# **Subject:** Geography

# Year: 10

**Dear Students,**

Each week in Geography you will be expected to complete a piece of Geography work that should take you between 1 to 2 hours. This is the minimum expectation and there are lots of other useful things you could spend your time completing in your free time as listed below:

| **Watching Documentaries:** | **Explore the following websites:** | **Read the following books:** |
|---|---|---|
| • Chasing Ice<br>• Blue Planet<br>• Planet Earth<br>• Life<br>• Severn Worlds One Planet<br>• Horizons: We need to talk about population<br>• National Geographic | • BBC Bitesize<br>• Geoguessr<br>• Google Maps<br>• Gapminder<br>• Kids World Travel Guide<br>• World Atlas<br>• Earthtime.org | • Our Place by Mark Cocker<br>• Adventures of a young naturalist by David Attenbrough<br>• Prisoners of Geography by Tim Marshall<br>• Population and Development – Tim Dyson<br>• Factfulness by Hans Rosling<br>• Adventures through the Anthrpocene by Gaia Vince |

| Week | Title of work | Learning Intentions: | Deadline for work |
|---|---|---|---|
| 1 | What work do rivers do? | To know the terms erosion, transportation, deposition.<br>To understand how rivers erode, transport and deposit material. | Friday 27th March 2020 |
| 2 | How does a river change from source to mouth? | To understand how a river changes from source to mouth and to know what the long and cross profile of a river is. | Friday 3rd April 2020 |
| 3 | What landforms do you find in the upper course of a river? | To be able to identify and explain the formation of landforms found in the upper course of a river. | Friday 10th April 2020 |
| 4 | What landforms do you find in the upper course of a river? | To be able to identify and explain the formation of landforms found in the middle course of a river. | Friday 17th April 2020 |
| 5 | What landforms do you find in the lower course of a river? | To be able to identify and explain the formation of landforms found in the lower course of a river. | Friday 24th April 2020 |
| 6 | Why do rivers flood? | To explain why rivers flood.<br>To be able to interpret a flood hydrograph. | Friday 1st May 2020 |

If you have any questions about your work please email your class teacher and they will get back to you as soon as they can.

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**Week 1:**

# What work do rivers do?

## Erosion:

Erosion involves the wearing away of rock and soil found along the river bed and banks. Erosion also involves the breaking down of the rock particles being carried downstream by the river.

### The four main forms of river erosion

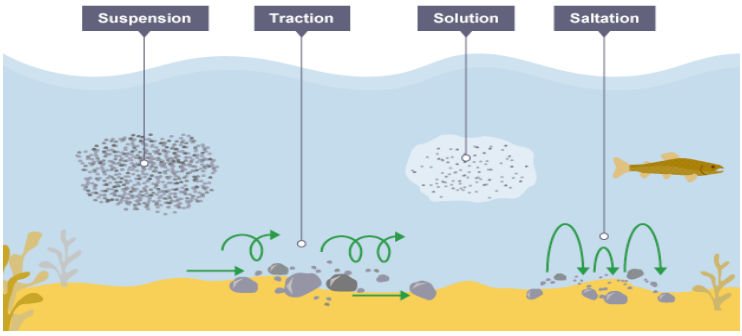
- **Hydraulic action** - the force of the river against the banks can cause air to be trapped in cracks and crevices. The pressure weakens the banks and gradually wears it away.
- **Abrasion** - rocks carried along by the river wear down the river bed and banks.
- **Attrition** - rocks being carried by the river smash together and break into smaller, smoother and rounder particles.
- **Solution** - soluble particles are dissolved into the river.

## Transport:

Rivers pick up and carry material as they flow downstream.

### The four different river transport processes

- **Solution** - minerals are dissolved in the water and carried along in solution.
- **Suspension** - fine light material is carried along in the water.
- **Saltation** - small pebbles and stones are bounced along the river bed.
- **Traction** - large boulders and rocks are rolled along the river bed.




Rivers need energy to transport material, and levels of energy change as the river moves from source to mouth.

