River basins and their management

Royal Geographical Society with IBG
Advancing geography and geographical learning

Embedding fieldwork into the curriculum

Rivers fieldwork is an excellent way to introduce pupils to investigation and enquiry in the field. It is relatively easy to do (ensuring the location/s is suitable) and there are a variety of areas which can be investigated including:

- River changes from source to mouth
- River features and process
- Erosion, deposition and transportation
- Sediment and bed material
- Use of the river
- River basin management
- Settlements along the river
- Flooding
- Land use change
- Leisure
- Pollution
- Hydrological cycle
- Human impacts on the river
- River conservation and ecology

There are several cross curricular themes such as:

- Builds on work covered during a flooding unit, such as QCA Unit 4 ‘Flood Disaster – How do people cope’.
- Could be included in a unit about coasts such as QCA unit 8 ‘Coastal Environments’
- Could be incorporated into a scheme of work based around the hydrological cycle, water management etc
- Linked to threats posed by pollution, major flooding events and global river patterns
- Includes key skills for all subjects such as communication, application of number, ICT, working with others, working independently
- Links to science curriculum, such as work on the water cycle, weathering and ecological relationships
- Could link to QCA unit 13 ‘ Limestone Landscapes’
- Links to mathematics, such as using and interpreting scale on maps
- Links to ICT, for example using digital images, word-processing and desktop-publishing packages, using the internet
- Links to citizenship, such as investigating responsibilities of local and central government, expressing and explaining views, considering other people's experiences, conflicts of opinion
- Flooding aspect links to QCA unit 2 'The restless earth' and unit 24 'Passport to the world'
- Fieldwork enhances thinking skills, taking part in group discussion, classifying and amending classification
- Links to voluntary organisations such as wildlife trusts, RSPB, English Nature etc
- Links to climate change and global warming, and the impact these have on land use and runoff.

Accompanying scheme of work

The scheme of work below has been created using aspects from a variety of QCA units and schemes available, including:

Unit 4: Flood Disaster - How do people cope?
http://www.standards.dfes.gov.uk/schemes2/secondary_geography/geo04/?view=get

Unit 7: Rivers a Fieldwork Approach
http://www.standards.dfes.gov.uk/schemes2/secondary_geography/geo07/?view=get

Unit 8: Coastal Environments
http://www.standards.dfes.gov.uk/schemes2/secondary_geography/geo08/?view=get

A rivers scheme written by Judith Mansell whilst teaching at Bishop's Hatfield Girls School

QCA unit schemes available to download for:
Geography http://www.standards.dfes.gov.uk/schemes2/secondary_geography/?view=get
Science: http://www.standards.dfes.gov.uk/schemes2/secondary_science/?view=get

River basins

About the unit

In this unit pupils consider the geomorphological patterns and process of river environments and carry out a fieldwork investigation on a section of a river and its valley to discover 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 explores the management and land uses of river basins. The focus of this unit is the geomorphological patterns and processes of a river basin environment. Pupils investigate the environmental planning and management of river basins and consider the tensions between development and conservation. The unit begins with the prior learning identified, and might end by considering the characteristics of another river basin 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 18 hours including one day’s fieldwork.

Key aspects

- 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 scale contexts
- investigate change in places
- describe and explain physical features

Knowledge and understanding of patterns and processes

Explored through:
- geomorphological processes
- weather and climate
- formation and development

Knowledge and understanding of environmental change and sustainable development

Pupils will study:
- environmental change and management
- sustainable development

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.

Begin to suggest relevant geographical questions and a sequence to investigate processes in the school buildings and grounds and environmental issues; describe and begin to explain how hydrological and weathering processes are responsible for the development of particular river features.

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, runoff*
- the effect of water on the environment, *eg weathering, erosion, transportation, deposition*
- fieldwork, *eg clinometer, flow meter, sample*

further examples of geographical language are identified in the scheme of work

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, metre rule, plastic bottle and tubing, stoneboard*
- palmtop computer

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:

- 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 is a river? What is its place in the hydrological cycle?			
• to use secondary evidence • to understand the components, links and stores in the hydrological cycle • to understand the role of interception, infiltration, percolation and groundwater storage • to understand that river systems are part of a wider river basin	• 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. • Give the class four tasks, written clearly on the board: – *What is the 'water cycle' and can you explain it?* – *What is the difference between 'weathering' and 'erosion'?* • Discuss with pupils the key words water cycle, weathering, erosion, • Undertake an enquiry in the school grounds to investigate different rates of infiltration on different surfaces • Ask pupils to plan a survey (drawing on their previous experience of enquiry questions and the investigative sequence) of evidence of weathering in the school grounds and buildings. Discuss with them the questions they might investigate, *eg Is one side of the school more prone to weathering than another? Which materials are more prone to weathering and were they poorly chosen? Is there a link between the amount of weathering and height? Which types of weathering are most common?* Pupils will need to make decisions about how they will record the evidence, *eg annotated sketches of parts of buildings, noting process, height and aspect, or a recording grid with suitable column headings.* • Using appropriate textbooks help pupils to understand the two main types of weathering (mechanical/chemical) and to show these in the form of annotated diagrams. Distinguish between weathering and erosion and identify the main erosion agents. Weaker readers will need more structured guidance on researching and note making.	• identify and show the components and links in the water cycle • distinguish between weathering and erosion • Name the main agents of weathering and erosion and the differences between them	• Word origin: hydrology/hydrological, from the Greek *hudor* (water); fluvial from the Latin *fluvius* (river) and *fluere* (to flow). • Key skills: communication, note taking and drafting, defining words and providing 'simple' explanations. • Science: links with key stage 2 work about the part played by evaporation and condensation in the water cycle. • Suggested geographical language: *Interception, infiltration, links, stores,* *River basin*
How do rivers shape the land?			
• to understand how rivers change along their course • to understand the geomorphological processes along a river's course. • To understand how a river transports its load	• Pupils watch a video, simulation or presentation of the processes of erosion, transport and deposition along a river's course and the resulting landforms. Pupils can then undertake a task to explain how various landforms are formed. • Pupils investigate what happens on a river bend using textbooks, video, simulations etc as appropriate.	• Show an understanding of river processes which shape landforms • Show an understanding of how these processes can be affected by the actions of people	• Rivers chosen as examples can be local or national. Examples should be as up to date as possible. Where is the river section we are going to study? • Geographical language such as: *Meander, floodplain, deposition, velocity, discharge, cross-section, long profile, hydrograph, annual,*

			seasonal, interlocking spurs, waterfall, plunge pool
Where is the river section we are going to study?			
• to use and interpret maps at 1:50,000 and 1:25,000 scales • to draw simple cross-profiles of river valleys • to draw simple long profiles of rivers	• 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). • Discuss scales e.g. vertical exaggeration.	• 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	• Homework activity: other cross-sections may be drawn for homework to practise/consolidate the skill and introduce the idea of down valley variation
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 • to discuss issues of sample selection	• 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. • Assessment of accuracy, error etc.
What does our data mean?			

