**Educational Resources: Geomorphology Projects for A/AS and GCSE level students**

## Meeting the requirements of your project

To start, consult your course curriculum for the requirements of the project. Your teacher or supervisor will can also give you this information.

## Choosing a suitable project

In some cases you may be given a project to do. If not, you will need to select a topic and identify a suitable location or site to study. Later you will be required to find information from books, to suggest appropriate techniques and equipment, and to devise sampling strategies and analysis. Follow these recommendations:

- Identify a topic or problem in which you are interested, then select a suitable site;
- You may wish to select a local site because of unfamiliarity with distant environments, the logistics of transport (several visits may be necessary), and time.
- Consult practical books in your school or college library - these are a good source of ideas.
- If available, obtain a copy of the Local Environment Agency Plan (LEAP) for your chosen site - these may be in your local library or get in touch with the Environment Agency.
- Keep in simple - don't make your project too advanced or elaborate.
- Ask the advice of your teacher or supervisor.

The collection of primary (first-hand) data is one of the main criteria for a project; use secondary sources only to supplement your own data. This, however, does not mean that you are forced to do fieldwork - there are several types of data collection. One or more of these components are usually included in a project:

- *Field work* - e.g. water quality and discharge measurement; making a map of land use, geomorphological features or topography, studying sediments.
- *Archival work* - e.g. tracing former watercourses from tithe maps stored in Local Records offices.
- *Map work* - e.g. basin morphometric analysis, assessing landform composition from geological maps.
- *Laboratory analysis* - usually of samples collected in-the-field, but also experiments.
- *Computer modelling* - e.g. using existing computer models of stream flow.

One of the first things to do is to produce a project (or research) proposal and plan of action. Things to consider when selecting a site to study are:

- *Transport* - do you have access to a car? Do you need to walk on water?
- *Field workers* - for practical and safety reasons you will always need at least one other (responsible) person to help you. Are they able to give up their time?
- *Time* - are you able to devote sufficient time to data collection. Remember you may have to sample on several occasions.
- *Field experience* - be prepared to get a little wet and muddy!

## Producing a research proposal and plan of action

Decide what kind of study you want to carry out, and how you plan to do it. Is it going to be based on measurements taken in-the-field only, or will samples need to be brought back to school or college for analysis, and will library or archival work need to be done? How many measurements will need to be taken, and how often? Remember that conditions such as river flow and water quality change from hour-to-hour, whilst landforms and sediments may change over timescales of months or years.

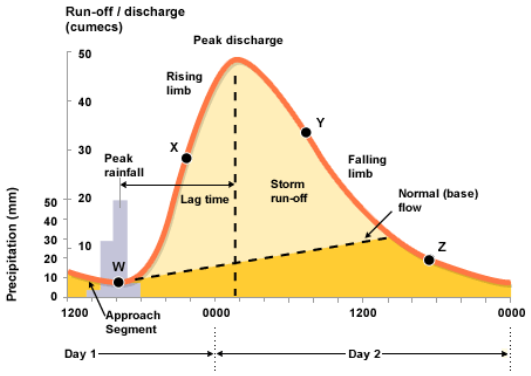
Your research proposal should contain the following information:

- Your idea
- Techniques and equipment
- Possible analysis, e.g. whether you intend to use simple statistics
- Sources of information
- Draft timetable

Discuss your ideas with your teacher or supervisor. They may suggest that you change or modify your project.

## Devising a sampling strategy

This involves getting the right amounts of spatial and temporal data. Too few data mean insufficient material for analysis - it is often impossible to get more data once you've left the site because the conditions will have changed. Having too many data is not so much of a problem because the weakest data can be left out, but the time spent collecting the extra data could have been spent on something else.




### What to sample?

Identify the variables you need to measure. These will determined by the focus of your project and the processes operating. For example, if you were planning a fluvial geomorphology project:

- The standard hydrology measurements are velocity, channel cross-section and water discharge.
- Do you also need to measure sediment? - if so, what kind? Dissolved (solute), suspended load and/or bedload.
- How are you going to record the landforms, features and vegetation that you see - using sketch maps, photographs, accurate measurement using surveying equipment?
- Do you need to record the freshwater invertebrates in the river?

### Where to sample?

Choosing a suitable site is critical as it will significantly affect the data collected and may also impose health and safety problems. For example, for the same fluvial geomorphology project you might need to consider:

- Is the river accessible?
- Can permission be obtained to cross property and land?

- Are there suitable road bridge-river channel intersections with off-road parking and easy access?
- Is the site typical of that particular stretch of river? Is it the best site you can find?
- Avoid areas of dumping or human activity (unless this is what you are studying, of course).