- When energy levels are very high, large rocks and boulders can be transported. Energy levels are usually higher near a river's source, when its course is steep and its valley narrow. Energy levels rise even higher in times of flood.
- When energy levels are low, only small particles can be transported (if any). Energy levels are lowest when velocity drops as a river enters a lake or sea (at the mouth).

**Deposition**

When a river loses energy, it will drop or deposit some of the material it is carrying.

- Deposition may take place when a river enters an area of shallow water or when the volume of water decreases - for example, after a flood or during times of drought.
- Deposition is common towards the end of a river's journey, at the mouth.
- Deposition at the mouth of a river can form deltas - for example, the Mississippi Delta

**Activities:**

1. Write definitions for erosion, deposition and transportation.
2. How does a river erode a landscape (4 marks)
3. Draw a diagram for the ways a river transports material.
4. Define the terms traction, saltation, suspension, solution.
5. Write a paragraph to explain why and where a river deposits material.

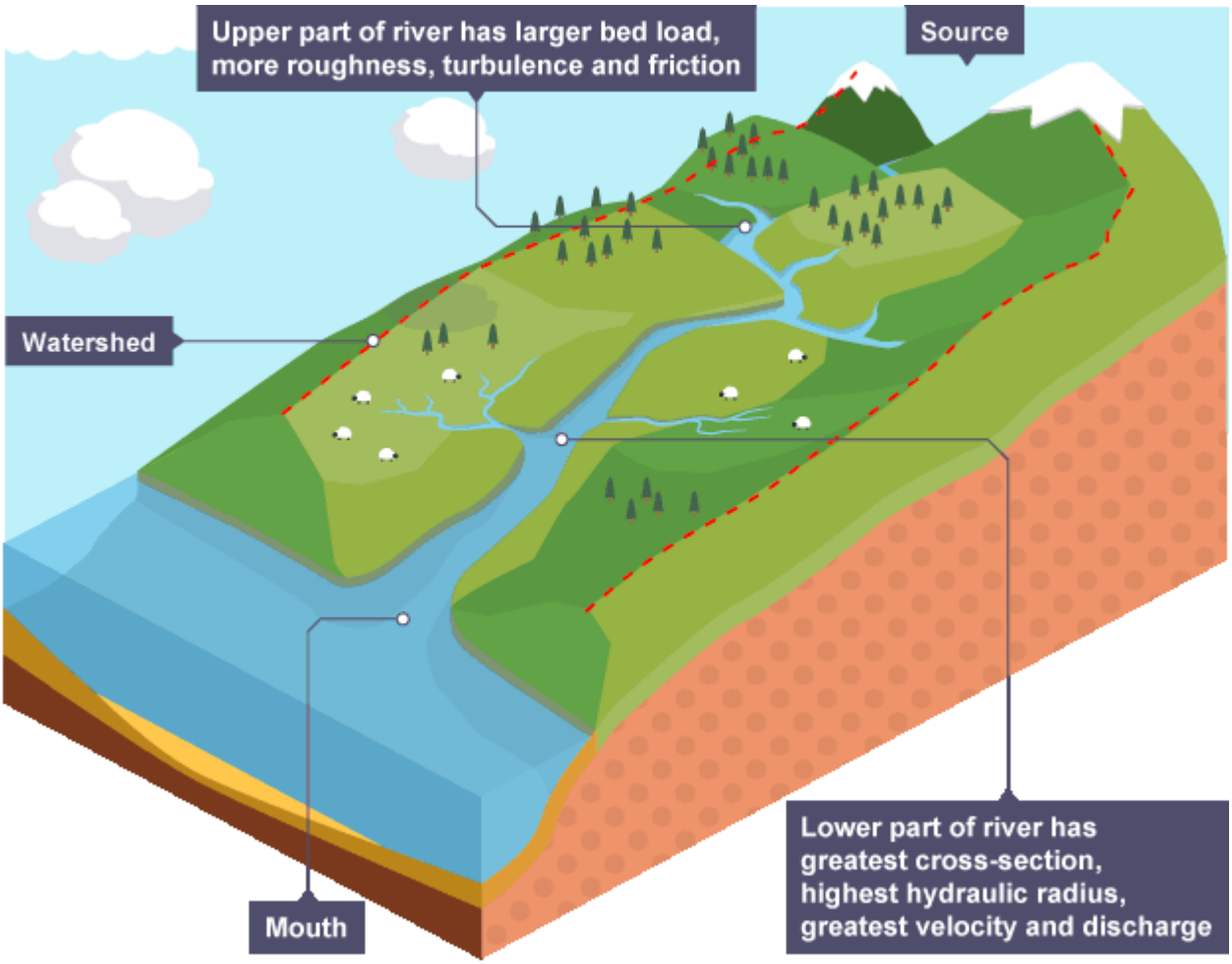
**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/z3b79qt/revision/1