• to present and interpret evidence
• to describe physical features
	• 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. Pupils could work in groups to produce display work on:
	  • The uses of the river by people and changes along its course
	  • Changing shapes of cross-sections along the course
	  • Seasonal and Annual hydrographs for the river
	  • Velocity and discharge graphs
	  • Features of the river
		• transform raw data into a range of suitable graphs, diagrams and sketches
		• describe physical features observed and measured
			• 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 (
			• Language for learning: this activity provides pupils with an opportunity to understand and use correctly terms of qualification and comparison such as

What conclusions can we draw?			
• 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	• Refer the class back to the earlier question *What do we expect to find out?* 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, *eg confining their writing to an evaluation of methodology.*	• 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	• 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, *eg in order to, so that*, and reservations, *eg although, unless, if.* (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, *eg in order to, so that, although, unless, if.* **Safety** – all off-site visits must be carried out in accordance with LEA and school guidelines

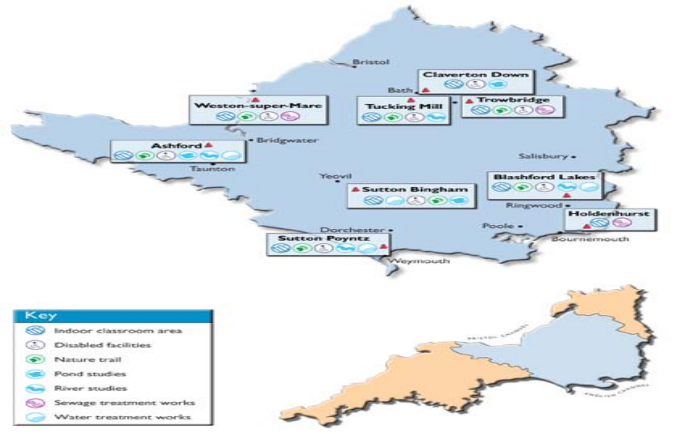
Potential fieldwork locations

Wessex water Education Centres:

Ashford education centre, Somerset, Ashford WTW, Mill Farm Hill, Nr Cannington, Somerset TA5 2NQ
Claverton Down education centre, Bath, Operations Centre, Claverton Down, Bath BA2 7WW
Trowbridge education centre, Wiltshire, Trowbridge STW, Bradford Road, Trowbridge, Wiltshire BA14 8NX
Tucking Mill study centre, Bath, Tucking Mill reservoir, off Midford Road, near Midford, Bath BA2 7DB
Weston-super-Mare interpretation centre, North Somerset, Weston super Mare STW, Wayacre Drove, off Accommodation Road, Weston super Mare, Somerset BS24 0AP

http://www.wessexwater.co.uk/education/sub_centres.aspx?id=299

Ashford Education centre: Tour of water treatment works, river dipping, pond dipping, river profile work and flow investigations, review of reservoir, environment games, nature trail, grassland study, woodland study, habitat studies, water and the Victorians, Dr John Snow play
Weston-super-Mare interpretation centre: Tour of sewage treatment works, environment games, habitat studies
Tucking Mill study centre: River dipping, river profile work and flow investigations, water uses at , woodland study, habitat studies
Trowbridge education centre: Tour of sewage treatment works, environment games, nature trail, grassland study, habitat studies, Dr John Snow play, micro-organisms
Claverton Down education centre: Pond dipping, environment games, habitat studies, Dr John Snow play



Also see ***Bristol Living Rivers Project*** for a Bristol watercourses map http://www.bristol-city.gov.uk/ccm/content/Environment-Planning/Pollution/bristol-watercourses.en and a list of rivers for which water quality data is available http://www.bristol-city.gov.uk/ccm/content/Environment-Planning/Pollution/bristol-living-rivers--watercourses.en

http://www.bristol-link.co.uk/entertainment/severn-bridges-centre.htm
The Severn Bridges Visitor Centre situated at the end of Shaft Road, off Green Lane, Severn Beach, near the east end of the Second Severn Crossing

Slimbridge Wetlands Centre http://www.wwt.org.uk/visit/slimbridge/
Group Admission Prices Adult £5.75 Concession (Students, Senior Citizens) £5.00, Child £3.25
WWT Slimbridge
The Wildfowl & Wetlands Trust
Slimbridge, Gloucestershire GL2 7BT
T: 01453 890333
F: 01453 890 827
E: info.slimbridge@wwt.org.uk

River survey locations used by local teachers (please note- ensure you visit a potential fieldwork site before taking school groups)

Location	Land use and possible activities
Henry Sleed Stream in Oldbury Court Park	Small landscaped stream in a public park, which joins the larger River Frome. Suitable for measuring cross sections, flow velocity, looking at bank erosion, meandering, different sediment types, vegetation and management.
River Chew	Rises in the Mendips and joins the Avon at Keynsham, rivers in Limestone areas
Syston Brook near Oldland Common, East Bristol	Stream measurements, valley measurement, fieldsketches
River Frome at Chipping Sodbury and Yate	Easily accessible, various management techniques can be seen, along with some rehabilitation techniques.
River Severn Bridge	Discuss tidal flows, salt marshes, mudflats, rock platforms, cliffs,

Example: a good river location

The picture above shows Corston Brook at Corston Village. This site is perfect for rivers fieldwork- the brook is around 2 metres wide and the water does not flow above wellington boot height. The site is situated at the edge of a recreation ground, which has picnic tables and plenty of open space for a lunch break. There is good access by foot to the brook, and coaches can reach the village in order to drop groups off for several hours. The area is secluded, so local residents would not be disturbed by pupils. The stretch of brook is long enough for several groups of pupils to work at intervals, all of which would be able to supervised from the same vantage point. Activities which could be undertaken here include measuring the cross section of the river, field sketches, bed load size, velocity etc. A little downstream the brook becomes slightly overgrown, so clear boundaries would need to be set about where pupils could or couldn't go. 0.25 miles away by footpath is the confluence with the River Avon.

Example: a good river feature

The picture shows a meander found on Corston Brook at Corston Village. A meander like this is ideal for rivers fieldwork- pupils can access the river easily and measure bed load material, river velocity etc. Being this close to the undercut banks means the students can get an idea of the processes going on to create the meander, and the river is shallow enough for students to get an accurate cross section at this point.

Example: Inappropriate river locations

	River Boyd at Doynton Both these points are inaccessible, firstly for coaches to reach because of small country lanes, and secondly because the banks are too high and overgrown. The river is also running too fast at Camberton for it to be safe for pupils to enter. The water is extremely murky, meaning it would need to be checked to see how deep it is before students entered.
	Cam Brook at Camberton

Using your local University: Bath Spa University, Department of Geography

The Geography Department at Bath Spa University is currently developing a river studies programme for use with undergraduates and local schools. The programme is based around an existing gauging station, located on Corston Brook on the Newton Park Campus of the University. Plans are being made to update the gauging station, and provide the opportunity for students too explore the processes and landforms of environmental systems (particularly rivers) and to link their applications to human environments. The project is also an excellent way to provide students with practical field experience in the safe and accessible University grounds, and to show how equipment and techniques are used to collect data.

