; tiny streams combine and can become mighty rivers. • The **course** of a river has an **upper, middle and lower** stage as it flows from higher to lower ground. Typical features occur at each of these stages and are associated with changes in the **depth** and **width** of the **channel,** the route of the channel and the water velocity/current. • Earth's rivers vary but share these common characteristics.	• Labelling and annotating [partially complete] river course diagram[s]: source, *stream, spring, rapids, waterfall, tributary, confluence, meander floodplain, estuary, marsh, delta, mouth* • Identification of stage in named river located using an atlas. Q: How does a river change as it flows from source to mouth?	• spatial variation • pattern .
3	**How do rivers and water change the landscape?** Process and effects of erosion (focus on upper course)	• Rivers look magnificent winding across a **plain** but rivers actually have the power to transform the surface of Earth's landscape– look at the Grand Canyon which was shaped by the Colorado River. • Erosion is the process of soil and rock being worn away and then transported by water or wind. River erosion is a type of **water erosion**: the soil and rock are washed away by the frictional force of flowing water. Rocks that break off through weathering or force of water are carried along in the river. They bounce along the bottom, collide and scrape against other rocks causing even more erosion. Rivers **erode** their bed and banks, carving out a deeper and wider channel. • When rivers are in flood, their force is even more powerful. Over a very long time this erosive force can transform a rocky landscape. • The effects of erosion in the upper course include the formation of deep cut channels, **steep sided valleys**, water-falls and **gorges**.	• Outside demonstration of erosion (hose pipe on soil) or video such as: https://www.youtube.com/watch?v=-MFLgtti51I Tig Tag river processes video https://www.youtube.com/watch?v=YETdZyZI6es • Questions/quiz to test understanding of concept/process of erosion including naming of landscape features caused by erosion. • Possibly process ordering of an upper course feature formed by erosion eg a waterfall/valley Q: How is this linked to [frictional] force? (rocks scraping together like sandpaper) Q: How does river erosion compare to a glacier? [Think Norwegian fjords]	• change over time – very long time periods (geological) • physical process • spatial variation
4.	**Why don't rivers flow in a straight line?** Erosion and deposition – middle lower course Two part process	• What happens to the rock and soil that is washed away by the river? A crucial element of erosion is that the material that is washed away is transported somewhere. The muddy colour of some rivers is from eroded soil being carried along in the water. Rivers carry the eroded material downstream. The transported rock/soil is the river's **load**. • As a river moves into the middle and lower course it slows down. When the flow is slower**,** its **load** is **deposited**: this **deposited material** is known as **sediment** and **silt. Deposition** is the other half of **erosion.** • Why don't rivers flow in a straight line? It is down to erosion and deposition. The river bends because one bank erodes and sediment builds-up on the opposite bank. The build-up of deposited sediment	• Lower course erosion/deposition. https://www.youtube.com/watch?v=8a3r-cG8Wic • Naming pictures of features eg valley, gorge, delta, meander, mudflats; identify erosion and/or deposition as responsible for formation. • Sequencing pictures in a time continuum according to formation length eg mudslide – quick erosion; Grand Canyon = millions of years. • Meander and/or oxbow lake sequencing/diagram/ animation	• change over time • spatial variation • physical process • scale [river cliff vs canyon]

		leads to the formation of landscape features which are common in the middle and lower course like **meanders, deltas** and sometimes **oxbow lakes**. https://www.youtube.com/watch?v=xz_zRqq3JIA (deltas – teachers)	Q: How does river erosion compare in the lower and upper course? Why? How does this change according to rock/soil type etc eg hard or soft rock	
5.	**What route does the Thames take to the sea?** Locational knowledge – concept of a county/counties of Thames Valley.	• The Thames **rises** on the edge of the Cotswolds in the west of England, not all that far from the Bristol Channel, but it follows a 215 mile easterly route to the North Sea[Why?- water flows downhill/least resistance]. • The many towns and cities on its banks show the importance of rivers to **human settlement**. • As it flows towards the sea, the Thames passes through different **counties.** The whole of the UK is divided into counties [shires] with rivers often acting as **meandering natural boundaries** between them. • Counties are like a jigsaw that covers the whole country. The course of the Thames takes it through 9 counties.	• Use of maps/atlas to identify counties. • Use of GIS online maps to identify county boundaries • Locational knowledge of towns on the Thames Q: Why doesn't the Thames flow into the Bristol Channel? Q Why are they so many towns and cities on the Thames?	• mapping/direction skills • locational knowledge