**Week 2:**

# How do rivers change from source to mouth?

**The long profile of a river shows how the gradient of a river changes from source to mouth.**



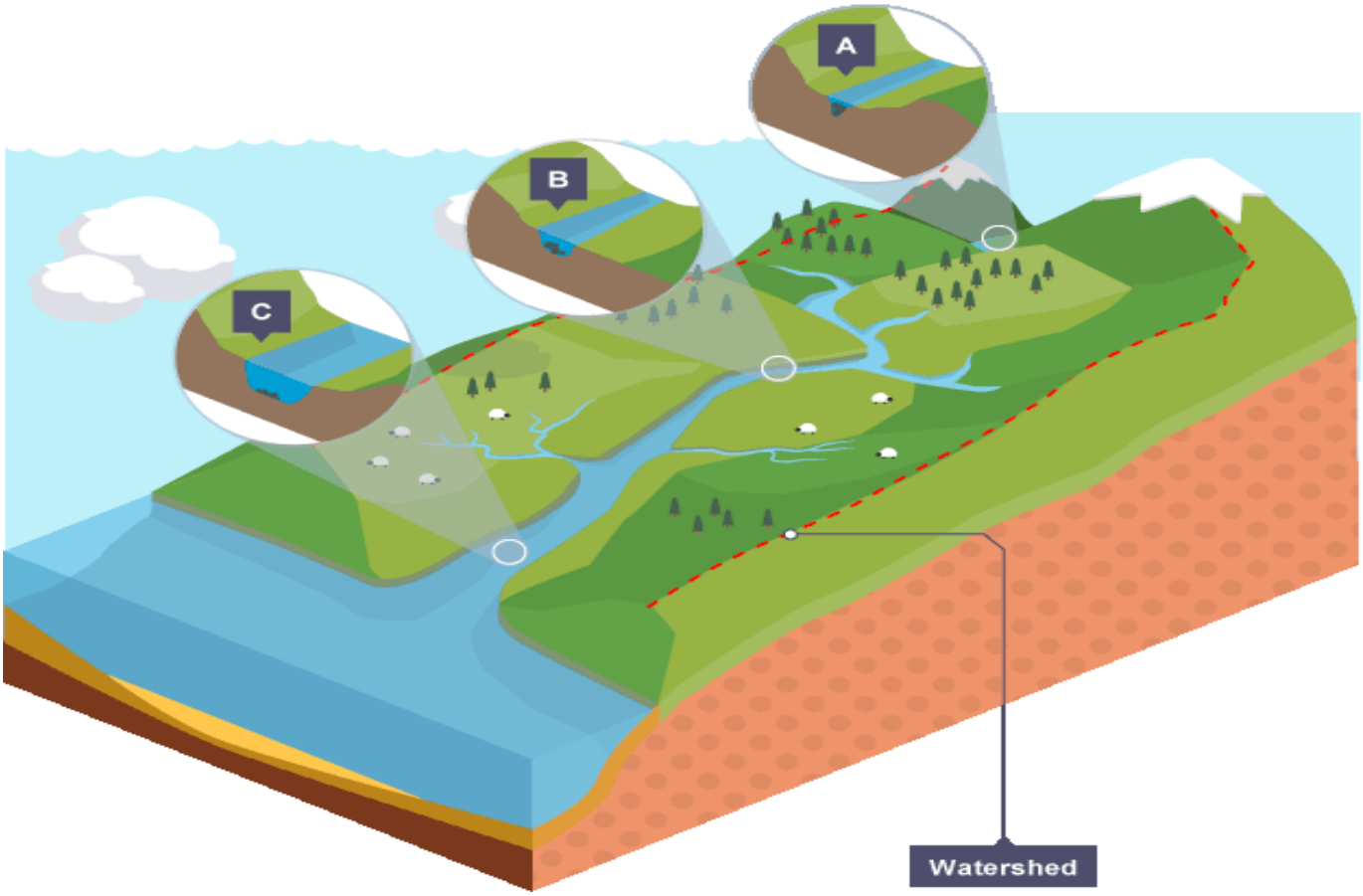

The **source** of a river is often - but not always - in an upland area. Near the source, a river flows over steep slopes with an uneven surface. It often flows over a series of waterfalls and rapids. Highland areas are usually composed of hard igneous rocks, which are ideal for forming such features.

As a river flows down steep slopes, the water performs **vertical erosion**. This form of erosion cuts down towards the river bed and carves out steep-sided V-shaped valleys.

As the river flows towards the mouth, the slopes become less steep. Eventually the river will flow over flat land as it approaches the sea.

The **discharge** (amount of water flowing) will increase as the river approaches the sea.

**The cross profile of a river shows how the width and depth of the river valley and channel change as you travel downstream.**




Near the source of a river there is more vertical erosion as the river flows downhill, using its energy to overcome friction **(A)**. As a result, the channels are narrow and shallow and may contain large boulders and angular fragments eroded and weathered from the steep valley sides. The sediment in the river creates turbulence and friction.

As the river approaches the mouth, velocity and energy increase due to increased discharge. The river performs more lateral erosion making the channel wider, and smoother **(B)** and **(C)**. As a result there is less turbulence and friction, making the flow of water more efficient.

**Activities:**

1. What does the long profile of the river show?
2. What does the cross profile of a river show?
3. Draw a diagram showing how the cross profile of a river changes in the upper, middle and lower courses of a river.
4. How does the width of a river change as you travel downstream?
5. How does the depth of a river change as you travel downstream?
6. How does the velocity of a river (how fast the water travels) change as you travel downstream?