Activities which will be available to schools when the project is complete include:

- General surveying and Geomorphological mapping
- Stream channel survey
- Stream flow measurement
- Water quality sampling
- Invertebrate sampling
- Sediment sampling
- Slope measurement
- Soil survey
- Nature trail and ecological survey

Students could investigate:

- Studying the effects of a reservoir on a river
- Mapping and measuring stream processes and landforms
- Measuring water quality and sediment changes
- Studying soil erosion and sediment transport

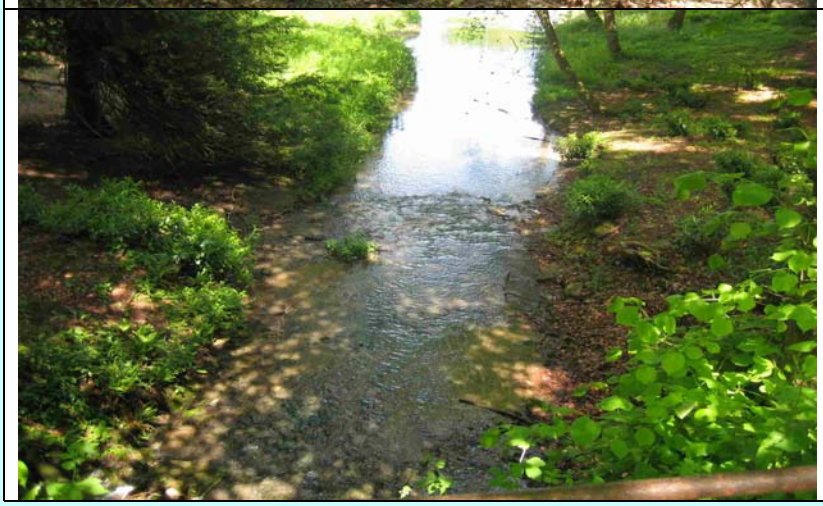
Bath Spa University Geography Department has a variety of facilities which schools may find useful during a field visit, including a variety of sites on campus, a weather station, a stream gauging station, laboratory facilities, PC suites and technician support. Risk assessments have been carried out for all activities and are available on request. Equipment is also available, including the stream gauging station (trapezoidal flume with broad crested weir, water quality detectors and turbidity meters), current meters, weather station, surveying equipment, compass-clinometers, GPS, particle size measuring equipment, water quality and invertebrate sampling equipment.

The field visits may consist of some time in the field sampling and doing practical activities, followed by analysis and discussion in the laboratory. Academics from the department will also be on hand to supply information and assistance if necessary (with expertise in hydrology, geomorphology, soil science, hazards and ecology). No preparation is needed for the visit, although teachers are advised that their students should have some prior knowledge of river systems, processes and landforms. Background information and worksheets, along with PC software will be available for teachers to access if needed.

The department also have some data archives available for use by schools, which when live can be access through the Department of Geography's website. The data includes aerial photographs and digital terrain models, and once the gauging station has been updated there will also be rainfall data and stream flow data available.
The department intends of offer a variety of options to teachers interested in the fieldwork opportunities on campus, including supervised school visits for groups of up to 25 pupils (aimed mainly at Key stages 4 and 5), and teacher days in which teachers are able to acquire subject updates, be trained in fieldwork methods and techniques, find out about field projects and share good practice with teachers in the area.

For information about organising a school visit please contact:
Department Secretary
Department of Geography
Bath Spa University
Newton Park
Bath BA2 9BN T: 01225 875685 (secretary) F: 01225 875776

Using your local University: Bath Spa University, Department of Geography

	Current gauging station at Bath Spa University (soon to be updated)
	Entrance to University lake- access to water quality testing, invertebrates, sedimentation investigations etc

Reservoirs

Cheddar Reservoir is owned by Bristol Water. Car Parking is found at Sharpham Road (OS 446 534) and at Axbridge (OS 438 44). The area is used by bird watchers, a local yacht club and wind surfers. http://www.bristol-water.co.uk/leisure/index.htm

Chew Valley Lake is also owned by Bristol water (shown below). Activities include nature trails (some wheelchair accessible), bird watching, sailing and fishing. The car park is found at)S ST 579 610 (Explorer 155), and a tea shop is also available. Chew valley is man made, and used to be the location of several farms before they were flooded to make way for the reservoir.

Choosing a site for a field visit

Using an Ordnance Survey map, it is very easy to identify possible locations for local fieldwork. A number of features on the map can help you to find appropriate and accessible sites. Here are some useful tips:

- Look for river locations which can be accessed by public footpaths to avoid issues getting permission to cross private land.
- Look for rivers within public parks or nature reserves that have a car park, as parking a coach or minibus on rural lanes or suburban streets may not always be possible.
- When looking for locations to enter the river, avoid weirs, which not only distort data but also can be very dangerous.

The exact choice of sites will depend on the topical focus of your fieldwork, the field techniques to be used and the time available. Topics may include:

– *Land use* – comparing land use (agriculture, residential, industrial) at different sites along a river.
– *River processes* – measuring and comparing river processes (channel width and depth, discharge, erosion and deposition, valley shape) at different stages of a river's course.
– *Human impact* – observing different types of water pollution and their sources, and assessing the impact on the river and its surroundings.
– *Management* – observing different management techniques (river bank strengthening, channel straightening, culverting, floodplains control) and their impact on river processes.
– *Resource use* – exploring different uses of rivers (energy, leisure, water supply) and identifying potential conflicts of interest.
– *Hazards* – visiting floodplain areas and mapping possible impacts of flooding.

Example (please note this is written from the perspective of a teacher researching potential river locations- these locations may not be suitable for fieldwork and must be checked first)

I am a teacher in Bristol. I want to plan a day-long fieldtrip based around the River Avon which visits three sites to compare changes along a river's course in terms of both land use and river processes. Using the OS map to look for sites in and around Bristol, I can suggest the following locations:

First I am looking for a site which represents the upper course of a river and is surrounded by agricultural land. The River Boyd seems a suitable tributary of the River Avon. Since this site visit will include taking measurements in the river, the river needs to be fairly narrow and shallow. According to the map, the river narrows upstream of Wick. The Monarch's Way long distance footpath runs alongside the river in many places, so access should be no problem and the field boundaries shown on the map indicate that the surrounding land is farm land. Hence I would choose to check out a site north of the village of Doynton accessing via ***Doynton Lane***.

Second I am looking for a site which represents the middle course of a river and is in an urban residential area. A possible stretch of the river as it passes through the city of Bristol is ***St Anne's Park***. A number of residential cul de sacs run down to the river and a footpath runs along the bank in some places. From the map I cannot judge the access to the actual river, but fieldwork in this location is likely to be by observations only as the river at this point will be too wide and deep for safe access. I will check to see if my predictions are correct before I take my class there.

Third I am looking for a site near the river mouth which represents the lower course of the river and is in an industrial area. Either side of the river at the mouth of the Avon is a possibility – the ***Avonmouth Docks*** on the north bank and the ***Royal Portbury Dock*** on the south bank. On both sides of the river there are docks, warehouses, stockyards and depots. Whilst there are no public footpaths, there are access roads to all these industrial facilities. The northern side can be accessed off Junction 18 of the M5 through Avonmouth and the southern side can be accessed off Junction 19 of the M5. This third visit of the day is likely to be short and is for observation purposes only. If the location is exposed, it might also be cold and windy, so observations can be made in under half an hour to be followed by discussions and follow-up work later.

The information above is based solely on looking at OS maps. All locations must be checked out in person prior to the visit with children to consider issues of parking, access, land ownership, safetv. and so on.

Fieldwork activities

How does a river change along its course?

