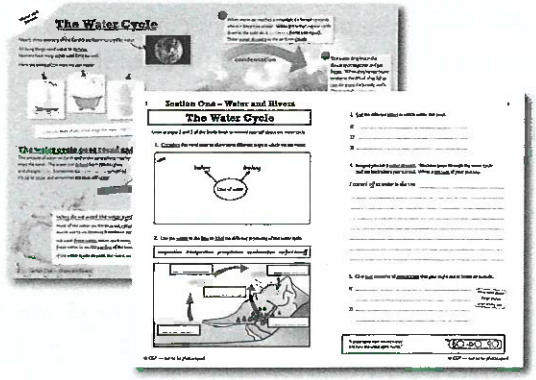
The Water Cycle

Study Book (pages 2-3)



Activity Book (pages 2-3)

National Curriculum Aims

- Understand the processes that give rise to key physical geographical features of the world.
- Describe and understand key aspects of physical geography, including rivers and the water cycle.

Introduction

This first topic introduces pupils to the water cycle — a fundamental process that keeps the world's rivers flowing and provides us with fresh water. There's a fixed amount of water on Earth, which has been continually circulated through the water cycle for about 4.6 billion years. Only 2.5% of this water is fresh water, and the majority of this is locked up in glaciers and ice sheets, so we rely on the water cycle to keep renewing less than 1% of the water on Earth. The water cycle happens when water evaporates from the ocean — the salt doesn't evaporate and is left behind — creating water vapour, some of which will eventually fall onto the land as rain.

Before pupils complete the Activity Book, get them to consider the importance of the water cycle by asking them what they think might happen if the water cycle suddenly stopped.

Answers to Activity Book Questions

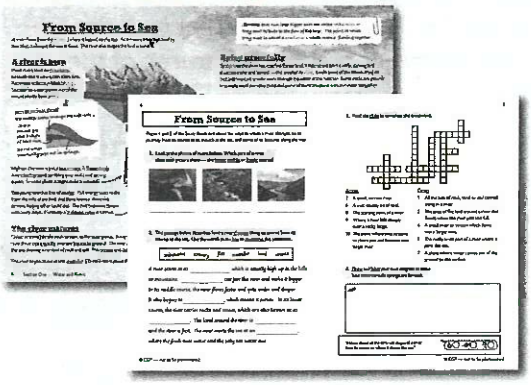
1. E.g. cleaning, transport (i.e. sailing), water sports and swimming.
2. In the centre: transpiration.
   Clockwise from top left: condensation, precipitation, surface runoff, evaporation.
3. Ice/snow, water and water vapour / solid, liquid and gas.
4. Any appropriate answer. Pupils don't have to include all stages of the water cycle as long as they get back to where they started.
5. E.g. clothes drying, puddles drying out, steam from tea/coffee, hair drying.

Extra Activities

- Show pupils an annual precipitation map of the UK. Ask them to identify the most mountainous areas of the UK on the map. Ask pupils if they can see any link between how mountainous an area is and the amount of precipitation it receives.
- Pupils can further explore evaporation and condensation in Science. Get pupils to look at salt water solutions in a saucer and observe how, when left for a few days, the water evaporates and leaves the salt behind. To speed up this process, an oven can be used to heat and evaporate the water. Pupils can see condensation in action by observing what happens when a cold plate is held over a boiling kettle.
- Ask pupils to design a poster to explain the water cycle to others.
- Ask pupils to write a song to help them remember the stages of the water cycle. Alternatively, search online for a song about the water cycle that pupils could learn as a class.

From Source to Sea

Study Book (pages 4-5)



Activity Book (pages 4-5)

National Curriculum Aims

- Understand the processes that give rise to key physical geographical features of the world.
- Describe and understand key aspects of physical geography, including rivers, mountains and the water cycle.

Introduction

Following on from the water cycle, pupils now learn in more detail how rainwater makes its way to the sea. The upper, middle and lower courses of a river have very different characteristics from each other.

As there is a lot of new vocabulary on these pages, it may be helpful to write some key words on the board before starting the activities. Pupils could draw their own flashcards with a picture of a river feature on one side and its name and definition on the other.

Answers to Activity Book Questions

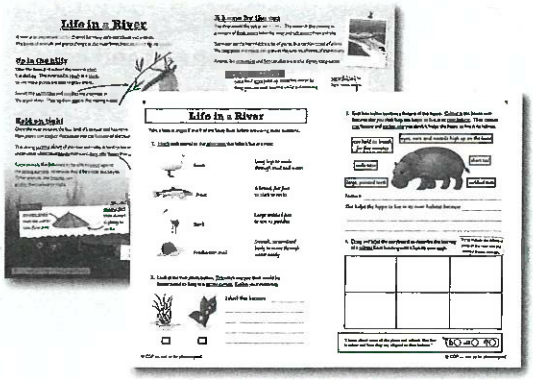
1. Lower, upper, middle.
2. A river starts at its *source* which is usually high up in the hills or mountains. *Tributaries* can join the river and make it bigger. In its middle course, the river flows faster and gets wider and deeper. It also begins to *meander*, which means it curves. In its lower course, the river carries rocks and stones, which are also known as its *load*. The land around the river is *flat* and the river is fast. The river meets the sea at an *estuary*, where the fresh river water and the salty sea water mix.
3. Across: 3 — stream, 6 — bog, 8 — source, 9 — waterfall, 10 — confluence
   Down: 1 — load, 2 — floodplain, 4 — tributary, 5 — estuary, 7 — spring
4. Any appropriate drawing and labels.