**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/zgxbp39/revision/1

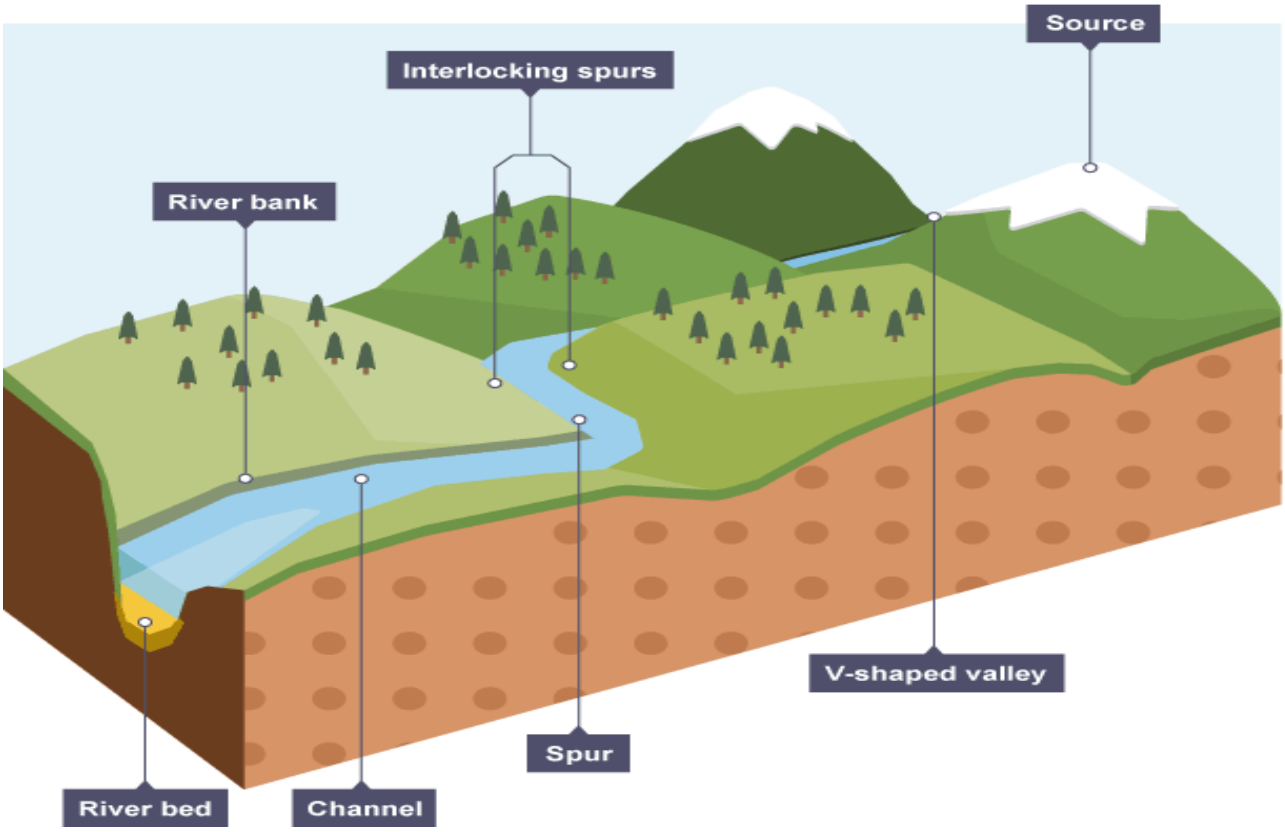
**Week 3:**

## What landforms do you find in the upper course of a river?

**Upper course river** features include steep-sided V-shaped valleys, interlocking spurs, rapids, waterfalls and gorges.

Middle course river features include wider, shallower valleys, meanders, and oxbow lakes.

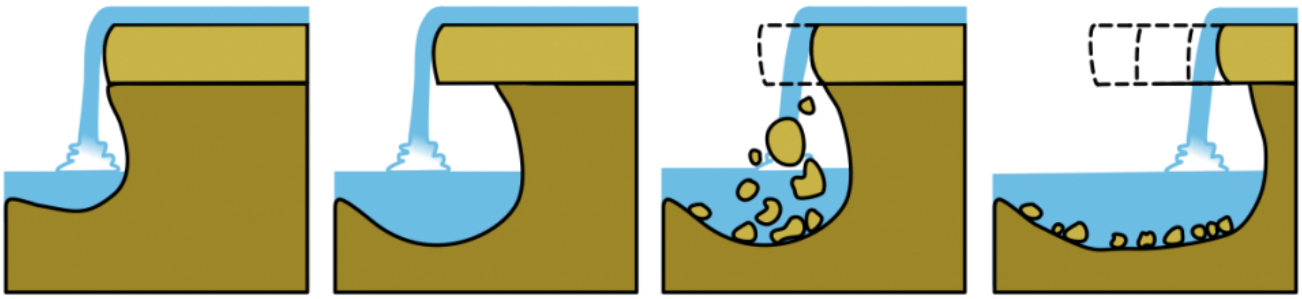
Lower course river features include wide flat-bottomed valleys, floodplains and deltas.




As the river moves through the upper course, it cuts downwards. The gradient here is steep and the river channel is narrow. Vertical erosion in this highland part of the river helps to create **steep-sided V-shaped valleys, interlocking spurs, rapids, waterfalls and gorges.**

- As the river erodes the landscape in the upper course, it winds and bends to avoid areas of hard rock. This creates **interlocking spurs**, which look a bit like the interlocking parts of a zip.
- When a river runs over alternating layers of hard and soft rock, **rapids** and **waterfalls** may form.

