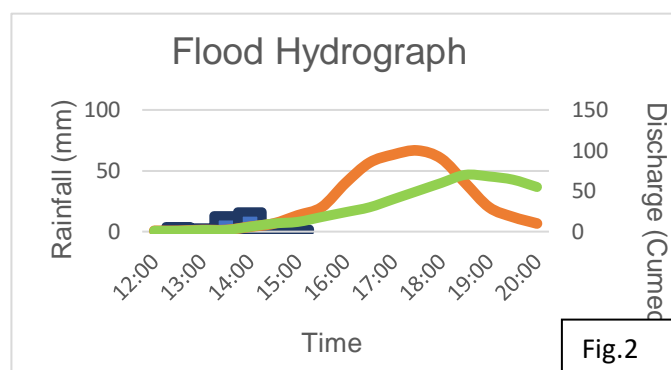
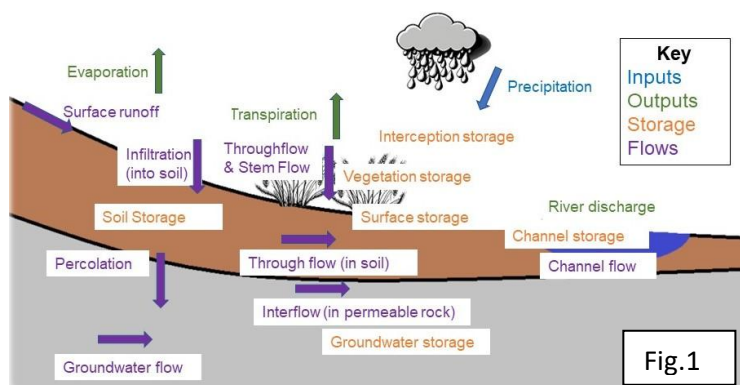


Answers: Factors Influencing Variations in Runoff: Soil Structure and Infiltration

How might farmers be impacted by extreme weather events such as flooding?

- **Waterlogged soils** can damage crops and delay planting or harvesting.
- **Soil erosion** can wash away nutrients and reduce fertility.
- **Machinery access** may be restricted, disrupting operations.
- **Infrastructure**, such as tracks, fences or buildings, may be damaged.
- **Crop yields** may fall due to poor growing conditions.
- **Flooding** can increase the spread of crop and livestock diseases.

Note: Other extreme weather events that can impact farmers include droughts (causing water shortages), heatwaves (affecting livestock and crop health), and storms (damaging infrastructure and crops).



Consider Figures 1 and 2. The hydrograph shows data from two drainage basins in the same region. The soil type and underlying rock is the same in both basins. Analyse the different land management practices that might explain these differences.

The differences in the hydrographs are likely due to **land management**:

- The basin with a **short lag time and high peak discharge** likely has **compact soil** or **bare ground**, increasing surface runoff. It may have been recently ploughed or heavily used by machinery or livestock.
- The basin with a **longer lag time and lower peak discharge** likely has **vegetation cover** (e.g. field margins or hedgerows), **reduced tillage** (e.g. direct drilling), or **improved soil structure**, allowing more water to infiltrate and slowing runoff.

Record your field work findings using this table. (If practical work has not been completed, please use the example data set for the remaining questions.)

Location	Location Description	Water Infiltration Time	Soil Structure Score
1			
2			
3			
4			
5			

Look at the data. Which location most strongly indicates that it may be more prone to generate surface runoff? What are the possible causes?

Example response using the provided data set:

Location 3 is the most likely to generate surface runoff.

- It had the **longest infiltration time** (9 minutes, 12 seconds).
- It received a **soil structure score of 5** (very poor).
- It is a **gateway** used by livestock and/or machinery — high traffic has caused soil compaction.
- There is **mud and standing water**, showing poor infiltration and a high likelihood of runoff.

Suggest how that area might be managed to reduce the amount of surface runoff.

Example response using the provided data set:

To reduce runoff at Location 3, the farmer could:

- Redirect traffic away from the gateway or rotate entry points.
- Use trackway surfacing (e.g. hardcore) to reduce compaction and mud.
- Aerate or subsoil the area to relieve compaction.
- Improve vegetation by reseeding

A farmer implements a range of strategies to reduce runoff. What additional benefits might arise because of this change? Consider productivity, biodiversity and other environment factors.

Example response:

- Improved productivity: Better soil structure promotes healthier root systems and stronger crop growth.
- Increased biodiversity: More stable habitats (e.g. field margins, reduced erosion) can support insects, birds, and other wildlife.
- Environmental benefits: Reduced sediment and nutrient loss into rivers; potential for carbon sequestration in soils.
- Greater resilience: Soils become more resistant to both flooding and drought, helping the farm adapt to climate change.
- Compliance with schemes: Improvements may support agri-environment schemes and unlock funding or subsidies.