4.	**How do the upper, middle and lower course of the Thames compare to other rivers?** The Thames in detail compared to other rivers.	• The **source** of the Thames is an **underground spring** in **gentle rolling hills** so it does not have the features associated with a mountainous upper course like the Severn. Its hillside source is about 100m so its route is gently downhill. • It has many **tributaries** and acts as a **drainage basin**, collecting rainfall and river water from a large area including London. The large area of drainage is what makes it become such a wide river. • The **tidal lower course** features large **meanders** – Chiswick, for example. The **tidal reach** extends 63 miles from the mouth to Teddington Lock, causing **high/low tidal** river levels and **brackish** water. The river current and incoming tide act in opposite directions. • There are many identifiable river features in our local area on the middle/ lower course of the river: **meanders,** the **confluence** with the River Brent; **tidal mudflats**; artificial **embankment**; aits.	• Applying prior knowledge to predict upstream and downstream features of the Thames • Comparing to another river eg the Severn which has a more 'typical' upper course • Explaining differences that occur eg why no waterfalls, oxbow lakes or steep-sided valleys? • Fieldwork sketch maps identifying the river features in our local area.	• spatial variation • place • pattern
5.	**How do people affect the Thames environment in our local area?** Fieldwork: human activity that effects the river environment	• Strand illustrates the historic importance of rivers in human settlement - fishing, farming, river transport, water works etc • Nowadays rivers provide a great deal of **leisure activity**. People live and visit rivers, riverbanks, foreshore for many reasons. • Rivers are also important habitats for wildlife but human activity creates **pollution** which affects **water quality** and wildlife. Some of this pollution, like plastic and other litter, is washed out to sea and causes widespread environmental damage.	• Brief historical context on role of rivers in human settlement including the Thames/Nile • Thames Explorer Trust and other fieldwork activities focusing on the river environment at SotG: Q How do people use the river now? • Survey of litter and plastic using quadrats.	• interconnectivity • environment • sustainability

6.	**Why is flooding a complicated issue?** Human role in flooding - environment	• **Flooding** is a **natural process** that can occur with extended or heavy rainfall, snow-melt and tidal surges. Storms bring flooding. But flooding is a normal part of a **river system** – hence the **flood plain**. It is beneficial eg **fertile soil.** • However, it is a problem in inhabited areas.. **Flood defenses**, like the Thames Barrier and Embankment, are man-made to protect cities like London from hazardous flooding. • But human activity **disrupts natural drainage** which can make flooding more likely and more severe. Flooding often has harmful effects in places that are i**nhabited** by people - it may also harm animal habitats.	• Reading and summarizing an information text/article on the effects of flooding and actions taken to prevent it. • Analysing the benefits and harmful effects of flooding Q: Is it right to alter the course of rivers?	• interconnectivity • sustainability • perspective
7	**What role do rivers play in the water cycle?** Changes of state: water cycle	• Rivers **drain** the land around them. • The **water cycle** is the process whereby water **evaporates** from the Earth's surface, travels into the atmosphere, forms clouds and then falls back to the surface as precipitation. Much of this rain water drains into rivers which flow into the seas where significant evaporation re-occurs.	• Labelled diagrams and/ or questions/quiz to check for understanding. See science scheme	• sustainability • physical process
8	**Big Question: How do rivers shape the landscape?** Why are they important for land and sea?	• Over time, rivers shape the surface of the Earth creating landscape features like canyon's, gorges, meanders through erosion and deposition. • Rivers bring water to dry places and drain the land in wetter places • Rivers advance the water cycle by transporting rain/drained water to the sea where most evaporation occurs.	Options • an informative piece of writing. • a verbal presentation perhaps with a set of pictures or slides as a starting point. • annotated pictures on large paper	• physical process • spatial variation