From Source to Sea: How Rivers Shape Land

Teacher		**Class**	Year 8
Subject	Geography	**Topic**	Rivers and river landforms
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils learn how rivers change from source to mouth. They build a tray river and explain waterfalls and meanders.

Curriculum links

- understand that the features of a river and the surrounding landscape change from source to mouth [1]
- gain an understanding of erosion, transportation and deposition and the role these processes play in shaping the river [1]

Learning objectives

- Students will trace a river from source to mouth and name valley features.
- Students will explain erosion, transportation and deposition in shaping river channels.
- Students will describe how waterfalls retreat and meanders form oxbow lakes over time.

Success criteria

- I can label V-valley upstream, meander midstream and wide mouth downstream.
- I can sort river actions into erosion, transportation and deposition groups.
- I can order waterfall collapse and meander cut-off to form gorge and lake.

What students already know

Ask: Where do many rivers start and what happens to water after heavy rain? Take 3 quick answers on mini whiteboards.

Key words

source	high place where a river starts as a narrow stream [1]
erosion	wearing away of rock and soil by moving water and stones [2]
transportation	carrying of sand and pebbles downstream by flowing water [1]
deposition	leaving behind of sand and mud when water slows down [2]
waterfall	steep drop where a river falls from one level to a lower level [2]
meander	large curve in a river that grows bigger further downstream [2]

Materials

- Slides 1-2, 5-8, 10-12 and projector
- Video clip 1 (0:00–5:00) on Slide 6 and Video clip 2 (0:00–2:39) on Slide 8
- shallow trays, sand or soil, small jugs of water, card labels, paper towels

Before the lesson

- Test Video clip 1 (0:00–5:00) on Slide 6 and Video clip 2 (0:00–2:39) on Slide 8
- Fill small jugs with water, fill trays with a thin layer of sand or soil, print card labels
- Set out paper towels, clear walkways and test projector for Slides 1-2, 5-8, 10-12

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- labelled diagram of the three courses for support
- mini whiteboards and pens

Lesson outline

0–5 min **Starter** 5 min · Whole class

To recall river start points and hook pupils into the source-to-mouth journey.

YOU DO

1. Show Slide 1 title and read Slide 2 objectives for the lesson.
2. Say the hook: If we shrank a whole river to fit on your desk, what would you expect at the top, the middle and the bottom?
3. Show Slide 5 vote and ask pairs to choose a village site: steep upper valley, wide middle bend or flat lower floodplain.
4. Link votes to the lesson: today we test which ideas match how rivers really change.

STUDENTS DO

1. Listen to objectives and hook question.
2. Discuss with partner and vote for a village site.
3. Give one reason for the choice.

Say: If we shrank a whole river to fit on your desk, what would you expect at the top, the middle and the bottom? Talk to your partner and vote for the best village site. Today we will build that whole river and check who was right.

Ask: Where do many rivers start? (High up from rain and springs as a narrow stream.) · What might be risky about living on a flat floodplain near the mouth? (The river is wide and can flood over its banks.)

Check understanding: Hands up vote count and cold-call two reasons; if unsure, note ideas on board to test later.

Support: Let pupils vote with a partner and whisper a reason before speaking. **Stretch:** Ask pupils to predict how valley steepness and channel width will change downstream.

Use: Slides 1-2, 5

5–17 min **Teaching** 12 min · Whole class

To explain the source-to-mouth model and the roles of erosion, transportation and deposition.

YOU DO

1. Play Video clip 1 (0:00–5:00) on Slide 6 and ask pupils to spot wearing away, moving and dropping.
2. Explain using Slide 7 timeline that features of a river and the surrounding landscape change from source to mouth [1].
3. Model a pebble journey: vertical cutting upstream makes steep land and V-shaped valleys [1], widening and meanders in the middle where land is flatter [1], widest channel and deltas downstream [1].
4. Define erosion, transportation and deposition and their role in shaping the river [1].

STUDENTS DO

1. Watch Video clip 1 and call out examples of wearing, moving and dropping.
2. Copy a three-box timeline: upper, middle, lower with one picture cue each.
3. Repeat definitions of erosion, transportation and deposition to a partner.

Say: A river is one system from source to mouth, and erosion, transportation and deposition shape it all the way [1]. Upstream the land is steep and the water cuts down into V-shaped valleys [1]. Further down the river widens, bends and in the lower course is at its widest with deltas [1].