# The formation of a waterfall



**1.** Waterfalls typically form in the upper stages of a river. They occur where a band of hard rock overlies a softer rock. Falling water and rock particles erode the soft rock below the waterfall, creating a plunge pool.

**2.** The soft rock is undercut by erosional processes such as hydraulic action and abrasion creating a plunge pool where water and debris swirl around eroding the rock through corraision further deepening it and creating an overhang.

**3.** Hard rock overhang above the plunge pool collapses as its weight is no longer supported.

**4.** Erosion continues and the waterfall retreats upstream leaving behind a gorge.

www.internetgeography.net

**Activities:**

1. Name five landforms you will find in the upper course of a river.
2. Draw a labelled sketch of an interlocking spur
3. What type of erosion occurs predominantly in the upper course of a river vertical erosion or lateral erosion?
4. Explain what the difference is between vertical and lateral erosion.
5. What landform is created when a waterfall retreats upstream through erosion?

**Practice exam question:**

Explain the formation of a waterfall **(6 marks)**

**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/z3h9v4j/revision/1

**Week 4:**

# What landforms do you find in the middle course of a river?

## Meanders

In the middle course the river has more energy and a high volume of water. The gradient here is gentle and lateral (sideways) erosion has widened the river channel. The river channel has also deepened. A larger river channel means there is less friction, so the water flows faster:

- As the river erodes laterally, to the right side then the left side, it forms large bends, and then horseshoe-like loops called **meanders**.
- The formation of meanders is due to both deposition and erosion and meanders gradually migrate downstream.
- The force of the water **erodes** and undercuts the river bank on the outside of the bend where water flow has most energy due to decreased friction.
- On the **inside** of the bend, where the river flow is slower, material is **deposited**, as there is more friction.
- Over time the horseshoe become tighter, until the ends become very close together. As the river breaks through, eg during a flood when the river has a higher discharge and more energy, and the ends join, the loop is cut-off from the main channel. The cut-off loop is called an **oxbow lake**.

Upstream a large bend becomes a horseshoe and is eventually cut-off to become an **oxbow lake**. Downstream the river is eroding its outer bank and depositing on its inner bank to create a new meander.

## Activities:

1. **Describe the cross profile (width and depth) of a river in the middle course.**
2. **Draw a labelled sketch of a river meander including the following labels (outside bend, inside bend, fastest flow line, slip off slope, river cliff)**
3. **Explain the formation of a river meander.**
4. **Explain in 6 stages the formations of an ox-bow lake.**

**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/z3h9v4j/revision/2

**Week 5**

# What landforms do you find in the lower course of a river?

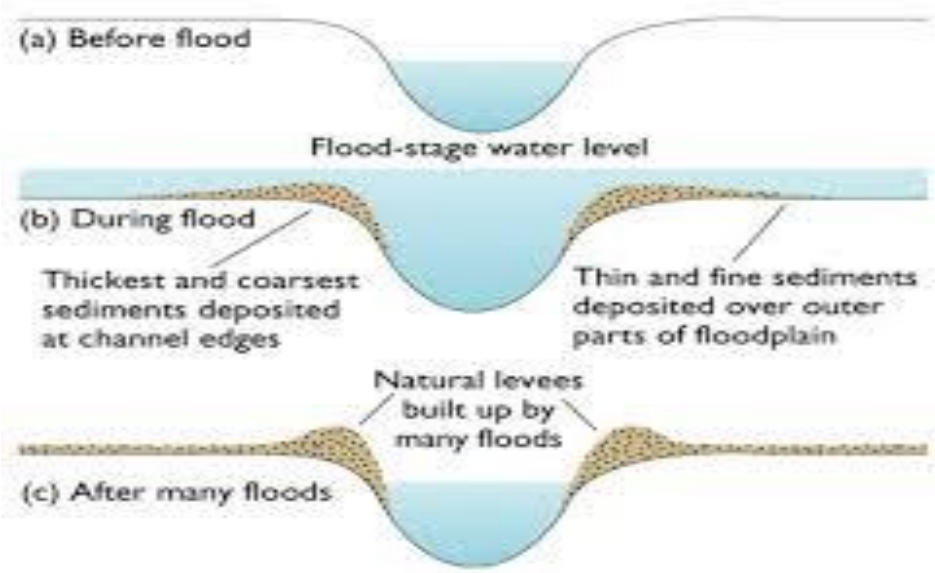
**Lower course features**

In the lower course, the river has a high volume and a large discharge. The river channel is now deep and wide and the landscape around it is flat. However, as a river reaches the end of its journey, energy levels are low and deposition takes place.