- Land use (settlement, industry, pollution)
- Management (flooding, management techniques, water supply)
- Process (features of river and valley)
- Economics (leisure, energy)

Locations selected will depend on whether you are looking at land use or process:
Land use (we suggest 3 sites in one day):

- Farming
- Industrial
- Urban
- Leisure

Process (at least one site in each area)

- Upper course (as close to the source as possible)
- Middle course
- Lower course (as close to the mouth as possible)

River survey

There are various measurements that can be made of a river, as long as it is shallow enough for you to actually get into with tape measures etc. Depending on the stretch of river you are going to measure you can then use these results to answer a number of different hypotheses.

P*ossible hypotheses about rivers*

1. Land Use changes along the river.
2. The discharge of a river increases downstream.
3. The slope of a river's valley sides (the bluffs) decreases downstream.
4. The width of a river increases downstream
5. Velocity is greatest at the centre of a channel
6. Velocity is greatest where the river is most narrow
7. The size of a river's bedload decreases downstream

As most of these hypotheses involve measuring quite a long section of a river we will not be able to see the whole picture during this fieldwork session, but you will be able to practise the techniques.

F*inding the cross-section of a river*

A.MEASURING THE WIDTH OF THE RIVER

Put all the measurements for this section on Table 1.

1. Using a long tape measure how wide the river would be if it were full after heavy rain. This is the BANKFULL WIDTH of the river.
2. Measure the width of the actual channel of the river where the water is flowing
3. Note down the vegetation or land use of the rest of the channel where the water is not flowing, it will give you some idea of how often the channel is actually at Bankfull stage.
4. Leave the tape measure stretched across the river you will need it later.

B.MEASURING THE DEPTH OF A RIVER.

Put all the measurements for this section on Table 1.

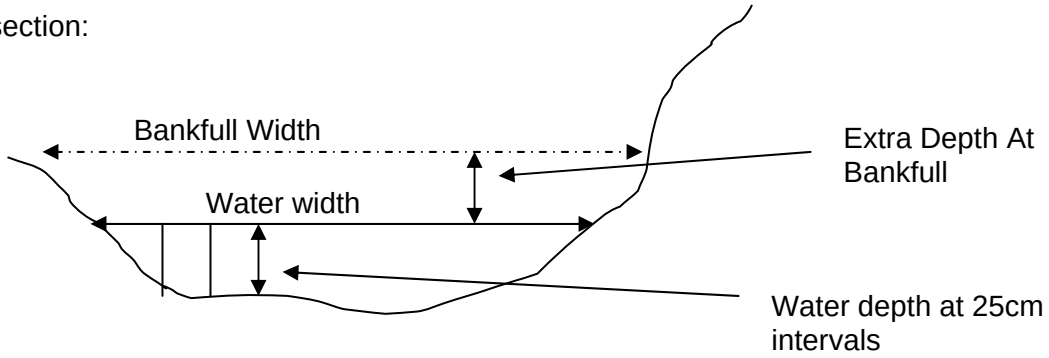
1. Start at the left hand bank of the river looking downstream
2. Use a metre ruler to measure the depth of the river at 25cm intervals across the width. If the river were wider you could have wider intervals.

3. With the tape measure stretched taut across the river measure what the depth would be at Bankfull stage.

C. MEASURING THE WETTED PERIMETER OF THE RIVER

This measures the actual amount of surface the water has to pass over and it may affect the efficiency of the stream.
1. Place the tape measure along the bottom of the river, as far as possible push around stones and pebbles as this is where the river has to flow! It will mean getting your hands wet!

Channel cross section:



M*easuring the discharge of a river*

Put all the measurements for this section on Table 2

A. MEASURING THE SURFACE SPEED OF THE RIVER

1. Measure a 10m stretch of the river with the tape measure, downstream.
2. Use a small orange (or any object which is small but heavy enough not to be blown by the wind), drop it into the water and time it as it travels the 10metres. Record your results on Table 2.
3. Repeat this five times then take the average speed as shown below.

Surface speed $\frac{\text{Distance}}{\text{Time}}$ metres/second

Average speed $\frac{\text{Total of all speeds}}{5}$ metres/second

Because the speed at the surface is faster than in the main body of the water it is necessary to multiply the average surface speed by 0.85 to give a more accurate speed of flow at the varying depths. If the river were wider it would be necessary to use more than one float, dropped simultaneously into the water, these would then need to be recorded on a modified table.

M*easuring the shape of the valley*

Record all these measurements on Table 3

Begin all measurements from the river, measure the LEFT bank first that is the side which is on your left as you look downstream.
1. Start on the edge of the bank of the river, just above where you measured the Bankfull stage. Put a ranging rod in at that point.
2. Place another ranging rod at a point up the valley slope where you think that the slope angle changes, this is called a break of slope.
3. Measure the distance between these two poles and record it (this is 1 segment)
4. Use a clinometer to measure the angle between the two poles. Always measure from the bottom one up to the top one.
5. Repeat the procedure until you reach the top of the slope.
6. Then go back to the river and repeat the whole process on the opposite bank of the river.

Measuring the shape of a valley may be difficult in some lowland areas or around larger rivers. Instead you can confine measurements to the floodplain and the first break of slope.

Maps could be used to show the shape of a valley instead of actual measurements. Encourage students to look at contour lines and think about how steep the valley sides may be. Students could even plot the shape of the valley onto graph paper using the heights given on a map.

Measuring river load

Rivers carry three types of load:

- Bedload
- Suspended load
- Solution load

The type and amount of sediment load will depend greatly on the speed of the river, discharge levels, gradients within the river, local geology, slope processes etc.

Measuring bedload

Stones can be collected either randomly or at regular intervals across the width of the river (at various points). If you have a stoneboard this can be used to identify bedload size and shape. Measure the rock or stone along its longest axis to find out the shape, following a general rule such as:

Shape 1	Less than 3cm
Shape 2	Between 3 and 6 cm
Shape 3	Between 6 and 9 cm
Shape 4	Over 9 cm

The longer this axis is the less round the stone will be.

By measuring the axis at a right angle to the longest axis, you will get the stone's width. By taking an average reading of the width from the stones selected at each site, you can get an idea as to the general size of the bedload at that point.

Measuring suspended load

It is possible to collect finer material such as sand and clay by using a plastic bottle. The amount of material collected will provide insight into discharge levels, vegetation further upstream, slope angles, runoff rates and periods of rainfall.

1. Find a little plastic bottle for each site you plan to take measurements at, along with a cork to fit in the top.
2. Into the cork drill 2 holes, and push through 2 pieces of plastic tubing (one bendy, one not)
3. Place the bottle at the sample site, on the river bed facing upstream.
4. Pull the bendy piece of tubing out into the air to allow air to escape from the bottle as it fills up. The other piece of tubing should be strong and wide enough for water to enter the bottle.
5. Stand downstream while the survey is being taken to avoid stopping sediment from entering the bottle
6. Once the bottle is full with water, remove it form the sample site. Take the cork and tubes out and replace the cap onto the bottle. Label this bottle with the sample site number/name.
7. Repeat the survey at other points to provide comparisons.
8. Leave the bottles to stand overnight to allow the sediment to collect in the bottom.
9. Make notes about the sediment amount, size, colour, water clarity etc.
10. Shake the bottles to allow the sediment to mix with the water again. Pour the water through some filter paper (make sure you know the weight of the paper before you do this). You may need to use a filter suction pump (ask the Science Department)
11. Dry the sediment and filter paper in an oven (100ºC for 2 hours)
12. Weigh the paper and sediment, then subtract the weight of the paper from this figure. This will give you the amount of sediment found in a litre.