### When to sample?

How often and how long you will need to spend in the field depends on your choice of project. For instance, if you are studying the sediments of a point bar you may only need to visit each site once, but repeated visits may be needed if you are looking at water quality or water discharge changes over time. Most time is available for data collection during the long summer vacation. However, if you are studying any geomorphological processes involving the work of water, bear in mind that this is also when these processes are likely to be at their least active. Conversely, data collection during winter may be hindered by the weather, high water discharges and floods.

If you are measuring water flow and its characteristics, decide whether you will need to sample an entire storm event (which may involve remaining at your sampling site for several hours) or at regular intervals (daily, monthly). Can data be obtained from the Environment Agency or nearby Sewage Treatment Works (STWs) to supplement your measurements?

## Pre-fieldwork preparation

As a general guideline:

- Make a list of the equipment you need - you may be limited by the equipment in your school or college, but some equipment can be easily and cheaply made. See the fieldwork texts in your library for instructions.
- Give a copy of the equipment list, with the dates when you will need it, to your teacher or technician well in advance of when you want to do the fieldwork.
- Make sure that your teacher has agreed your project and your equipment list.
- Find out as much as possible about the area and the place you are going to visit - look in the LEAPs, at topography and geology and other thematic maps, local history books, etc.
- If possible do a reconnaissance trip to your site so that you know where you are going. You can also select sampling sites.
- Make sure you know how to use all of the equipment, and that it is functioning correctly. Always treat equipment carefully, especially fragile instruments - other students will need to use them later.
- If possible, practise using the equipment before doing the work 'for real'.
- Make sure that you have obtained any permissions from local farmers and land-owners to cross land and gain access to the site.
- Inform someone where you are going and how long it will take.

## Fieldwork: Conduct in-the-field

- Always get the permission of the landowner (enquire at local farms) before entering fields. Landowners may be reluctant to give permission if growing crops, around lambing time and the shooting season.
- Notify the local Environment Agency or Natural England office if undertaking an activity which may significantly affect a site, e.g. a large invertebrate survey.
- Follow The Countryside Code.
- Be polite to anyone who enquires what you are doing - sometimes they can give you useful local information or contacts. Always follow any requests to leave land - select a different site.

## Fieldwork safety

In general:

- Always be accompanied by at least one other adult when undertaking fieldwork.
- Always wear rubber gloves when sampling (to protect from Weil's disease, etc.).
- Don't take unnecessary risks - if you don't feel comfortable seek assistance or select a different site.
- When working in river, glacial or other hazardous environments:
- When entering a muddy river for the first time, use a stick to probe the channel bed for scour pools. Apply your knowledge of fluvial geomorphological processes to predict where different features (e.g. riffles, pools) are most likely to be found.
- Don't stand within 1 m of overhangs on the channel bank otherwise you may contribute to cantilever failure of the bank.
- Don't enter rivers which are deeper than 1.2 m - wading can be

difficult even in slow-moving streams. When visiting the river for the first time look for any trashline debris (representing the level of a recent flood) to gauge possible flood levels.

- Beware of benches of fine sediment which may be softer and deeper than they first appear.

## General advice

- Take two sets of fragile (e.g. thermometers) or potentially temperamental (e.g. batteries getting wet) equipment.
- Undertake careful reconnaissance to find a suitable (and accessible) site.
- Remember that when collecting real-time data in-the-field, once you have left the site you can't go back to measure anything that you have forgotten.
- Don't rely on just one measurement (e.g. water temperature) - it is far better to take several readings and obtain an average. Multiple samples also allow the calculation of standard deviations (which can be plotted as error bars on graphs).
- Remember to note down the calibration formula for any equipment you used (it may be different from other meters).

## Sources of information

A good source of information for any UK-based project are the regional Environment Agency, National Park Authorities, Natural England, River's Trusts and the Centre of Ecology and Hydrology or other relevant research organisations, which can supply a myriad of background information, for example, annual hydrographs, River Basin Management Plans (contains useful background information on river catchments). Environment Agency River Basin Management Plans (RBMP) are also useful sources of information for hydrological or fluvial projects. Check out the data available from UK National River Flow Archive (NRFA).

When contacting anyone for information, it helps if you know exactly what you want (ask for specific information and dates, rather than a vague request for "everything you've got on ...") and are courteous.

## Project report production

It is usual to include the some, if not all, of the following:

- A local area map with sample sites marked (including a scale, north arrow and a location map).
- Always cite grid references - eight figure references if possible.
- Geology map, where relevant.
- Environmental data on the (long-term) precipitation and temperature values.

And consider the following:

- Are the statistics appropriate? Do you understand how to use the test correctly?
- Think carefully as to the best way to present the data you have collected. Select the most effective way of presenting data.
- Graphs and tables of data should be accompanied by a description or explanation in the text describing the dataset and highlighting the important features.
- You may incorporate your own data with other datasets (e.g. obtained from the Environment Agency), but remember that you must clearly differentiate your own data from that of other sources.

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**Risk assessment**

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