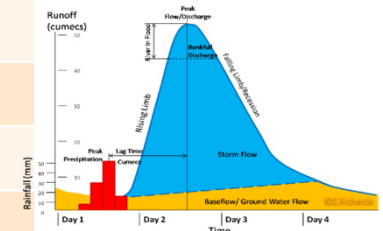


Water Cycle Key Terms		Percolation	Movement of water into the rocks
Precipitation	Moisture falling from clouds as rain, snow or hail.	Vegetation storage	Storage of water in vegetation
Interception	Vegetation prevents water reaching the ground.	Soil moisture	Storage of water in the soil
Surface Runoff	Water flowing over the surface of the land into rivers	Ground water	Storage of water in the rocks
Infiltration	Water absorbed into the soil from the ground.	Evaporation	Turning of water into a gas.
Transpiration	Water lost through leaves of plants.	Surface storage	Storage of water on the surface

Hydrographs and River Discharge

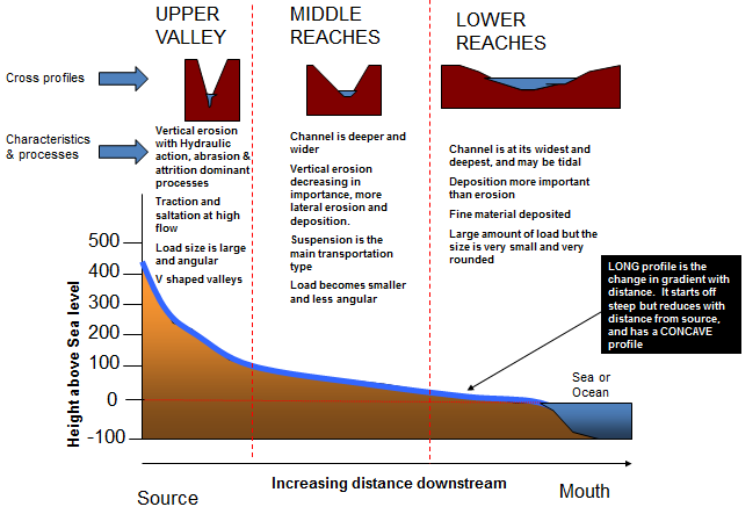
River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.



Physical and Human Causes of Flooding.	
Physical: Prolong & heavy rainfall Long periods of rain causes soil to become saturated leading runoff.	Physical: Geology Impermeable rocks causes surface runoff to increase river discharge.
Physical: Relief Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	Human: Land Use Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

Long and cross profiles on a TYPICAL river



Case Study - Boscastle flood August 16th 2004

Boscastle is a small village in Cornwall. It has a permanent population of under 1000. 90% of jobs in the village are linked to tourism.

Causes of flood - 5 hours of heavy rain (3 inches in 1 hour), Impermeable rock, steep valley sides, thin soils limit vegetation. Buildings narrowing river channel. Narrow bridges trapped debris.

Effects of flood - 100 homes and 25 businesses

damaged. 75 cars and 8 boats washed away. 150 people had to be rescued. Damage cost £15 million. Responses to flood - Scheme cost £4.6 million. Beds of rivers lowered and channels widened. Bridges widened. Car park raised. Trees removed from near river.

River Management Schemes	
Soft Engineering	Hard Engineering
Afforestation – plant trees to soak up rainwater, reduces flood risk. Demountable Flood Barriers put in place when warning raised. Managed Flooding – naturally let areas flood, protect settlements.	Straightening Channel – increases velocity to remove flood water. Artificial Levees – heightens river so flood water is contained. Deepening or widening river to increase capacity for a flood.

Case Study: The River Tees

Location and Background
Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.

Geomorphic Processes
Upper – Features include V-Shaped valley, rapids and waterfalls. Highforce Waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed.
Middle – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.

River Landscapes knowledge organiser.

Types of Erosion	
The break down and transport of rocks – smooth, round and sorted.	
Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart or scraped against the banks and bed of a river.
Hydraulic Action	Water enters cracks in the cliff, or river bank, air compresses, causing the crack to expand.

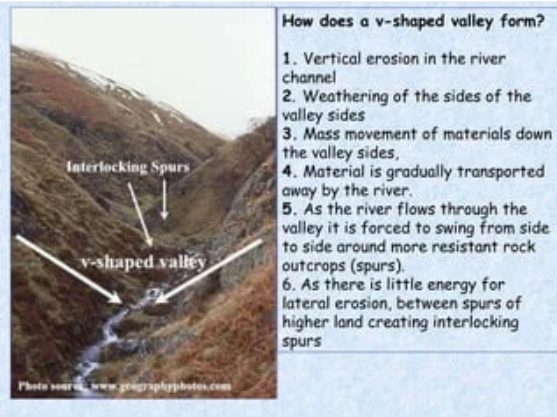
Types of Transportation	
A natural process by which eroded material is carried/transported.	
Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

Deposition	
This is when the river drops the sediment it is transporting, this happens when the river slows down, this can happen for a few reasons -	
Changes in the volume of water	
The amount of transported material increases	
The water gets shallower (eg the inside of a meander)	
The river hits a stagnant body of water (eg the sea at its mouth)	

River Landforms

Upper course

V shape valley and interlocking spurs

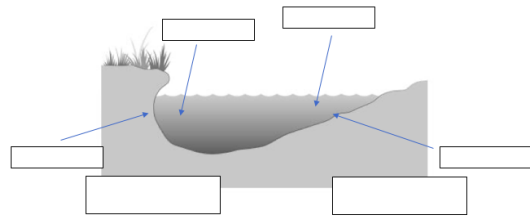


How does a v-shaped valley form?

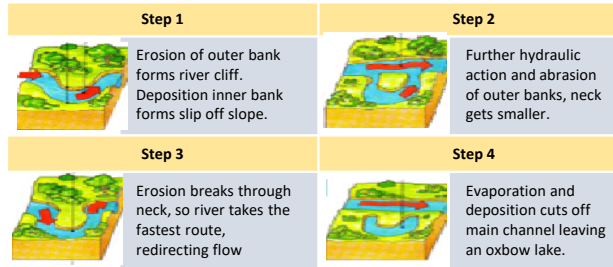
1. Vertical erosion in the river channel
2. Weathering of the sides of the valley sides
3. Mass movement of materials down the valley sides.
4. Material is gradually transported away by the river.
5. As the river flows through the valley it is forced to swing from side to side around more resistant rock outcrops (spurs).
6. As there is little energy for lateral erosion, between spurs of higher land creating interlocking spurs

Middle/lower course

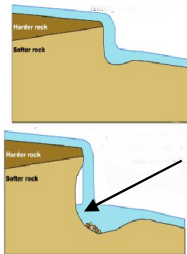
Cross section of a meander



Formation of Ox-bow Lakes



Formation of a Waterfall



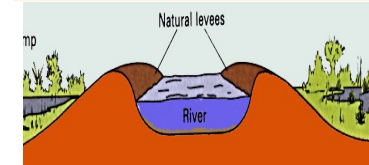
- 1) River flows over alternative types of rocks.
- 2) River erodes soft rock faster creating a step.
- 3) Further hydraulic action and abrasion form a plunge pool beneath.
- 4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
- 5) Waterfall retreats leaving steep sided gorge.

Lower course

Formation of Floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.

- ✓ Nutrient rich soil makes it ideal for farming.
- ✓ Flat land for building houses.



Estuary

They are found at the mouth where the river meets the sea. Sediment being transported down the river is deposited at the mouth as it meets the sea.

In particular during high tide when the river will flood the land either side of the channel and deposit a lot of the silt it is transporting