Extra Activities

- Split pupils into pairs and ask each pupil to write clues describing a certain part of a river. They should then give their clues to their partner, who has to work out which part of the river the clues describe.
- As a class, read some poems about rivers. E.g. *The River* by Valerie Bloom, *River Journey* by Moira Andrew and *The Immortal River* by David Windle. After reading one or more of these poems, ask pupils to write their own poem about the course of a river.
- Ask pupils to use an atlas to identify some rivers around the world, e.g. the Rhine, the Columbia River, and the Yellow River. Ask them to identify the countries the rivers flow through and their major tributaries.
- Demonstrate to the class how springs form. Cut the top off a water bottle and make holes at various heights up the side of the bottle. Fill the bottle halfway with sand, then make an impermeable layer with modelling clay or play dough. Fill the bottle the rest of the way with sand. At this point, ask pupils to predict what will happen when water is added. Slowly pour water into the bottle until the water emerges from one or more of the 'springs' (holes). Explain that when the water reaches the impermeable layer and is unable to flow downwards, it's forced sideways.

Life in a River

Study Book (pages 8-9)



Activity Book (pages 8-9)

National Curriculum Aims

- Describe and understand key aspects of physical geography, including rivers, mountains and the water cycle.

Introduction

As covered on pages 4 and 5 of the Study Book, different parts of a river have different characteristics. These different characteristics create a variety of habitats. The plants and animals that live in the river are adapted to the environment found in that part of the river.

Before reading the Study Book, ask pupils what plants and animals they think might live in or around a river. (Pupils should be able to draw on their existing knowledge of living things and their habitats.) Recap the different features of a river from its source to its mouth and ask the pupils if they think certain plants or animals are better suited to certain locations of the river.

Answers to Activity Book Questions

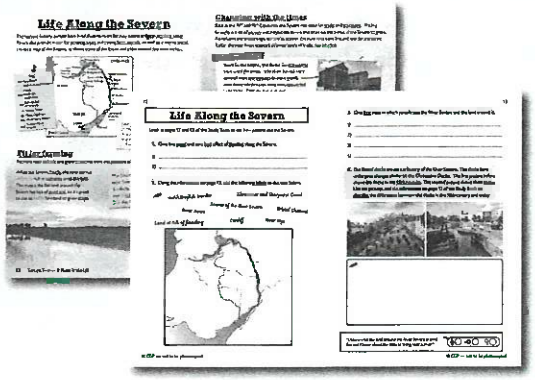
1. Swan — Large webbed feet to use as paddles, Trout — Smooth, streamlined body to move through water easily, Stork — Long legs to wade through mud and water, Freshwater snail — A broad, flat foot to stick to rocks.
2. Pupils should have ticked the plant with long, thin leaves. Pupils' explanations should demonstrate that they understand that long, thin, flexible leaves help the plant to bend to tolerate a strong current.
3. Pupils should have coloured: can hold its breath for five minutes / eyes, ears and nostrils high up on the head / webbed toes.
   Pupils should have selected one of the above features and identified how it helps the hippo to live in the water, e.g. *Feature:* eyes, ears and nostrils high up on the head. *This helps the hippo live in its river habitat because* it can see, breathe and hear above the water while swimming / when its body is underwater.
4. Any appropriate drawings. Pupils should draw on information from page 9 of the Study Book.

Extra Activities

- Pupils can use what they have learned about life in rivers to create their own imaginary river animal. Ask pupils to describe which part of the river their animal lives in and what adaptations it has to make it well-suited to its particular environment.
- Further to question 4 in the Activity Book, pupils could write a diary entry from the point of view of a salmon, describing the journey back upstream to spawn. To help pupils visualise the journey, search online for a video documenting the return of sockeye salmon from the sea to lay their eggs.
- Ask pupils to research a plant or animal that is found in a river. This can include what part of the river it lives in, and how it's adapted to live in the river. They can then create a presentation about the plant or animal that they have chosen to research.

Life Along the Severn

Study Book (pages 12-13)



Activity Book (pages 12-13)

National Curriculum Aims

- Name and locate geographical regions of the United Kingdom and their identifying human and physical characteristics.
- Understand the processes that give rise to key physical and human geographical features and how these are interdependent.
- Understand land-use patterns and how they have changed over time.
- Interpret a range of sources of geographical information, including maps.

Introduction

This topic introduces pupils to different forms of land use around a river, from farming to industry. During the Industrial Revolution, the Severn, like many UK rivers, was used for trade and transport. Many factories were also built along its banks (there's more on factories on page 14 of the Study Book and Activity Book). Waterways were later overtaken by roads, railways and air travel as these provided quicker and easier means of transport. As a result, some ports and docks, including the Gloucester docks, fell into disuse. The Gloucester docks have since been renovated and have been transformed into residential and recreational areas.