13. In order to find out the suspended sediment concentration of river water (grams per litre), you will need to know the discharge of the river.
14. Discharge X sediment grams per litre = suspended sediment at that point in the river.

TABLE 1

Finding the cross section of a river

River Name ……. Location……..Date…….
Bankfull width……Stream width……..

Depth of the stream at 25 cm intervals

Point of Measurement	Depth of stream	Depth at Bankfull
Left Bank (0cm)		
25cm		
50cm		
75cm		
100cm		

TABLE 2

The speed of the river

Float number	Time to travel 10m
1.	
2.	
3.	
4	
5.	

TABLE 3

The shape of the valley

Start on the LEFT bank facing downstream and work away from the river.

Left Bank Segment Number	Segment Length	Slope Angle
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Bankfull Channel Width……..

Right Bank Segment Number	Segment Length	Slope Angle
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Field sketches

Pupils can draw a field sketch of the valley, looking downstream first and sketching the shape of the valley, marking on any features they can see such as waterfalls, meanders, deposition and points of erosion. They should then do the same looking upstream. Always remember to put the location and direction of the sketch. Pupils could also do several sketches with an environmental quality survey at each point.

Using features

Meanders are a great feature for pupils to sketch during fieldwork, especially if they can access the river to really see the processes going on at the meander. Ensure pupils focus on where erosion and deposition is taking place, where most sediment is and where the river is running fastest on the bend.

Pebble survey

Pebble surveys can be done to determine the size and shape of the bed load at various points along the river. Pupils should measure 25 randomly selected pebbles at each point, measuring length and width and determining shape according to a key such as:

VA	Very angular	R	Rounded
SA	Sub angular	WR	Well rounded
SR	Sub rounded		

Observations

Ensure that throughout the field work pupils observe land use around the river, and any human interference that may impact positively or negatively on the river, such as industry, tourism, protected areas, woodlands etc.

Things to think about

Before you embark on your rivers fieldwork, you might like to consider:

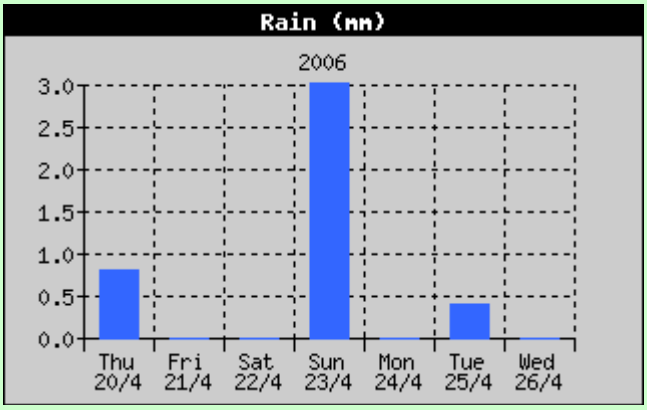
- Who owns that land you will need to cross to access the river
- Safety (is the river likely to be flowing faster or higher than usual, do you have the relevant numbers of staff if a child is hurt, should children be wearing life jackets when entering river, do children have suitable clothing for the activity, have all staff been properly briefed)
- Transport access (will your coach or minibus be able to get down that narrow country lane)
- The feasibility of the location in terms of its potential to provide the required results
- Local weather forecasts for the day and days before (is rain due, has it been raining heavily so the river flow will be affected)
- Risks involved (does the risk assessment cover all eventualities)
- Are you and the accompanying staff aware of how the equipment works
- That your chosen stretch of river has sufficient variations in discharge, channel size, bed load etc
- Establish a river safety code with your pupils before the visit
- Encourage observations form the bank
- Don’t go into water higher than Wellington boots
- Have wet wipes or hand wash available if students are eating later in the day
- Take A Level students along for extra supervision and to collect data from deeper areas for the smaller children.
- When looking at bedload size, ransom sampling may not be as random as it first appears. You will naturally aim for rocks that are big enough to pick up, but small enough not to cause a problem in lifting.

Adding value to your fieldwork with additional data

Data you could work with during your enquiry may include:

- Flow data over time
- Rainfall
- Pollution levels
- Land use maps
- Soil / geology maps
- Flooding data
- Recent urban development on floodplains (planning applications, impact assessments)

Using local weather data



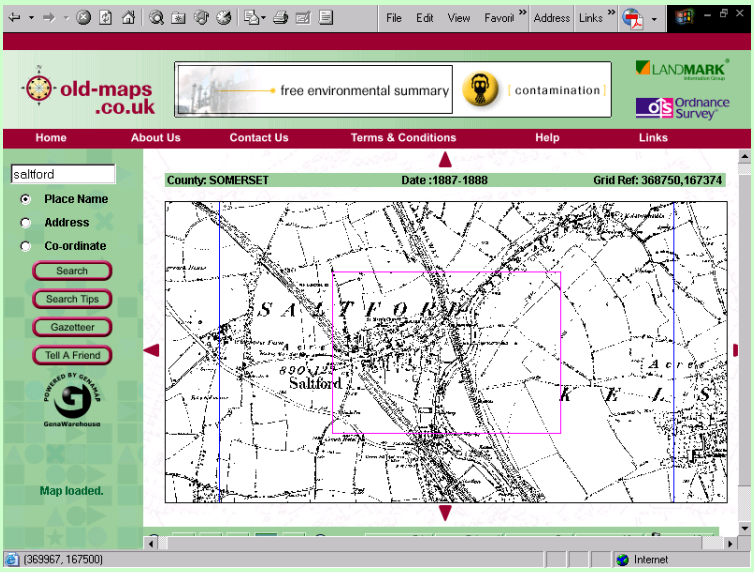
Results for Totterdown, near Bristol, 26.4.06.
Source http://www.afour.demon.co.uk/one_week/History.htm

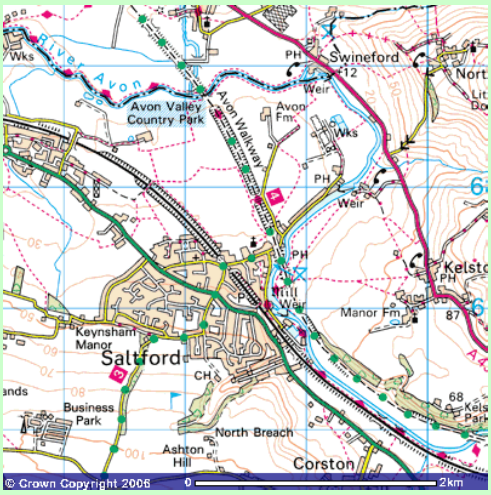
Using rainfall graphs or figures for the week before your river visit, you can predict whether the river is likely to be flowing higher or lower than usual. This is particularly effective if used over a sustained period of time, for example if a local river is surveyed every several times a week for a month, and flow rates compared to the amount of rainfall during that time. Link this to runoff, throughflow and flash flooding, leading on to causes of increased run off (urbanisation, deforestation, poor drainage systems). Data should be available from your local weather station (find via internet search)

Using old and new maps

Historical maps can be used to monitor the changes to a river over time and management strategies such as widening and straightening. They can also be useful for highlighting changes in land use over time, which can then be compared to water quality data and river flow data from previous years.
Historical maps can be found online at http://www.old-maps.co.uk/ or purchased from Ordnance Survey
http://www.ordnancesurvey.co.uk/oswebsite/jsp/mapshop/mapShop.jsp?display=/products_new/oneinch/index.cfm?shop_ID=1

