

## **St Peter's CE Primary School** Water Topic Overview

#### Unit Overview:

This topic focuses on the National Curriculum requirement to describe and understand river systems, coastal and fluvial geomorphology, and the process responsible for their formation, as well as developing our fieldwork skills. Pupils will also expand their understanding of places in the UK and wider world, by investigating the location of river systems, how they have changed over time, and the effect they have on human settlement.

In Autumn term, pupils will build on their locational knowledge, identifying the position and journey of UK rivers. Using maps, globes, digital mapping, and other sources, they will investigate the landforms and processes which characterise and shape the physical geography of our rivers. To prepare pupils for the Summer case study, they will also explore why settlements develop where they do and how a community's needs may have changed over time.

In the Spring term, pupils will focus on developing their fieldwork skills by conducting a detailed investigation of a river. Pupils will use maps, atlases, globes and digital/computer mapping to locate and describe our river, from source to mouth, observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps (including use of an eight-point compass, and symbols and key for mapping), plans, photographs, graphs, and digital technologies. They will also investigate the causes and impact of flooding in the UK, as well as exploring how we can reduce the risk of flooding.

In the Summer term, pupils will complete in-depth case studies of a river environment, exploring the location, physical features, processes, and changes affecting their focus river environment, as well as how human interacts with the river (see six areas of Geographical Enquiry). Year 3 will investigate the River Nile in Africa, Year 4/5 will investigate the Mississippi River in North America, and Year 6 will investigate the Amazon River in South America.

Pupils will also be linking to the prior topic, Earth, by linking the physical geography of mountain landscapes to the upper course section of rivers and revisiting prior learning about the water cycle from the science unit.

Note: During the Spring/ Summer term pupils will complete a home project on coastal features.

#### Key Questions:

- 1. What are rivers? How are rivers formed and change?
- 2. Where are the rivers of the UK and the world?
- 3. Where are settlements located?

Objectives covered in this unit:				
Geography	•	I can locate places on a map.		
(see progression in expectations document)	•	I understand about different places		
	•	I can compare different places around the World.		
	•	I can ask geographical questions.		
	•	I can answer geographical questions.		
	•	I can use a wide range of geographical words in my work.		
	•	I can share my geographical knowledge effectively.		
	•	I can use a wide range of geographical and fieldwork skills – field sketching, measuring, direction, using/drawing maps, scale and distance, photography, recording, questionnaires.		
Science	n/	a		



# Water Key Knowledge

### Geography definitions

Geography - Geography is the study of places and the relationships between people and the natural environment. Geographers explore both the physical properties of Earth's surface and the human societies spread across it.

**Human geographers** study the relationship different people have with the Earth. This includes where they live, what they do and how they use the Earth's resources, as well as understanding the culture and customs of different communities.

**Physical geographers** observe, measure, and describe Earth's surface, climate, and processes. They study how landforms develop and how the Earth is changing.



Revisit - What is the water cycle?

Heat from the sun evaporates water from water sources (mainly oceans and seas, but also rivers, ponds, puddles, etc.), When the warm, moist air (water vapour) cools it condenses into tiny water droplets which appear as clouds. When clouds are pushed into higher, cooler air above land, the cooled droplets fall as precipitation. Ensure children understand that the water cycle is a closed cycle, water is neither gained nor lost.

Also link to science forces, water courses flow downhill due to gravity, moving from higher inland areas to lower lying coastal areas (note: misconception that rivers run from sea to inland).

What are<br/>rivers? HowThere are many different bodies of water:<br/>River - a moving body of water that drains the land flowing along a natural channel<br/>with banks on both sides and a bed at the bottom.formed and<br/>change?Stream - as a river, but smaller.

Canal -waterways built by people and used for shipping, travel, and irrigation. Canals enable boats to travel inland from oceans and lakes. A canal may also serve as a shortcut between two bodies of water. Other canals carry drinking water to cities or irrigation water to farms. Water in the canals is controlled by a system of locks

Ocean - a large expanse of saltwater that covers over 70% of the Earth's surface and stretches from one continent to the next. There are five world oceans: Arctic, Indian, Atlantic, Pacific, and Southern (Antarctic).

Sea - geographically much smaller than an ocean, and typically contained by areas of land, or forms the body of water where land and ocean meets.

Lake - a naturally formed large body of either salt water or fresh water, surrounded by land. Compared to rivers with flowing water, lakes are slow moving and sometimes even completely still.

