

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



This handout is for use during the live fieldwork lesson. Make sure you have your pre-lesson work with you as well. We will review the background ideas, then start from Learning Objective 4. You might also want to have a calculator handy.

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



Task 1: Storm simulation measurements

We will see the impact of different land uses on surface run off as a process within the hydrological cycle and apply this to the drainage basin. As we look through the storm simulation method, note any limitations and justifications of the method below.

Validity	Reliability
Precision	Representativeness
Overall, is this an accurate data set?	



Task 2: Storm simulation predictions

If we consider this in the context of the drainage basin, can you annotate the photos below with ideas of how surface runoff might vary in different areas? How will this, in turn, affect the likelihood of flooding?

Command word advice: When you are asked to **annotate** a resource, you are being asked not just to **label** it but to expend your label into a **description** and **explanation** of that feature. Look at the one done for you as an example.



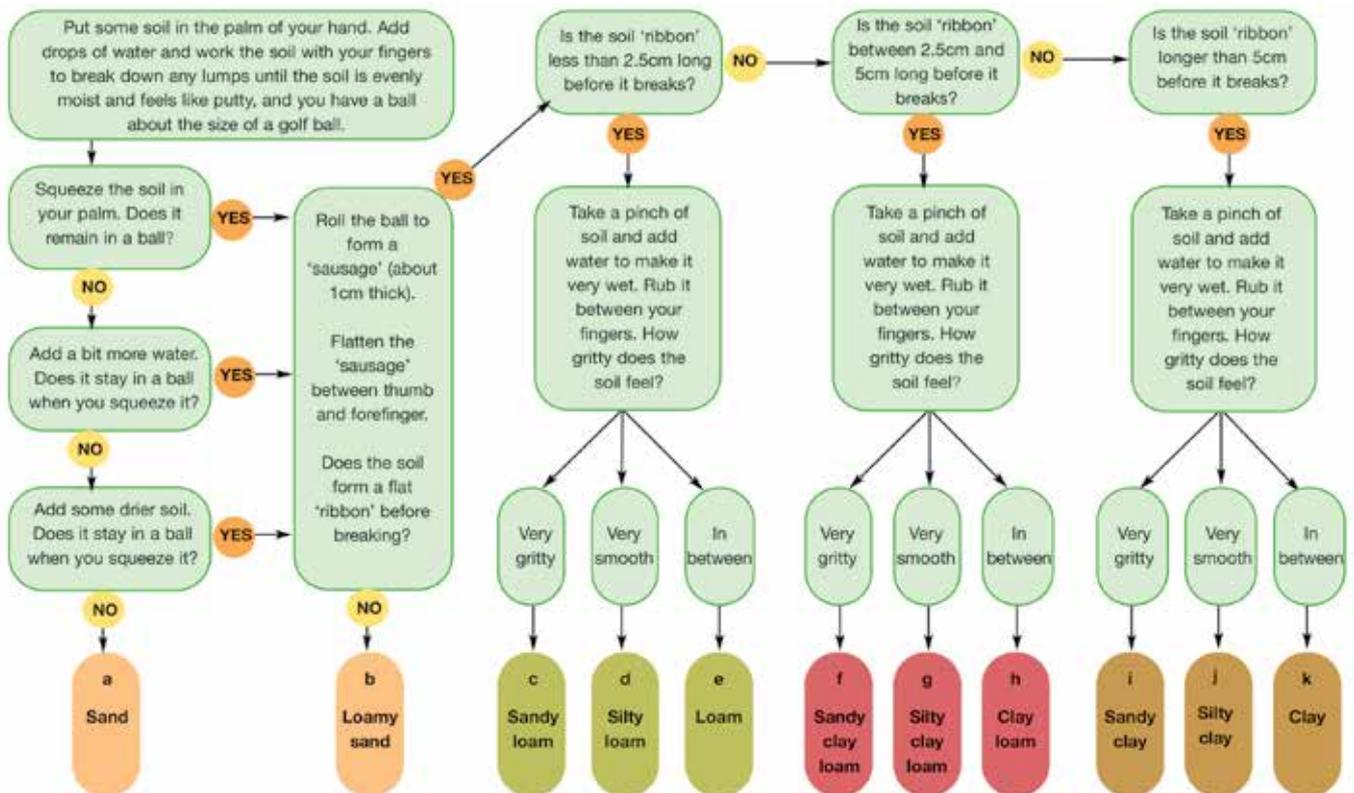
During winter, there is often snow and ice. If the ground is frozen, infiltration will not occur so surface run off rates will be fast. It might be similar to urban areas as the soil surface is impermeable if frozen.

If there were heavy rain or snow melt while the soil is frozen, flooding would be more likely.



Task 3: Determining soil texture

Take a sample of soil and use this key to determine the soil texture.



Soil texture observation notes for your location

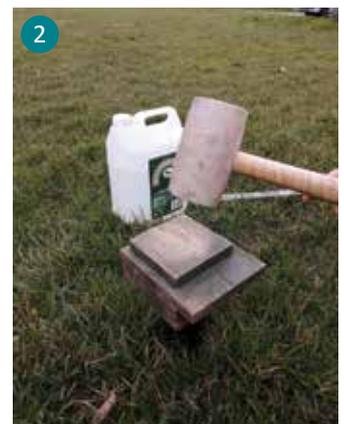
What does it tell you? (validity)	Justify the method: Reliability? Precision? Representativeness?	Any limitations to the accuracy of the results?





How could you measure infiltration?

1. Make sure you have the correct equipment: a piece of tube or piping, a 30cm ruler, a mallet, a block of wood, and some water.
2. Place a piece of wood over the black tube and carefully hammer it into the ground up to a set depth (eg. 5cm).
3. Remove the wood and place the 30cm ruler inside the black tube.
4. Fill the black tube with water up to a set depth (eg. 20cm).
5. Write down the water level within the black tube then start a timer after the first. Record the water level every 30 seconds for 15 minutes.
6. If the water in the tube drops below a set depth (eg. 10cm) – mark the minute when this happened and then fill up the black tube without removing it from the soil. You should make a note of when this is done, so that it can be taken into account when you are calculating the infiltration rate.





Task 4: Recording the infiltration measurements

Record the findings in the table below

Time (minutes)	Water level on ruler (mm)	Drop (mm)	Infiltration rate (mm / hr)
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Mean infiltration rate =			

Calculating your Infiltration rate

- Work out the drop (mm) each minute from the difference in each reading
- Multiply your drop 60 (mins to hours) to work out the infiltration rate (mm/hr)

➤ Why is infiltration rate a valid measurement for our investigation?

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➤ Why are we measuring in mm and not cm?

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- Can you identify any other justifications or limitations of our method? How might these impact on the quality of our data and our conclusions?

- This recording has been taken in one location, can you suggest another location where the rate might be different and explain why?

- What sort of sampling strategy could be useful in getting a representative sample based on your last answer?

Use this link <https://bit.ly/fieldworkliveHydrologyData> to add your soil texture and soil infiltration rate (mm/hr) data from your own experiments. We are using the Survey 123 app to collect a geo-located big data set.

- Why might it be useful to create a large geolocated dataset for soil type and soil infiltration?

- What further investigations could be done with this big dataset?