Worked example: Follow one pebble. Source: rain feeds a narrow stream. Upper course: fast water uses hydraulic action and abrasion to wear rock away, that is erosion. Middle course: water carries the pebble downstream, that is transportation. Lower course: slow water cannot carry it, so it drops it to build flats and a delta, that is deposition [1].

Ask: How does the valley and channel change from source to mouth? (Steep narrow V-valley upstream, wider meandering channel in middle, widest flat channel and delta downstream [1].) · What is the difference between erosion, transportation and deposition? (Erosion wears rock away, transportation moves material downstream, deposition drops it when water slows [1].)

Check understanding: Mini whiteboards: label upper, middle, lower on a simple long profile; reteach any mixed-up order with Slide 7.

Support: Give a half-filled timeline with sentence starters for each course. **Stretch:** Ask pupils to predict where cutting down is strongest and where building up is strongest, with a reason.

Use: Video clip 1 (0:00–5:00), Slides 6–7

17–30 min **Teaching** 13 min · Whole class

To show how waterfalls retreat to leave gorges and how bends migrate to form oxbow lakes.

YOU DO

1. Show Slides 3-4 facts: soft rock wears first and swirling stones grind potholes.
2. Play Video clip 2 (0:00–2:39) on Slide 8 and use Slide 10 to contrast outside bend and inside bend.
3. Model waterfall retreat step by step from hard rock over soft rock to plunge pool, collapse and gorge [2].
4. Model meander migration: fastest flow outside erodes to a river cliff, slowest flow inside deposits, so the bend moves across the valley [2].

STUDENTS DO

1. Watch Video clip 2 and point to where water is fastest and where sand builds up.
2. Draw a quick cross-section of a bend labelling river cliff outside and gentle slope inside.
3. Practise saying the waterfall sequence to a partner using hard rock, soft rock and plunge pool.

Say: Waterfalls do move uphill over time when soft rock wears away first and the hard lip collapses [2]. The fall retreats upstream leaving a steep-sided gorge [2]. On a bend the fastest water is on the outside leading to erosion and the slowest water is on the inside leading to deposition, so the meander migrates [2].

Worked example: Waterfall in four frames. 1. Drop where hard rock overlies soft rock [2]. 2. Hydraulic action and abrasion wear soft rock quicker and undercut hard rock to make a plunge pool [2]. 3. Overhang collapses into the pool, increasing abrasion and deepening the pool [2]. 4. Process repeats and the waterfall retreats upstream leaving a gorge [2]. Meander: outside erodes back as a cliff, inside builds forward, neck narrows, flood cuts through, ends seal with deposition to leave an oxbow lake [2].

Ask: What rock arrangement makes a waterfall retreat? (Hard rock over soft rock, soft rock erodes quicker and undercuts the hard rock [2].) · Why does a meander move and how does it become an oxbow lake? (Erosion outside and deposition inside moves it; in flood the river cuts through the neck and deposition seals the old bend [2].)

Check understanding: Thumbs up for true or false: fastest water is inside the bend; correct to outside and revisit Slide 10 if needed.

Support: Give sentence starters such as softer rock erodes first and the hard rock is left hanging. **Stretch:** Ask pupils to predict where the next waterfall collapse or meander cut-through will happen and why.

Use: Video clip 2 (0:00–2:39), Slides 3–4, 8, 10

30–50 min **Main activity** 20 min · Groups

To build and label a tray river system showing upper, middle and lower course features.

YOU DO

1. Demo tilting the tray, pouring slowly and shaping a steep upper section, wider middle bend and flat wide lower section.
2. Remind groups that erosion, transportation and deposition shape the river from source to mouth [1] and point to Slide 7 as a guide.
3. Circulate, narrate V-shaped valleys upstream [1], widening meanders midstream [1] and deltas downstream [1].
4. Stop class at 15 minutes for groups to label three photos: steep V-valley, widening meander and wide channel with delta.

STUDENTS DO

1. Tilt tray, pour water slowly and shape upper, middle and lower sections with one connected channel.
2. Observe where water cuts down upstream and where sand builds up downstream.
3. Label three photos to show steep V-shaped valley upstream, widening meander in the middle, and wide channel with delta downstream.

Say: Tilt your tray to make a slope and pour gently to form one river system. Shape a steep top, a bendy middle and a flat wide bottom. You will label three photos to prove what changed from source to mouth.