This map is taken form http://www.old-maps.co.uk/ and shows the town on Saltford which is on the River Avon. It can be compared to the latest OS map for the area, shown below

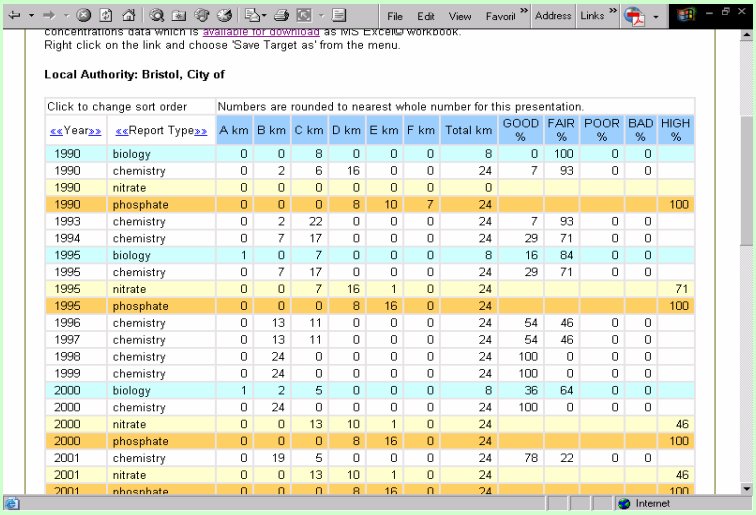




Taken from http://www.ordnancesurvey.co.uk/oswebsite/getamap/

Using river quality data

River quality data (biological, chemical, nitrates and phosphates) is available from Defra at http://www2.defra.gov.uk/db/rq/gorlist.asp .The table below shows the water quality of the Bristol City Local Authority area inland waterways (source http://www2.defra.gov.uk/db/rq/lareport.asp?LocalAuth=257)



Click to change sort order — Numbers are rounded to nearest whole number for this presentation.

<<Year>>	<<Report Type>>	A km	B km	C km	D km	E km	F km	Total km	GOOD %	FAIR %	POOR %	BAD %	HIGH %
1990	biology	0	0	8	0	0	0	8	0	100	0	0	
1990	chemistry	0	2	6	16	0	0	24	7	93	0	0	
1990	nitrate	0	0	0	0	0	0	0					
1990	phosphate	0	0	0	8	10	7	24					100
1993	chemistry	0	2	22	0	0	0	24	7	93	0	0	
1994	chemistry	0	7	17	0	0	0	24	29	71	0	0	
1995	biology	1	0	7	0	0	0	8	16	84	0	0	
1995	chemistry	0	7	17	0	0	0	24	29	71	0	0	
1995	nitrate	0	0	7	16	1	0	24					71
1995	phosphate	0	0	0	8	16	0	24					100
1996	chemistry	0	13	11	0	0	0	24	54	46	0	0	
1997	chemistry	0	13	11	0	0	0	24	54	46	0	0	
1998	chemistry	0	24	0	0	0	0	24	100	0	0	0	
1999	chemistry	0	24	0	0	0	0	24	100	0	0	0	
2000	biology	1	2	5	0	0	0	8	36	64	0	0	
2000	chemistry	0	24	0	0	0	0	24	100	0	0	0	
2000	nitrate	0	0	13	10	1	0	24					46
2000	phosphate	0	0	0	8	16	0	24					100
2001	chemistry	0	19	5	0	0	0	24	78	22	0	0	
2001	nitrate	0	0	13	10	1	0	24					46
2001	phosphate	0	0	0	8	16	0	24					100

The table below, taken from the same source, explains what each of the data columns in the table shows.

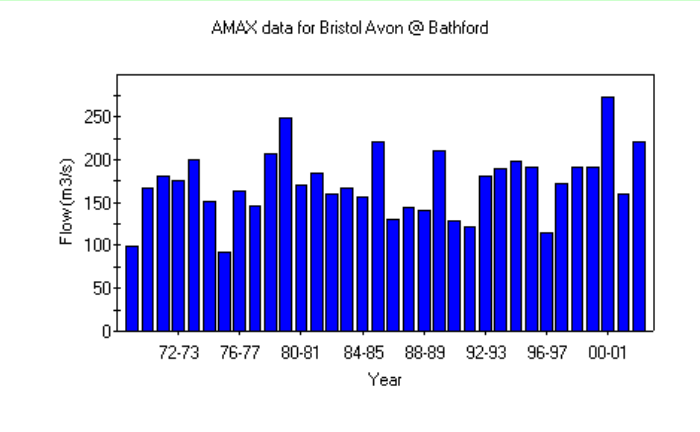
Format of the data

Column	
1	Year
2	Report Type: Biology or Chemistry
3-8	River length in grades A-F (kilometers) (or grades 1-6 for nitrates and phosphates)
9	Total river length (kilometers)
10	Percentage of river length of 'Good' quality (Grades A+B)
11	Percentage of river length of 'Fair' quality (Grades C+D)
12	Percentage of river length of 'Poor' quality (Grade E)
13	Percentage of river length of 'Bad' quality (Grade F)
14	Percentage of river length of 'High' quality (more than 30mg per litre for nitrates, more than 0.1mg per litre for phosphates). 'High' nutrient concentrations are not necessarily good or bad; rivers in different parts of the country have naturally different concentrations of nutrients. The classifications merely states that concentrations are high relative to other rivers

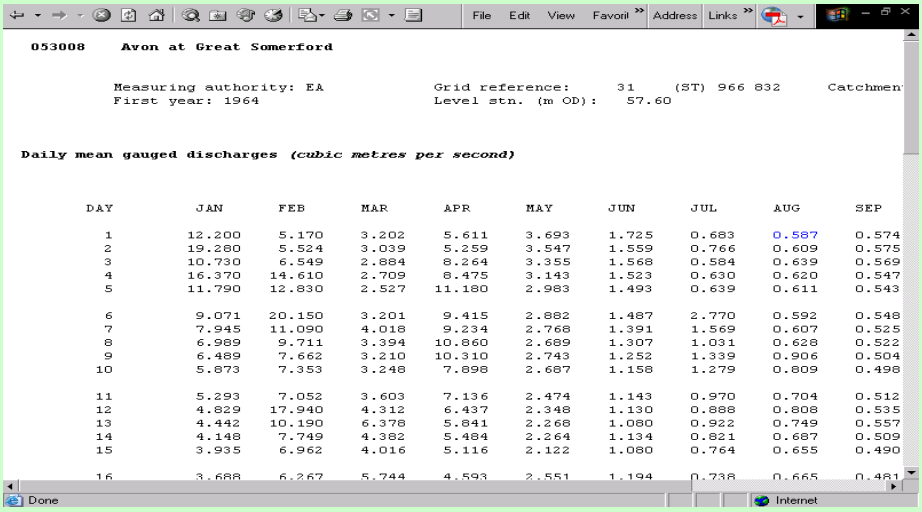
River quality tables can be used to show the impact of land use on the quality of a river, pollution levels and areas in need of river management.

