



Lesson Plan: River Investigation (Clither Beck)

KS4/5 activity looking at order 1, 2 and 3 streams along the beck. This activity is carried out along a linear walk (approx. 3 Km) *Coach drop-off at one end of the river is needed.*

Activity Details Summary

Location: 3 sites along the Clither Beck (north of Danby)

Duration: *Full day – approx. 4.5 hours*

Age Range: *GCSE and A-level students*

Max group size: *30 students per Activity Leader*

Subject: *Geography*

Activity Type: *River Fieldwork*

Risk assessment: *Fieldwork activity river Risk Assessment*

Main Curriculum Links

Geography: Practical fieldwork relating to water on the land (with a focus on river processes and landforms)

Science: Data recording, observations

Maths: Recording measurements and completing calculations from data collected.

Learning Objectives

Knowledge and Understanding

- *Gain a greater understanding of river processes and landforms (in particular: erosion, including attrition and abrasion; meanders and v-shaped valleys).*
- *Undertake fieldwork in a National Park, gaining a greater understanding of the North York Moors National Park, special features of this protected landscape and other background site information.*
- *Consider how a river changes with distance downstream and typical landforms of the upper, middle and lower course of a river.*
- *Gain a greater understanding of fieldwork techniques and how a river fieldwork investigation can be undertaken.*

Skills and Personal & Social Development

- *Independent learning, through research pre and post visit and during small group tasks in the field.*
- *Co-operation and problem solving skills during practical fieldwork tasks.*

Learning Styles

For aural learners: *Instructions and background information on the processes and landforms we pass will be delivered orally. AFL discussions and questioning used by activity leader to engage students and check understanding.*

For visual learners: *Maps, landforms sketches, seeing 'real world' casebook examples embedded into day.*

For kinetic learners: *Practical fieldwork tasks throughout the day to ensure students are regularly moving and to take into account weather conditions.*

Equipment Required:

In each set (4-5 pupils)

*Map & compass
Clinometer
GPS unit
Recording sheet and paper
10m tape measure
2 x metre rulers
30cm ruler
Hydroprop/flow meter
3 x floating objects
Stopwatch*

National Park Leader to carry:

*Chain
mini whiteboard and pen
(Supplementary images and examples)
Mobile phone
Throwline
First aid kit*



Activity Outline:

Brief welcome at the Moors Centre. Pupils are dropped off roadside, north of Danby village. After a brief walk an introduction to the moors and its special qualities are given. The pupils are then taken to the first site where a demonstration of the equipment is shown. After pupils have collected their data we follow the course of the Clither Beck to sites 2 and 3. At site 3 the findings are summarised before returning to the Moors Centre.

Introduction (15-20mins) (usually at Moors Centre):

- Introduce study site and NYMNP, and locate it and NYMNP on the map of the north east of England.
- H&S information (stay in groups, deep water, waterborne diseases, hazard of roads and weather).
- Brief outline of day and objectives for the day.
- Set up the days investigation aim and consider hypotheses.
- Toilet stops and when lunch is likely to be. (Students use toilets and collect waterproofs and wellies).

The Activity: (activities depend on the weather and if the water levels are very high, river fieldwork may not be possible. When larger groups are split, one group can be dropped off at the upper sites, whilst the other group starts in the lower course, crossing half way through the day).

On the Moors (10 mins)

Divide out equipment, outline how kit should be carried, and explain all breakages need to be paid for. Walk a short way from the road. Cover any parts of Intro talk (outlined above) not already covered.

Site 1 (Walk to site, 10-15 minutes then 35 minutes at site) (1st order stream site high on the Moor)

Demonstration - Follow order of data collection sheet for demonstrations, going through how the group will measure the width and depth of the river, then wetted perimeter and gradient followed by pebble data collection (can be split into two parts depending on ability and size of group). **Pupils collect data** in 3 or 4 groups. **Demonstrate** use of GPS for taking grid reference, pupils follow instructions.

Mini-plenary at site: recap hypotheses by asking how you think the river will change downstream.

Key terms to cover related to data collection (More advanced terms for A-level students – AL):

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|----------------------------|-----------------------------------|---------------------------------|
| - systematic sampling (AL) | - subjective data (Power's scale) | - Bias |
| - random sampling (AL) | - attrition | - channel efficiency/ hydraulic |
| - stratified sampling (AL) | - discharge | Radius (AL) |

Walk to Site 2 (15 minutes)

Site 2 (2nd order stream at V-shaped Valley near Clither Beck Farm) (20 mins)

Pupils to collect data as at site one. Supervise pupils and discuss and changes to methodology that may be required e.g. spacing intervals for river depth. Go around groups checking they know what they are doing, and take photos/video of methods/data collection if you have permissions from the school.

Data collection and field sketch (25mins): draw a field sketch highlighting features such as steep V-shaped valley, rapids, interlocking spurs. Demonstrate as you go: (1) Go through the main lines to draw to construct sketch. (2) Add in key labels (3) add in title/date.

Mini plenary: Peer-assess field sketches using the field sketch scaffold, give feedback and a personalized target next time each student undertakes a field sketch. **Key terms to cover:**

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|--------------------------------------|--------------------|-----------------------------|
| - upper course | - vertical erosion | - interlocking spurs |
| - abrasion | - rapids | -suspension (peaty channel) |
| - 'in-efficient channel' (noisy)(AL) | - V-shaped valley | |

Walk to Site 3 (20 mins) - warning pupils to take care on steep sided slope.

Site 3 (3^d order stream near meander) 20 mins

Pupils collect data (Ensure all groups have a go with all field equipment as this is the last field site).

Gather the groups around to summarise, discussing trends and other findings. (10 mins)

What trends can be identified, are they what you expected (e.g. pebbles becoming smoother downstream)?
What river features have you seen? Flaws in methodology? Discuss upland flood management, if wanted.

Draw field sketch of meander site or data collection site (20 minutes)

To begin with ask students to remind themselves of their personalized target from the last field sketch. The go through a second field sketch outlining key features of the site. **Key terms at site:**

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|-----------------------|---------------------|---------------|
| - meander | - lateral erosion | - river cliff |
| - slip off slope | - deposition | - flood plain |
| - middle/lower course | - riffles and pools | |

Walk back to Moors Centre (15 minutes) If done in reverse (bottom to top) ensure arrangements are made to have a driver waiting (or with you) and allow time for pupils to get back onto the minibus.

Extension activities:

- Create videos of river methods, which utilize a scaffold to assess the quality of the video (level 1 - describing methods; level 2 - explaining; level 3 - explaining and suggesting issues; level 4 - the above and suggesting alternative methods).
- Pick out river features on the OS map and discuss how the river changes downstream from Danby.
- On return to the Centre collate the data and discuss trends, including looking at Scatter graphs and Cross sections.

Summing up and review of learning:

- Students compare notes and discuss how the river changes with distance downstream.
- Briefly return to the day's original hypotheses, consider the evidence to accept/reject these.
- Outline what students could do post visit to follow up on the investigation.

Possible Pre and post session activity suggestions include:

Before coming out on fieldwork visit:

- Teach about key concepts related to rivers, such as those listed on coversheet.
- Introduce the study site using the online North York Moors National Park PowerPoint.

Post visit:

- Collate data on North York Moors National Park river spreadsheet for pebble data; use this as a stimulus to (1) consider different ways to present data (2) with A-level groups consider statistical tests which could be done on the data (3) return to the investigation key questions/ hypotheses.
- Present downstream data (such as discharge on google earth (utilizing GE graph).
- Annotate photos from the day to illustrate methods and/or outline the formation of landforms.