Reservoir - man-made lake

Pond - as lake or reservoir, but smaller

#### Rivers

Rivers are important as part of an inland system of water courses that drain an area of land, forming a vital part of the water cycle, returning water to the seas and oceans. There are three parts to a river system: the upper, middle and lower courses. The geomorphology of the land and fluvial action varies in each course.

The upper course includes the river source. The water flow is slow over rough ground in tiny streams. In some places it might make a waterfall. The young river has lots of energy. The energy tears rocks from the side and bottom of the river. This eats away



at the land making a deep valley with steep sides. This is called a V-shaped valley. In the middle course the river flow is wider, moving quicker over less rocky ground. It carves a course through the land, finding a path where the soil and rock is easier to move and flowing around the harder rock. The bends in the river are called meanders. Smaller rivers that flow into larger rivers are called tributaries and the point of joining is called a confluence.

In the lower course the river reaches flatter land. It is wide and curving. When there is heavy rain the banks of the river might burst and flood the flat land around the river. This land is called a floodplain. Rivers run into an estuary, a wider stretch of river where it joins the sea. Estuaries are tidal so will rise and lower with the sea, mixing salty sea water with the freshwater from the land. Where the river joins the sea, it is called the mouth.

#### Erosion -

A river wears down rocks where it flows through erosion. Transportation is the process which refers to the movement of sediment (pieces of soil, rock and stone) further downstream. Deposition occurs when the energy of the water flow is reduced, so it cannot continue carrying a load, so deposits it. The process of

	erosion, transportation and deposition changes the shape of the land around a river, as well as the shape of the river itself.			
	The river will erode softer rocks. Where it encounters harder rocks, it doesn't have enough energy to erode them, so flows around them. Over a long period of time rivers create valleys and canyons.			
	Waterfalls - sometimes a river flows over an area of hard rock, as it drops onto a softer rock it will slowly erode the soft rock, creating a waterfall. The waterfall will recede when the softer rock undercuts the hard rock and sections of hard rock break off and are carried away by the river.			
	Meanders - curves in the river, occurring in the middle and lower courses when the land is flatter. The river is faster flowing around the outside of the curve, so erodes and removes sediment, but is slower moving on the inside, so deposits sediment.			
	erosion deposition Oxbow lakes - as meanders grow, the erosion enables the river to cut through to another meander. This cuts off a meander and it makes an ox-bow lake			
	NB - Coastal landforms and processes are to be covered as part of a home project			
Where are the rivers of the UK and world?	Ocean and seas around the UK coast (Atlantic Ocean, North Sea, Irish Sea, Celtic Sea, English Channel) and UK rivers (Thames, Severn, Trent, Tay, Bann, Tyne, Clyde, Dee, Mersey and Exe)			
	<ul> <li>Revisit oceans of the world and name and locate the world's longest rivers, including the Nile, Amazon and Mississippi. The world's ten longest rivers are:</li> <li>Nile River - 6,650km</li> <li>Amazon River - 6,400km (note: the Amazon does carry the most water)</li> <li>Yangtze River - 6,300km</li> <li>Mississippi/Missouri River - 6,275km</li> <li>Yenisey-Angara-Selenga River - 5,539km</li> <li>Yellow River - 5,464km</li> <li>Ob-Irtysh River - 5,410km</li> <li>Rio de La Plata-Parana-Rio Grande River - 4,880km</li> <li>Congo-Chambeshi River System - 4,700km</li> <li>Amur River - 4,444km</li> </ul>			