Using river flow data

Various river data are available which can be adapted and incorporated into fieldwork enquiry. The Environment Agency Hi-Flows UK http://www.environment-agency.gov.uk/hiflowsuk/aboutus/ provides data for around 1000 river flow gauging centres, which can be searched by river name. Data like this is particularly useful if you are using the same areas for fieldwork over a number of years, where previous years data can be used to show changes in the river. You would then encourage the pupils to think about what changes have occurred within the basin and how these might affect the river over time.



The graph above is an example of the river flow at the Bristol Avon at Bathford (53018) gauging station. Source http://www.environment-agency.gov.uk/hiflowsuk/aboutus/



053008 Avon at Great Somerford

Measuring authority: EA Grid reference: 31 (ST) 966 832 Catchmen
First year: 1964 Level stn. (m OD): 57.60

Daily mean gauged discharges (cubic metres per second)

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12.200	5.170	3.202	5.611	3.693	1.725	0.683	0.587	0.574
2	19.280	5.524	3.039	5.259	3.547	1.559	0.766	0.609	0.575
3	10.730	6.549	2.884	8.264	3.355	1.568	0.584	0.639	0.569
4	16.370	14.610	2.709	8.475	3.143	1.523	0.630	0.620	0.547
5	11.790	12.830	2.527	11.180	2.983	1.493	0.639	0.611	0.543
6	9.071	20.150	3.201	9.415	2.882	1.487	2.770	0.592	0.548
7	7.945	11.090	4.018	9.234	2.768	1.391	1.569	0.607	0.525
8	6.989	9.711	3.394	10.860	2.689	1.307	1.031	0.628	0.522
9	6.489	7.662	3.210	10.310	2.743	1.252	1.339	0.906	0.504
10	5.873	7.353	3.248	7.898	2.687	1.158	1.279	0.809	0.498
11	5.293	7.052	3.603	7.136	2.474	1.143	0.970	0.704	0.512
12	4.829	17.940	4.312	6.437	2.348	1.130	0.888	0.808	0.535
13	4.442	10.190	6.378	5.841	2.268	1.080	0.922	0.749	0.557
14	4.148	7.749	4.382	5.484	2.264	1.134	0.821	0.687	0.509
15	3.935	6.962	4.016	5.116	2.122	1.080	0.764	0.655	0.490
16	3.688	6.267	5.744	4.593	2.551	1.194	0.738	0.665	0.481

The table above shows the daily flow readings at the gauging station on the Avon at Great Somerford. These can be used to compare with the readings taken during fieldwork, and linked to rainfall data for the area. Data available includes daily flow readings (data tables and graphs), rainfall data, catchment descriptions and land use at various gauging points (data could be used to show how land use can have an impact on river flow). The UK National River Flow Archive is searchable by river name and found at http://www.nwl.ac.uk/ih/nrfa/river_flow_data/flow_data/gauging_station_list_river.htm

Using aerial photography and satellite imagery

Google Earth http://earth.google.com/ is a great tool for investigating the river you are using for fieldwork before and after the fieldtrip takes place.

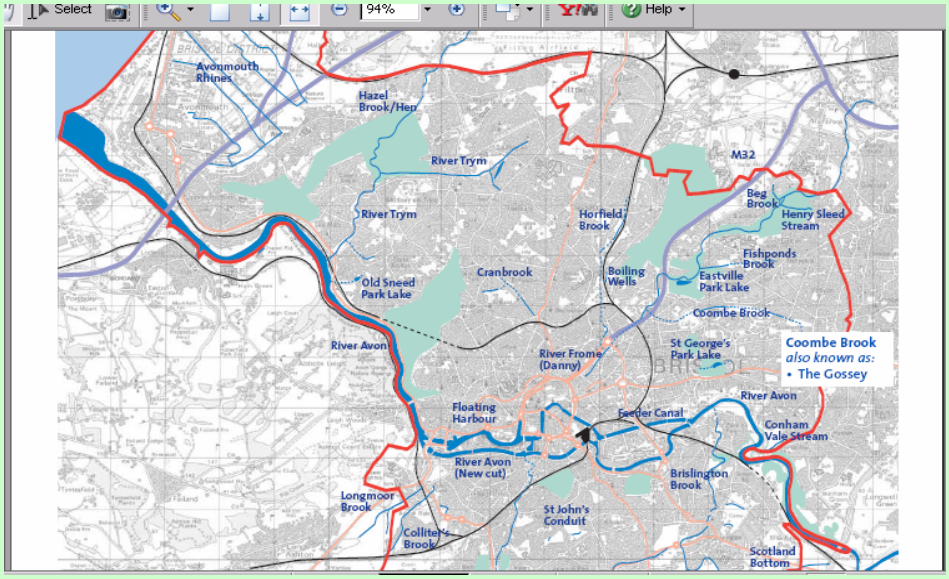
The image above is taken from Google Earth, and shows the River Avon near Keynsham (be aware that some areas have more detailed images than others, but data on the tool is being updated regularly). The images show land use, urban developments and features. Images from a section of years could be compared to show changes to the river's course and land use.

The tool can also be used for a virtual flyover of a river from source to mouth, with points of interest picked out along the way. This is useful to show the changes in valley shape, which can be seen in the image below (which shows the Clifton suspension bridge)

Using the Bristol Living Rivers Project

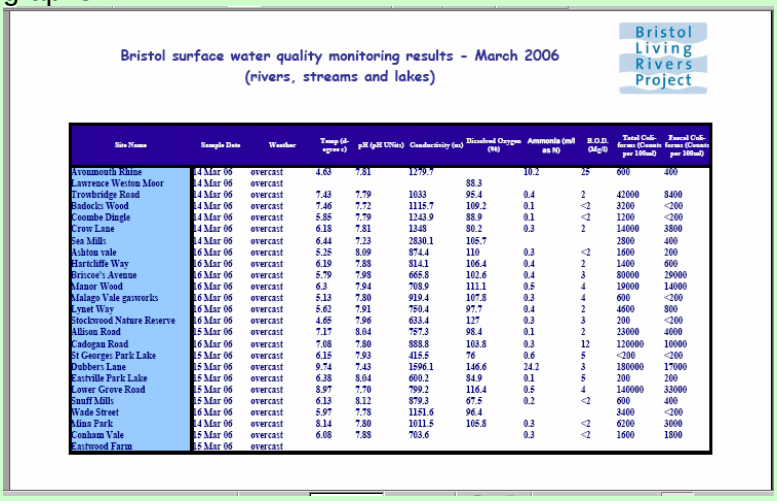
Found at www.bristol-city.gov.uk/rivers , the Bristol Living Rivers Project is an excellent resource funded by Bristol City Council and The Environment Agency. Its aim is "To promote and facilitate the sustainable management, development and use of rivers in Bristol. Optimising quality-of-life and ecological benefits".

The Project includes a wide range of activities and topics ranging from water quality monitoring of rivers and streams and the Floating Harbour to riverside walks and opportunities relating to the waterways of Bristol, including reporting water pollution and getting involved with a river clear up. Below is a screen shot showing the downloadable watercourses map found at http://www.bristol-city.gov.uk/ccm/content/Environment-Planning/Pollution/bristol-watercourses.en



Other resources available include information about campaigns and events in the area, riverside walks, education opportunities and information about the Floating Harbour.

