

Aim : Evaluate the links between drainage basin characteristics, the hydrological cycle and flooding



This handout is for you to complete before the Fieldwork Live Lesson but you should make sure you have it with you during the Live Lesson as well in case you want to refer to any of the ideas.

We will look at the geographical concepts underpinning the water cycle and flooding, then use a Storymap to complete the planning and background research sections of our investigation. If you have any questions after this pre-course work, you can submit those to us via your teacher. We will try to address these questions during the Live lesson.

Learning Objectives

1. Identify inputs, outputs, stores and flows of water within a drainage basin
2. Describe and explain how drainage basin characteristics will affect flood risk
3. Use secondary data sets to interrogate the study location
4. Develop critical geographical enquiry skills to investigate hydrology and flooding
5. Justify appropriate qualitative and quantitative methods of data collection
6. Assess how soil type affects infiltration rate
7. Evaluate the investigation process and suggest further enquiries that could be investigated

Student Information

You should aim to complete the 4 tasks in this pack prior to the #fieldworklive lesson.

The aim is to build on your knowledge of drainage basin characteristics from your GCSEs and introduce you to A Level concepts and fieldwork.

In order to complete the tasks in this pack you will need to complete research and access secondary data. Please follow the weblinks as instructed.

Some students may wish to do further reading and research prior to the #fieldworklive lesson. This can be found on the last page of this pack.



A drainage basin is an **open system**, with water (matter and energy) able to enter and leave (**inputs** and **outputs**) across the catchment watershed (boundary between systems). Geographers use a 'systems approach' to simplify these complicated processes.

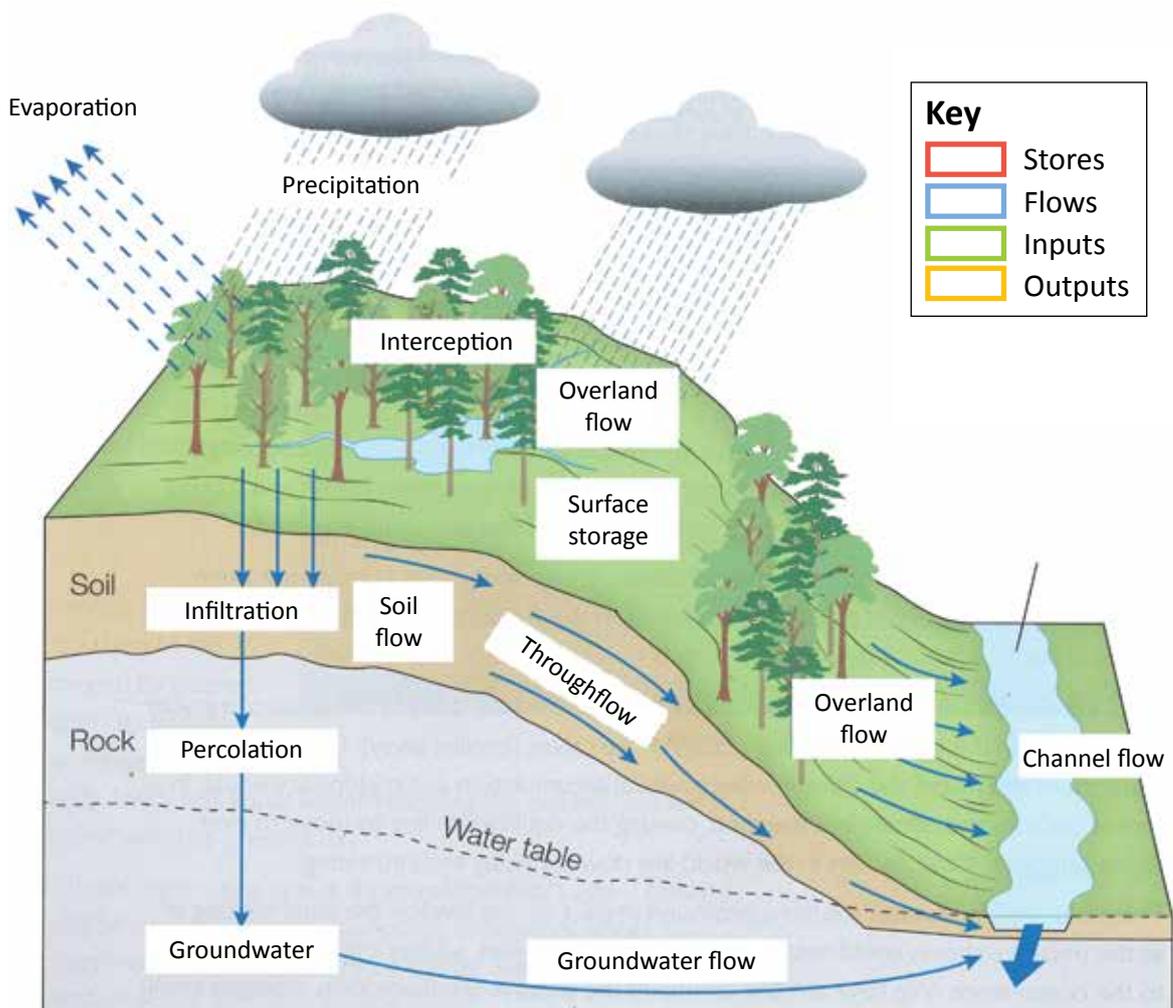


Task 1: The hydrological cycle within the drainage basin

Watch the drainage basin hydrological cycle learning video. Take note of how 'stores', 'flows' 'inputs' and 'outputs' are defined within a drainage basin

www.youtube.com/watch?v=8GOJ3S5jKSI

Using the key words on the diagram, classify them as stores, flows, inputs or outputs. If you are unsure, or any terms are unfamiliar, star them and come back to them at the end.



