

Unit 7 Rivers – a fieldwork approach

About the unit

In this short unit pupils carry out fieldwork to investigate a section of a river and its valley and the changes that take place downstream. They use a variety of equipment to measure and record their findings. At the end of the unit pupils produce a piece of continuous writing explaining the processes that cause the downstream changes and reflect on how they could have improved their fieldwork.

The unit could build on work covered earlier in unit 4 'Flood disaster – how do people cope?' or be developed as the central part of a long unit as an alternative to unit 8 'Coastal environments'. It can be extended into a long unit on river processes and landforms, which might begin with the prior learning identified, and end by considering the characteristics of another river (see 'Resources') and the global patterns created by major river systems. The threats posed by pollution and major flooding events could also be added.

In this unit specific reference is made to key skills in 'Points to note'.

This unit is expected to take 4–7 hours.

Key aspects

Geographical enquiry and skills

Pupils will:

- ask geographical questions
- suggest investigation sequences
- collect/record/present evidence
- analyse evidence and draw conclusions
- communicate appropriately
- use extended geographical vocabulary
- use fieldwork techniques
- use atlases/globes/maps
- use secondary evidence
- draw maps, plans and graphs
- communicate using ICT
- experience decision making

Knowledge and understanding of places

Pupils will:

- locate places and environments
- describe and explain physical features

Knowledge and understanding of patterns and processes

Explored through:

- geomorphological processes
- weather and climate

Knowledge and understanding of environmental change and sustainable development

Not focused on

Expectations

At the end of this unit

most pupils will: draw on their knowledge of river behaviour to suggest relevant questions and an appropriate sequence of investigation in the field; plan and use appropriately a variety of fieldwork techniques and equipment to collect data, collate it and present their findings about downstream changes in the course of a river and its valley, both graphically and in writing, using IT; use some of the evidence collected to begin to reach plausible conclusions and how the quality of their fieldwork might be improved in future

some pupils will not have made so much progress and will: draw on their knowledge of river behaviour and begin to suggest suitable questions and a sequence of investigation; follow instructions to carry out a range of field measurements relating to river and valley characteristics and bring together information; select and use a range of skills, including using IT, to present information about downstream changes in river channel and valley characteristics, in summary form; use primary and secondary sources of evidence and present their findings both graphically and in writing

some pupils will have progressed further and will: draw on their knowledge and understanding of river behaviour to identify relevant geographical questions and a sequence of investigation; carry out a geographical investigation effectively in the field with minimal teacher support, selecting and using a wide range of skills and equipment to collect, collate and present data; describe and explain downstream changes in river channel and valley characteristics; begin to reflect critically on evidence collected and methods of working; present well-argued reports and begin to reach conclusions that are consistent with the evidence

Prior learning

It is helpful if pupils have:

- some familiarity with the components of the water cycle, can match the terms with definitions and produce a flow diagram
- considered the difference between weathering and erosion
- learnt about weathering and understand erosion, transportation and deposition in the context of river studies
- discussed various changes in rivers and river valleys from source to mouth, after research in textbooks
- some understanding of, and can use, the terms river basin, source, mouth, meander, tributary, watershed, waterfall

Language for learning

Through the activities in this unit pupils will be able to understand, use and spell correctly words relating to:

- rivers, *eg river basin, source, mouth, meander, tributary, watershed, water cycle, waterfall, valley, gorge, channel, current, landscape, reservoir, weir, flood plain, rapids, estuary, delta, profile, hydrology, storage, infiltration*
- the effect of water on the environment, *eg weathering, erosion, transportation, deposition*
- fieldwork, *eg clinometer, flow meter, sample*

Writing – through the activities pupils could:

- show relationships between ideas by links which illustrate purpose, *eg in order to, so that*, and reservations, *eg although, unless, if*

Resources

Resources include:

- OS maps
- field equipment as available, *eg flow meter, stopwatch, ranging rods, floats, measuring tape, clinometer, digital camera*
- palmtop computer
- a virtual field visit, *eg www.niwa.com/cam-era/waimakariri-b.htm or www.uwsp.edu/acaddept/geog/courses/geog391/toriv/g391main.htm* or using the Environment Agency Riverside Explorer CD-ROM (a free copy will be issued to all secondary schools in April 2000)

Future learning

The unit provides an introduction to fieldwork techniques and investigative approaches to use in some GCSE coursework. There is opportunity to develop ideas relating to weathering and erosion in different contexts and scales later within key stage 3 and into key stage 4.