Where are settlements located?	Settlements develop for a reason: maybe as a centre for buying and selling local goods - a market town. Others owe their growth to their location such as holiday resorts, ports, or fishing on the coast. Some developed around an industry, such as textile mills or pottery making, even if that industry has now declined. Maps and place/ street names can give clues as to the historic origins of a settlement. Stoke-on-Trent derives its name from 'stoc' meaning a holy meeting place and links to its location on the River Trent.		
	Positive factors for development of a settlement:		
	Water - Essential for drinking, cooking, washing and crop irrigation.		
	Bridging point - Historically rivers were a major obstacle and so places where they narrowed or were shallow allowed a communal crossing point to develop.		
	Building materials - Wood and stone were traditional materials used to build houses and with both being heavy proximity to a natural source was good.		
	Protection – Villages were often attacked by invaders and so siting your settlement on a hill or in the curve of a river made sense.		
	Flat land – It is easier to travel around, build on and grow crops on land which is flat and even.		
	Negative factors for development of a settlement:		
	Poor farmland - If the land is not fertile then you can't grow crops and must import all your food.		
	Flooding - Although flat land can be easier to build on it also floods more easily if there is a river nearby.		
	Wetlands – It is tough to get good footings when building on a marsh and likewise crops do not grow well.		
	Steep land – Rocky outcrops can make solid foundations, but they are more often impractical to farm, travel across and, if steeply angled, build on.		
	Why live by a river?		
	The location of a water source, specifically a river features strongly in our requirements for a good location for a settlement. Rivers are still essential but our use of them has changed over time.		
	Food and water - Water from rivers was used for drinking and could be used to cook food. People could also wash in the water or take water from the river to use elsewhere and wash things. Water sources drew animals from surrounding lands, which could be hunted, and provided fish. Land around rivers was good to grow crops and farm animals. Later, irrigation systems were built to move water, allowing additional land to be cultivated.		
	Transportation - People, goods, animals, food could be transported in boats along the river in times when there were no proper roads. Link to use of canals locally to transport clay and coal, then finished pottery products.		
	Energy and industry – new technologies at the time used the force of the water in rivers to push water wheels to turn cogs and gears in machinery and make the production of goods, such as the grinding of flour easier. In the Industrial Revolution, the invention of steam engines bought about the use of coal to heat up		

water and this created steam which was used to run the machines. From the 1850s large mills and factories used steam generate power. Steel factories, used coal to heat up, melt and shape the metal, but also needed water from rivers to them cool the metal. Later, nuclear power stations needed to heat water to spin large turbines which generate electricity. Coal fired power stations generate electricity by burning coal to heat water and create steam to spin turbines. Hydro-electric power stations block off the river with a dam creating a lake behind them. Gates in the dam can open allowing large amounts of water through to push the turbines round and generate electricity.

Leisure - people use rivers as a location for walking, cycling, fishing and for water sports such as canoeing.

However, there are many ways humans are damaging rivers, including litter and endangering wildlife, pollution through use of chemicals (including pesticides, fertilisers) and sewerage.

Treating Water				
Water is stored in reservoirs to allow solids to settle at the bottom.	Chemicals are added to help remove small particles.	Water passes through gravel and carbon to filter out tiny particles.	Chlorine is added to kill off bacteria.	Water is clean and safe to drink.

## Flooding

Use a case study of a UK flooding event such as Storm Desmond (2015) which caused the flooding of 5200 homes across the UK, as well as leaving 100,000 homes and businesses without power, to explore cause, effects and actions to prevent future flooding.

### Causes – There are many natural and man-made reasons for flooding:

Urban development - Non permeable material used in urban areas prevent water from soaking into the ground, therefore it is channeled into drains which move water quickly into streams and rivers, The impact of a large quantity of water reaching the river can cause flooding as the river system is overwhelmed.

Farm machinery - heavy machinery compacts the soil, making it harder for water to soak into the soil. Therefore the water is more likely to runoff into rivers and streams, again overwheling the river system.

Deforestation - removal of trees and plants means that less water is soaked up, therefore water enters the channel quicker and increases flow.

Weather and climatic conditions – Global warming has caused sea levels to rise, this has a knock on effect of raising the level of inland waterways. Climate change is also causing more extreme weather events, including storms which can produce short, torrential downpours, where water cannot soak into the soil quickly enough, excess rainwater will drain into rivers and streams. Long periods of rain can lead to soaked ground, or long periods of dry weather can harden ground, both conditions make it difficult for water to be absorbed by the soil, and increase run off into rivers and streams.

Channel straightening - people have altered the natural shape of rivers, removing the meanders and straightening the channel allows the water to move faster. This action can help remove a flood risk from one area but can increas the risk of flooding further downstream.

Poor drainage or blocked drains/sewers - blocked or damage drainage systems can lead to surface flooding

### Impact of flooding:

A floodplain is a naturally flat area of land next to a river, where water flows when a river overflows during a flood. In many urban areas, people have built on the floodplains, therefore these buildings are at higher risk of flooding. Therefore there is risk to homes and businesses, loss of powers and distruption to water supplies (flooding can cause pollution of clean water sources), damage to roads, bridges and railways.