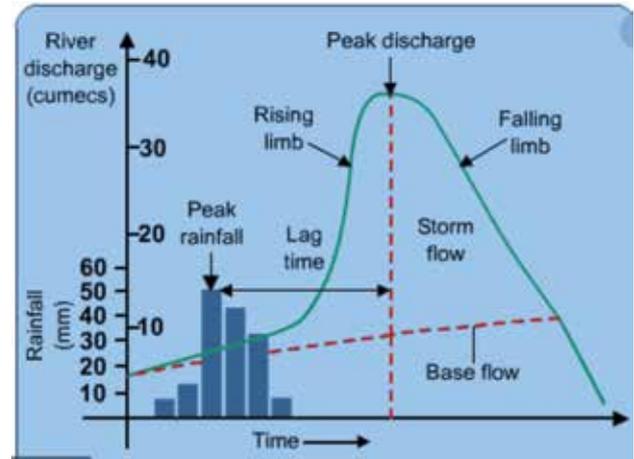


Task 2: The flood hydrograph

The characteristics of any drainage basin and the climate will affect the likelihood and severity of flood events.

A flood hydrograph is a graph that shows how a river responds to a period of rain.

- Using your prior knowledge from GCSE, can you explain how the following characteristics will affect the hydrograph? (As an example one has been done for you.)



Source: s-cool.co.uk

| | |
|--------------------------------|---|
| Antecedent conditions | The conditions occurring before (7-10 days prior). After heavy rain, for example, the soil becomes saturated: water will be unable to infiltrate and will flow into the river more quickly as surface run off. Lag time of the flood hydrograph will be reduced, the rising limb of the hydrograph will be steeper, peak discharge will occur sooner. |
| Geology (permeability of rock) | |
| Precipitation | |
| Soil type | |
| Elevation and Topography | |
| Drainage basin density | |
| Land use | |



Task 3: Interrogation of research location

Now we know the theory of how catchment characteristics might affect flood risk, we need to apply that knowledge to the study location for the investigation.

Use the information in the Story Map to help you identify and explain how the characteristics of the Upper Aire catchment might influence flood risk there.

<https://bit.ly/fieldworkliveHydrology>

| | |
|-----------------------------------|-------------------|
| Elevation & Topography | Land Cover |
| Rainfall | Geology |

- How have these secondary data sources been useful in the investigation planning process?

.....

.....

- Are there any limits to the reliability, precision or validity of the secondary data affecting the accuracy of our research?

.....

.....

- What makes the Upper Aire catchment a suitable place to investigate the hydrological cycle?

.....

.....





Task 4: Developing geographical Enquiry Skills

Climate change has caused an increase in major flood events on both a global and national scale in recent years, therefore the importance of investigating the hydrological cycle has never been greater.

Yorkshire Dales hit by flooding following heavy rain

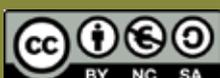
<https://www.bbc.co.uk/news/uk-england-york-north-yorkshire-51597105>

The fieldwork investigation is set within the Upper Aire catchment. The water from the catchment flows into the Malham Beck and the River Aire.

Using ideas from the Storymap, photos and the article above, explore why flooding might be a risk in the area and why understanding the water cycle system helps to manage it. This will give geographical justification to our study.



| What can we investigate about this place and why? | |
|--|--|
| What flows and stores of water are there in this landscape? | |
| What features of this landscape would affect flood risk? | |
| To investigate our aim, what quantitative data could you collect here? | |
| And what qualitative data could you collect here? | |
| How might investigating the catchment help manage future flood risk? | |
| Any questions for the Live Lesson? | |





Additional reading and sources of information

Natural Flood Management

Information to read plus a great video showing natural management options:
www.thames21.org.uk/natural-flood-management/

National River Flow Archive

For information on flooding and river flow behaviour
<https://nrfa.ceh.ac.uk>

Meteorological Office

For ideas on how our climate is changing and the impact on flooding, plus other impacts
<https://www.metoffice.gov.uk/weather/climate-change/effects-of-climate-change>

Hydrological summary

From NRFA, summaries of the UK's hydrological conditions
<https://nrfa.ceh.ac.uk/monthly-hydrological-summary-uk>

Geographical Association or RGS resources

A wide range of Geography resources on your Water cycle topic
<https://www.rgs.org/> or <https://www.geography.org.uk/>

The Rivers Trust

River Eden Virtual Field Investigation
<https://schools-theriverstrust.hub.arcgis.com/pages/ks4>