**Floodplains:**

The river now has a wide floodplain. A floodplain is the area around a river that is covered in times of flood. A floodplain is a very fertile area due to the rich alluvium deposited by floodwaters. This makes floodplains a good place for agriculture. A build up of alluvium on the banks of a river can create levees, which raise the river bank.

## Levees:




**Levees** are natural embankments which are formed when a river floods. When a river floods friction with the floodplain leads to a rapid decrease in the velocity of the river and therefore its capacity to transport material. Larger material is deposited closest to the river bank. This often leads to large, raised mounds being formed. Smaller material is deposited further away and leads to the formation of gently sloping sides of the levees. High pressure, caused by a river meeting its bank-full capacity, can cause a levee to burst.

## Activities:

1. **Describe the cross profile of a river in its lower course.**
2. **Define the term floodplain.**
3. **Make a copy of the levee diagram.**
4. **Explain the formation of a natural levee in a rivers lower course (4 marks)**

**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/z3h9v4j/revision/3

**Week 6**

# Why do some rivers flood?

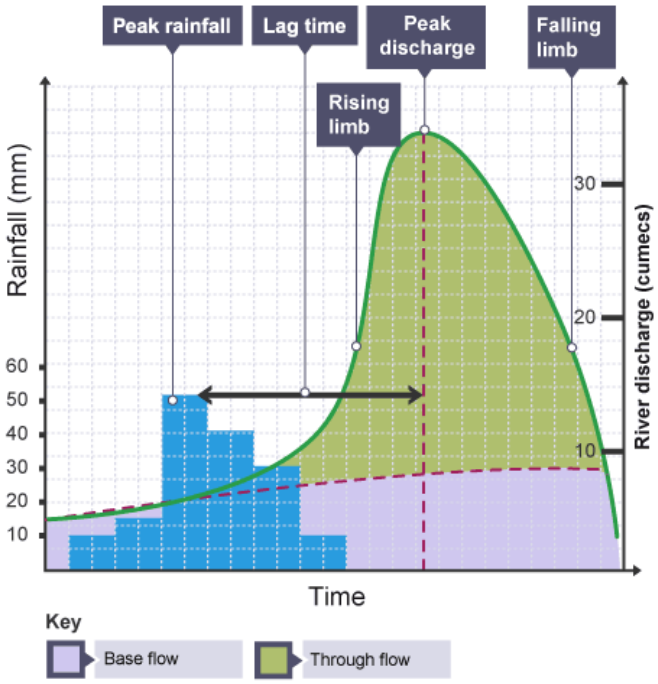
Flooding occurs when a river bursts its banks and overflows onto the surrounding land. There are many factors which can cause a flood - often the natural landscape can influence flooding and also human interactions can increase the risk.

## Causes of flooding

- **Prolonged rainfall** - if it rains for a long time, the land around a river can become saturated (it's holding as much water or moisture as can be absorbed). If there is more rainfall it cannot be soaked up, so it runs along the surface - this is known as surface run-off.
- **Heavy rainfall** - if there is heavy rainfall there is less chance of it being soaked up by the soil (infiltration) so it runs off into the river. The faster the water reaches the river, the more likely it will flood.
- **Relief** - a steep valley is more likely to flood than a flatter valley because the rainfall will run off into the river more quickly.
- **Geology** - permeable rocks allow water to pass through pores and cracks, whereas impermeable rocks do not. If a valley is made up of impermeable rocks, there is a higher chance of flooding as there is an increase in surface run-off.
- **Vegetation** - trees and plants absorb water, this is known as interception. Lots of vegetation reduces flood risk. Sometimes people cut down trees (deforestation). This will increase the flood risk, as the water will not be intercepted and flow into the river.
- **Urban land use** - when an area surrounding a river is built on, there is an increase in the amount of tarmac and concrete, which are impermeable surfaces. Drains and sewers take water directly to the river which increases flood risk.