Solutions to reduce flooding:

Dams and reservoirs can be built to control to flow of water through a section of river

Levees are naturally occuring banks created by the movement of the sediment during flooding. Man-made flood walls can be built along the river, to enable the river to carry more water and protect the floodplains, or rivers can be dredged (removing material from the river bed to make it deeper).



Protecting meanders, floodplains and areas such as moorlands (which store lots of water).

Managing farmland and tree planting

	Replacing impermeable surfaces with permeable surfaces, maintaining and protecting drainage and sewerage systems (only flush the 3 p's – pee, poo and paper). Be aware of the flood risk ( <u>Check the long term flood risk for an area in England - GOV.UK</u> (www.gov.uk)), check weather warnings and have a flood plan.	
Fieldwork -	<b>Before visit</b> - use variety of maps (including OS) to locate river and key human and physical features in the locality, also use maps to identify key river features (upper, middle, lower course) and mark on maps, drawing own maps from OS, using grid lines to help (LA - tracing), mark compass points,	
	<b>On visit</b> - use compasses to identify direction of flow, then draw field-sketches at upper, middle and lower course points, labelling for physical features using geographic vocab, and describing river flow and any human activity/features, and taking note of vegetation (planted or natural), spot signs of flooding, erosion and deposition	
	Take photos to show valley shape and river features.	
	Look at old photos of river - how has it changed? Road names, town names	
	Measure how quickly river flowing - measure 10m stretch, pupil at finish line with stopwatch and tells pupil at start when to drop dog biscuit into river, observers check doesn't get trapped/ stalled by obstacles. Repeat multiple times (with multiple groups?) and take average. Record on tables and bar charts? Test against different points on river to compare results, eg at a meander. (GD calculate speed, speed (m/s) = distance (10m) ÷ av time (secs).	
	After visit - annotate photos, create display, research history of area (old maps and photos) to see how has changed, write report, history of flooding/ preventative measure now in place, research and report on human activity (who uses river and how)	



## Water Vocabulary

Vocabulary				
Tier 1	river	canal	port	
	catchment	lock	coast	
	source		beach	
	mouth		dune	
	tributary		cliff	
	meander		harbour	
			dock	
Tier 2	main channel	dam	peninsula	erosion
	downstream		reef	
	upstream		tide	
	confluence		arch	
	floodplain		stack	
	estuary			
	drainage basin			
Tier 3	upper course	hydroelectric	causeway	transportation
	middle course			deposit/
	lower course			deposition
	delta			
	oxbow lake			



## Geography – Water School Ethos

Love Christ	<ul> <li>Fruits of the spirit</li> <li>Parables</li> <li>Worship</li> <li>Prayer</li> <li>Christian values</li> <li>Following teachings of Christ</li> </ul>	We will be celebrating the natural world; exploring different environments, and the plants and animals that they support.
Love Learning	<ul> <li>Self-manager</li> <li>Reflective learner</li> <li>Team player</li> <li>Participator</li> <li>Independent enquirer</li> <li>Resourceful</li> <li>Challenge to meet potential.</li> </ul>	We will be like Selah and manage our time when completing research and activities. We will be like Reid by presenting our learning clearly and accurately. We will be like Tova by listening to the ideas of others and sharing responsibility on team tasks. We will be like Pia and participate in class discussions using geographic vocabulary and asking questions about the world. We will be like Ingmar to analyse and evaluate information from a range of sources. We can be like Rowan and be resourceful to adapt and apply my learning within a topic.
Love One Another / Citizens of the World	<ul> <li>21<sup>st</sup> ready</li> <li>E-safety</li> <li>Community spirit action</li> <li>British values</li> <li>SMSC</li> <li>PHSE</li> <li>Manners</li> <li>Independence</li> <li>Responsibility</li> <li>Healthy living</li> <li>Road safety</li> <li>Environmentally friendly</li> </ul>	Understanding what effect flooding and drought has on different communities around the world. Understanding more about the lives of people in Britain and the wider world, including cultures and religions, as well as discussing our role as global citizens.
X Factor	<ul> <li>Pedagogies</li> <li>Trips</li> <li>Experiences</li> <li>IT</li> <li>Resources</li> <li>Out of the box thinking.</li> </ul>	Using IT to view digital mapping systems See video clips linked to areas under study 3D, animated models of landforms and possible recreating 3D models of river landforms Trip to undertake geography fieldwork