Links

The activities in this unit link with:

- other geography units – unit 4 ‘Flood disaster – how do people cope?’
- key skills – communication, application of number, IT, working with others, improving own learning and performance
- science – work on the water cycle, on weathering and on ecological relationships

What do we already know about hydrological patterns and processes?

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| <ul style="list-style-type: none"> • to use secondary evidence • to investigate the patterns and processes of river and valley shape and formation | <ul style="list-style-type: none"> • Start by finding out what pupils remember from their work on rivers at key stage 2. Introduce them to new words relating to water to be used in the unit and explain them and their origin. A reminder about <i>patterns</i> and <i>process</i>, with illustrations, may also be useful. • Give the class four tasks, written clearly on the board: <ul style="list-style-type: none"> – <i>What is the 'water cycle' and can you explain it?</i> – <i>What is the difference between 'weathering' and 'erosion'?</i> – <i>What changes take place in the 'long profile' of a river valley?</i> – <i>What features result from 'fluvial erosion'?</i> • Discuss with pupils the key words water cycle, weathering, erosion, long profile and fluvial erosion. In groups, ask pupils to use a range of texts and images to prepare and present information for one of the tasks and then share what they have learnt with the rest of the class. | <ul style="list-style-type: none"> • identify and show the components and links in the water cycle • distinguish between weathering and erosion • describe and explain the main processes of fluvial erosion • identify land forms associated with fluvial processes | <ul style="list-style-type: none"> • Word origin: hydrology/hydrological, from the Greek <i>hudos</i> (water); fluvial from the Latin <i>fluvius</i> (river) and <i>fluere</i> (to flow). • Key skills: communication, note taking and drafting, oral presentations, defining words and providing 'simple' explanations. • Science: links with key stage 2 work about the the part played by evaporation and condensation in the water cycle. • Weathering is covered in more detail in unit 8 'Coastal environments' and in unit 8G 'Rocks and weathering' in the science scheme of work. What is important here is to distinguish between weathering and erosion, that the latter involves movement. |
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Where is the river section we are going to study?

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| <ul style="list-style-type: none"> • to use and interpret maps at 1:50,000 and 1:25,000 scales • to draw simple cross-profiles | <ul style="list-style-type: none"> • Help pupils to locate the river section to be studied on an OS map. If available, both 1:50,000 and 1:25,000 maps may be used, and the opportunity taken to note briefly the differences between them in scale, symbols and level of detail. • Using one of the maps, help pupils identify key points and characteristics that can be deduced from the map using six-figure grid references, and speculate on the most likely locations for certain features. As points of reference, it may be helpful to have some simplified drawings of typical river and valley features (contour lines and three-dimensional sketches) to help identification. There is an opportunity here to demonstrate how to draw a cross-profile from contour lines and for pupils to replicate a simple one. • Ask pupils, in groups, to work out a route to reach the study area from base (school/field centre). | <ul style="list-style-type: none"> • read OS maps to identify and locate features correctly • use map evidence to interpret and draw out characteristics of long and cross-profiles of a valley section | <ul style="list-style-type: none"> • Homework activity: other cross-sections may be drawn for homework to practise/consolidate the skill. |
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Learning objectives

Pupils should learn:

Possible teaching activities**Learning outcomes**

Pupils:

Points to note**What do we want to find out?**

- to use an extended vocabulary
- to ask geographical questions
- to suggest an appropriate sequence of investigation
- to select and use appropriate fieldwork techniques and instruments
- to communicate and exchange ideas in a variety of ways
- decision-making skills
- Give pupils the key question *What changes take place downstream in this river section?* Ask pupils to suggest what are the important geographical questions in this context and in what order they should be investigated, eg *What do we want to find out? What do we expect to find out? What information will we need to collect? How will we collect it? What equipment will we need? Who will do what? Where?* Ensure that the pupils have considered appropriate questions, in relation to water volume and speed, cross- and long profiles, physical features (channel and valley), water quality. (Higher-attaining pupils may be given more opportunity to identify their own questions/sequence.)
- Demonstrate how the equipment is to be used in the field, eg *clinometer, digital camera, palmtop computer, flow meter, tape and ranging rod, meter rule*. The pupils should agree the design of data collection sheets and standardise them to ensure data is collected effectively.