Water quality data is also available (biological, lakes, pollution reports, and general overview). Water quality data is available for a variety of named areas, see http://www.bristol-city.gov.uk/ccm/content/Environment-Planning/Pollution/bristol-living-rivers--watercourses.en for a map and list and http://www.bristol-city.gov.uk/ccm/cms-service/download/asset/?asset_id=10159044 for overview data to compare areas. Data is available in table format like the table below, or in a report style with maps and graphs.



Bristol surface water quality monitoring results - March 2006
(rivers, streams and lakes)

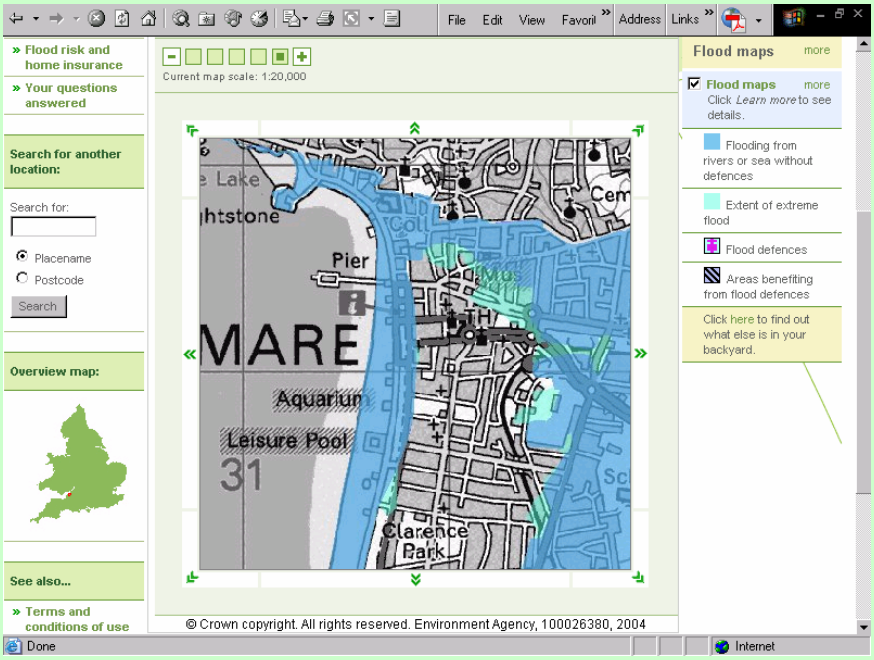
Bristol Living Rivers Project

Site Name	Sample Date	Weather	Temp (degrees c)	pH (pH Units)	Conductivity (us)	Dissolved Oxygen (%)	Ammonia (ml as N)	B.O.D. (Mg/l)	Total Coliforms (Counts per 100ml)	Faecal Coliforms (Counts per 100ml)
Avonmouth Rhine	14 Mar 06	overcast	4.63	7.81	1299.7		10.2	25	600	400
Lawrence Weston Moor	14 Mar 06	overcast				88.3				
Trowbridge Road	14 Mar 06	overcast	7.43	7.79	1033	95.4	0.4	2	42000	8400
Badocks Wood	14 Mar 06	overcast	7.46	7.72	1115.7	109.2	0.1	<2	3200	<200
Coombe Dingle	14 Mar 06	overcast	5.85	7.79	1243.9	88.9	0.1	<2	1200	<200
Crow Lane	14 Mar 06	overcast	6.18	7.81	1348	80.2	0.3	2	14000	3800
Sea Mills	14 Mar 06	overcast	6.44	7.33	2630.1	105.7			2800	400
Ashton vale	16 Mar 06	overcast	5.25	8.09	874.4	110	0.3	<2	1600	200
Hartcliffe Way	16 Mar 06	overcast	6.19	7.88	814.1	106.4	0.4	2	1400	600
Briscoe's Avenue	16 Mar 06	overcast	5.79	7.98	665.8	102.6	0.4	3	80000	29000
Manor Wood	16 Mar 06	overcast	6.3	7.94	708.9	111.1	0.5	4	19000	14000
Malago Vale gasworks	16 Mar 06	overcast	5.13	7.80	919.4	107.5	0.3	4	600	<200
Lynet Way	16 Mar 06	overcast	5.62	7.91	750.4	97.7	0.4	2	4600	800
Stockwood Nature Reserve	16 Mar 06	overcast	4.65	7.96	633.4	127	0.3	3	200	<200
Allison Road	15 Mar 06	overcast	7.17	8.04	757.3	98.4	0.1	2	23000	4000
Cadogan Road	16 Mar 06	overcast	7.08	7.80	888.8	103.8	0.3	12	120000	10000
St Georges Park Lake	15 Mar 06	overcast	6.15	7.93	415.6	76	0.6	5	<200	<200
Dubbers Lane	15 Mar 06	overcast	9.74	7.43	1596.1	146.6	24.2	3	180000	17000
Eastville Park Lake	15 Mar 06	overcast	6.38	8.04	600.2	84.9	0.1	5	200	200
Lower Grove Road	15 Mar 06	overcast	8.97	7.70	799.2	116.4	0.5	4	140000	33000
Snuff Mills	15 Mar 06	overcast	6.13	8.12	879.3	67.5	0.2	<2	600	400
Wade Street	16 Mar 06	overcast	5.97	7.78	1151.6	96.4			3400	<200
Mina Park	14 Mar 06	overcast	8.14	7.80	1011.5	105.8	0.3	<2	6200	3600
Conham Vale	15 Mar 06	overcast	6.08	7.88	703.6		0.3	<2	1600	1800
Eastwood Farm	15 Mar 06	overcast								

This data can be used to look at land use and human impacts on rivers, to compare to data collected on the same rivers and to look at pollution levels and water quality.

Using the Environment Agency Flood Map
http://www.environment-agency.gov.uk/subjects/flood/?lang=_e

This online GIS can predict the risk of flooding in your area and is searchable by area or postcode. A map showing flood risk is then produced, like the one below for Weston-Super-Mare



Students can search for flood risk in the school or home area, and also in fieldwork locations and unusual areas, such as those that have been in the media recently. You can then explore why there is flood risk in those areas, how it can be managed, and the impact this risk may have on residents and businesses in the area. This could be combined with council planning legislation related to flood plans and insurance issues for at risk areas.

Web links

Environment Agency http://www.environment-agency.gov.uk/
Is your local river healthy?
Information and maps covering river quality (chemicals, nitrates, phosphates and biology) and river quality targets, high flood levels, urban waste water treatment, managing water resources.
Searchable by postcode and area

The Geography Site http://www.geography-site.co.uk/pages/skills.html
Information and guidance on how to measure and calculate river cross sections, discharge, friction, gradient and velocity, and also about skills such as Chi squared and Spearman's rank

Bristol Living Rivers Project
http://www.bristol-city.gov.uk/ccm/navigation/environment-and-planning/pollution/pollution-control---water/
"To promote and facilitate the sustainable management, development and use of rivers in Bristol. Optimising quality-of-life and ecological benefits"
Water quality tables for various watercourses in the Bristol area, a pdf map of watercourses in Bristol with possible fieldwork locations marked on, information about the floating harbour, events such as 'Crossing the Avon' which is an exibition of new and old photographs and historical drawings of the bridges that cross the Avon.

English Nature: Avon River Special Area Conservation
http://www.english-nature.org.uk/about/teams/NewsDetails.asp?Id=16&NewsId=588