Worked example: Teacher model: top third is high and steep with a narrow straight channel cut down into a V-shape. Middle third is less steep with one clear bend, narrow neck and sand piled on the inside. Bottom third is almost flat, channel is widest, water spreads and drops sand to make a fan-shaped delta [1].

Ask: Where is cutting down strongest and where is building up strongest? (Cutting down upstream by vertical erosion, building up downstream by deposition [1][2].) · How does your model show the middle course widening and bending? (Land is flatter and rivers widen and begin to meander [1]; fastest water outside erodes, slowest inside deposits [2].)

Check understanding: Check labelled photos for all three courses; if a group misses the delta or V-shape, send them back to reshape that third.

Support: Give pupils a labelled diagram of the three courses to copy when shaping their tray. **Stretch:** Ask pupils to add arrows for where they think cutting down happens upstream and building up happens downstream, then explain their choice.

Use: Slide 7

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50–60 min **Plenary** 10 min · Pairs

To check secure knowledge of river courses, processes and landforms and link floods to building landforms.

YOU DO

1. Pose Slide 11 question: after heavy rain, does a flood only destroy landforms, or can it build them too?
2. Take pairs: one natural cause, one human cause and one impact on the environment or community [1].
3. Run Slide 12 quick quiz on waterfall rocks, V-valleys and fastest water.
4. Return to Slide 2 success lines and confirm what pupils can now label and explain.

STUDENTS DO

1. Think, pair, share on whether floods destroy only or also build, using cut-through and deposition ideas.
2. Answer quiz questions in pairs on mini whiteboards.
3. Self-assess against I can label and explain statements.

Say: After heavy rain, does a flood only destroy landforms, or can it build them too? Discuss with your partner for two minutes. Rivers flood after heavy or prolonged rainfall and growing urbanisation makes flooding more likely [1].

Ask: Why do places flood and what does flooding affect? (Heavy or prolonged rainfall, landscape and rock type, plus urbanisation [1]; it impacts the physical environment and the community [1].) · Can a flood build landforms as well as destroy them? (Yes, flood can cut through a meander neck and deposit material to seal an oxbow lake and build floodplains and deltas [1][2].)

Check understanding: Exit whiteboards for three quiz answers; if many miss one, reteach that landform with a quick sketch.

Support: Provide talk frames such as one cause is heavy rain because and flooding affects people by.
Stretch: Ask pupils to rank causes for a steep rocky valley versus a flat built-up town and justify the order.

Use: Slides 11–12

Common mistakes

Mistake	How to spot it	How to fix it
Thinking a waterfall stays in one place	Draws the fall fixed and omits the gorge upstream	Retell collapse sequence: soft rock erodes first, hard lip collapses, fall retreats upstream leaving a steep-sided gorge [2].
Mixing up erosion and deposition sides of a meander	Labels deposition on the outside bend and erosion inside	Remind fastest water is outside leading to erosion and river cliff, slowest inside leading to deposition [2].
Placing deposition upstream and deep cutting downstream	Draws wide flats at the source and narrow V-valley at the mouth	Revisit model: vertical erosion cuts V-valleys upstream, lateral erosion widens midstream, deposition builds deltas downstream [1][2].

Support

- Labelled diagrams of three courses and sentence starters for each explanation
- Talk frames for causes and impacts and pre-coloured sorting cues for processes

Stretch

- Add arrows for cutting down versus building up and justify choices
- Predict next waterfall collapse or meander cut-through and rank flood causes for two valley types

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- LSE to pre-teach source, erosion, deposition, waterfall and meander with pictures

For the LSE or teaching assistant

Stay with tray groups to manage pouring and labelling; prompt with where is water fastest and where is sand dropped, and scribe labels if needed.

Safety

- Wipe up spilled water at once to stop slips, keep water jugs small and pour slowly
- Wash hands after touching soil and pebbles

Check for understanding

Question	Answer
Name one feature of the upper, middle and lower course in order.	V-shaped valley, meander, delta [1].
What rock order forms a retreating waterfall and what is left behind?	Hard rock over soft rock; gorge left as fall retreats upstream [2].
Where is erosion and deposition on a bend, and what forms if the neck is cut through?	Erosion outside, deposition inside; oxbow lake after cut-through and sealing by deposition [2].

Homework

Sketch your tray river and label upper V-valley, middle meander and lower delta.

Sources

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