Before pupils read the section, recap the ways in which we use water, and ask them to identify any ways in which people use rivers specifically.

Answers to Activity Book Questions

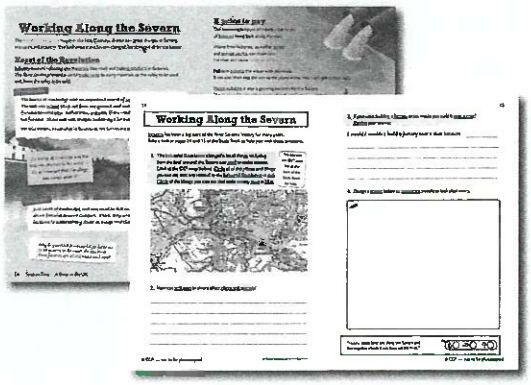
1. E.g. Good: When the river floods, it brings sediment onto the land around the river. The sediment is full of nutrients and makes the soil fertile. This makes the land good for crop farming.
   Bad: Flooding can damage homes and other buildings. / Flooding is dangerous and people can get hurt.
2. *Welsh/English border* — dashed line, *Land at risk of flooding* — hashed shading, *Source of the River Severn* — the river starts in North West Wales. All other labels should match those on page 12 of the Study Book.
3. E.g. Raising farm animals / growing crops / fresh water / trade / transport / water sports / sailing.
4. Pupils' answers should display an understanding that the river is now mostly used for leisure. They may describe there being fewer boats, new buildings, shops, more tourists etc.

Extra Activities

- Ask pupils to research various flood defence methods either in books or online, for example, dams, diversion canals, reservoirs, metal barriers along river banks, and sand bags. Divide pupils into groups and ask each group to research one defence method in detail. Each group can then present an overview and some pros and cons of their flood defence method to the rest of the class.
- Share images and video clips of news footage (available online) of the 2007 flooding of the River Severn with the class and provide pupils with key facts about the event. Ask pupils to write a newspaper report about the flooding of the River Severn.
- Provide pupils with a map of the River Severn, along with images of tourist attractions along the river. The images could include Ironbridge, Bridgenorth Cliff Railway, Worcester Cathedral and the Gloucester Quays. Ask pupils to imagine that they've been on a boat travelling along the Severn. Get them to write a postcard describing their journey, including some of the places they've seen from the boat.

Working Along the Severn

Study Book (pages 14-15)



Activity Book (pages 14-15)

National Curriculum Aims

- Understand the processes that give rise to key physical and human geographical features and how these are interdependent.
- Understand land-use patterns and how they have changed over time.
- Describe and understand key aspects of human geography, including land use and economic activity including trade links.

Introduction

Industry along the Severn has changed a great deal since the Industrial Revolution. The Severn was a vital transport link between the coalfields and the Bristol Channel. Ironworks, brick and tile works and porcelain factories all grew along the banks of the Severn throughout the 18th and 19th Centuries. Although polluting industries, like ironworks, no longer operate along the Severn, pollution is still a problem, particularly plastic pollution.

This topic provides an opportunity to discuss the positive and negative impacts of industry, as well as the wider issues of the environment and recycling.

Answers to Activity Book Questions

1. Pupils could circle: Industrial Revolution: Ironbridge / Coalport / Furnaces / Tar Tunnel
   Now: Craft Centre / Museum / Discovery Centre / Caravan Park / Power Station / Hotel
2. Any appropriate answer. Pupils may expand on information in the Study Book to draw their own conclusions. E.g. Pollution in rivers can harm the plants and animals that live in and around the river. Too much pollution can block the sun from shining through the water so plants can't survive. Plastic and chemical waste can kill animals if they eat it.
3. Pupils may answer either way, as long as they give sensible reasons to support their answer.
4. Any appropriate drawing and text. Pupils can draw on information from the Study Book.

Extra Activities

- Show pupils pictures of The Iron Bridge in Ironbridge. It was the first major bridge in the world to be made from cast iron. Discuss other materials that bridges can be made from and ask pupils why they think building a bridge from iron is a good idea (e.g. it's very strong and lasts a long time).
- Show pupils pictures or a video of waterwheels. As a class, discuss why the water makes the wheel turn and why this is useful for industry (e.g. turning mill wheels to grind flour). Pupils can then make their own waterwheels — this can be done using two paper plates placed about 5 cm apart, with a stick through the centres of both plates. Plastic cups should be attached between the two plates around the edge, all facing the same way. Pour water from above to fill each cup in turn. This should make the wheel rotate with the weight of the water. Pupils can also look at how a stream flowing under the wheel can cause it to turn.
- Take pupils to a local waterway. Ask them to make a list of the different types of litter along the river that they can see. Back in the classroom, ask them to discuss the effects that pollution and littering could have on the environment. They can also write a letter to their local council about the pollution they saw. Alternatively, contact the local council to organise a litter pick for the class along a local river bank.