- identify and agree the procedures and questions to find out about river profile characteristics
- design or adapt data sheets for effective use

- Key skills: application of number – pupils identify what data should be collected and how it is to be collected, and interpret scales on measuring instruments.
- Key skills: working with others and IT – pupils plan and collect data as a team effort, agreeing and allocating tasks. The data-collection sheets can be designed in a spreadsheet, which can be loaded onto a palmtop computer taken into the field. This has the advantage that pupils can check results before returning to the classroom.

What information can we collect in the field?

- to apply enquiry and investigation skills in the field
- to pay due regard to safety instructions
- Out in the field oversee the work of groups in three/four pre-agreed locations on the long profile; set time limits, manage deployment of equipment and monitor safety and control. Ensure pupils know what they are to do – measure channel width, depth (to determine its cross-profile), the speed of flow (velocity), the angle of slope of the valley sides and the width of the valley floor. Any interesting physical features or ecological links could also be noted (in a sketch or with a camera). Provide what assistance is necessary, leaving each group as much autonomy as possible.
- complete data sheets to answer the questions agreed about valley width, channel width and depth, cross-profile and river velocity
- Key skills: application of number – pupils collect and process data.
- Key skills: working with others – pupils plan and work with others, have own responsibilities, review progress.
- Links with unit 8D 'Ecological relationships', in the science scheme of work.

Learning objectives

Pupils should learn:

Possible teaching activities**Learning outcomes**

Pupils:

Points to note**What does our data mean?**

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| <ul style="list-style-type: none"> • to present and interpret evidence • to describe physical features | <ul style="list-style-type: none"> • Ask pupils to collate the data from all groups, represent it in a variety of forms and draw out the key downstream changes recorded. (It may be helpful to discuss with some pupils the types of diagrams and graphs they might use.) Help pupils to describe and explain what their diagrams show. | <ul style="list-style-type: none"> • transform raw data into a range of suitable graphs, diagrams and sketches • describe physical features observed and measured | <ul style="list-style-type: none"> • Key skills: application of number – pupils represent data and interpret graphs/charts. • Key skills: IT – pupils use ICT to analyse, process and present data collected (using palmtop computer, digital camera, word processor, desktop-publishing package and spreadsheet package, etc), and present data combining text, number and graphics. • Language for learning: this activity provides pupils with an opportunity to understand and use correctly terms of qualification and comparison. |
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What conclusions can we draw?

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| <ul style="list-style-type: none"> • to analyse and evaluate evidence and draw conclusions • to describe and explain physical patterns and processes • about the processes responsible for the development of selected land forms | <ul style="list-style-type: none"> • Refer the class back to the earlier question <i>What do we expect to find out?</i> Ask them to identify and attempt to explain the changes recorded at the different recording sites. • Having identified the changes, encourage pupils to try to explain the processes which caused them, using appropriate vocabulary. Help pupils reflect upon the strengths and weaknesses of their fieldwork in relation to accuracy, reliability, consistency between groups and the value of data collection. Ask them to suggest how the work could have been improved. • Ask pupils to produce a written report under given headings, illustrated by appropriate graphs, diagrams and sketches, and including some evaluation of their methodology. Weaker writers may need more structured guidance or a narrower focus, <i>eg confining their writing to an evaluation of methodology.</i> | <ul style="list-style-type: none"> • draw evidence from their own group and other groups to identify, describe and explain changes to the river section downstream • produce a well-structured report which draws on evidence to reach conclusions | <ul style="list-style-type: none"> • Key skills: communication – this activity provides pupils with the opportunity to produce writing which shows relationships between ideas by using linking devices that show purpose, <i>eg in order to, so that, and reservations, eg although, unless, if.</i> (A minimum of 300 words is suggested.) • Key skills: application of number – pupils draw conclusions from data. • Language for learning: in preparation for report writing, pupils can be reminded of useful linking devices to structure their ideas, <i>eg in order to, so that, although, unless, if.</i> |
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Safety – all off-site visits must be carried out in accordance with LEA and school guidelines