## Hydrographs

A hydrograph shows how a river responds to a period of rainfall.

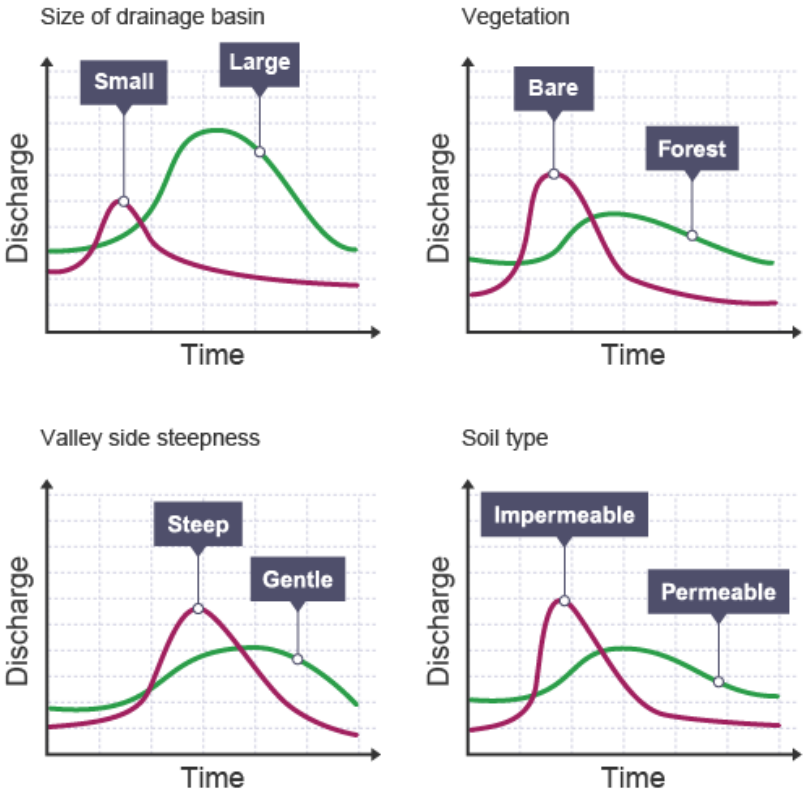


- **Peak** discharge - maximum amount of water held in the channel.
- **Peak rainfall** – maximum amount of rainfall (millimetres).
- **Lag time** - the time taken between peak rainfall and peak discharge.
- **Rising limb** - shows the increase in discharge on a hydrograph.
- **Falling limb** - shows the return of discharge to normal/base flow on a hydrograph.
- **Base flow** - the normal discharge of the river.

The lag time can be short or long depending on different factors. For example, if there is no vegetation in an area, the water runs off into the river quicker, therefore it would have a short lag time. Alternatively, if there is plenty of vegetation in the area, the lag time would be longer as the plants would intercept the rainfall. A short lag time means water is reaching the river quickly, so there is a greater chance of a flood.

**Factors influencing lag time include:**

- Size of drainage basin
- Vegetation
- Valley side steepness
- Soil type



**Activities:**

1. What does the term ‘river flood’ actually mean?
2. Write down three physical (natural) causes that a river may flood
3. Write down three human causes that a river may flood
4. What does a hydrograph show?
5. Write down definitions for the following key terms when looking at a hydrograph:

- Peak discharge
- Peak rainfall
- Rising limb
- Falling limb
- Base flow
- Lag time

6. Explain why vegetation (trees / grass / plants) may impact the lag time
7. Explain why the gradient (steepness of the land) may impact the lag time

**For useful information and revision videos see:**

https://www.bbc.co.uk/bitesize/guides/zg4tfrd/revision/2