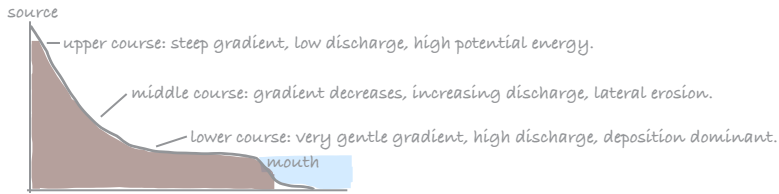


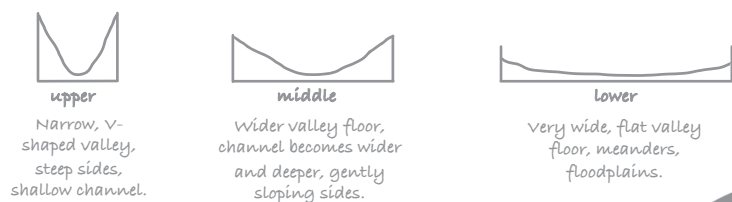
# UK River Landscapes

## 1. River Profiles

**Long profile** Describes the gradient of a river from source (steep) to mouth (gentle).



**Cross profile** The river's cross-section at a particular point. The channel cross-profile includes only the river itself. The valley cross profile includes the river channel, valley floor, and the valley sides.



## 2. Processes

**Erosion**  
wearing away of land by a river.

**Abrasion:** sediment scrapes against bed and banks.

**Attrition:** sediment particles knock into each other, becoming smaller/rounded.

**Hydraulic action:** water enters cracks, air compressed, rock breaks apart.

**Solution:** soluble minerals dissolve in river water.

**Transportation**  
The process by which a river carries its load.

**Traction:** large boulders rolled along the riverbed.

**Saltation:** smaller pebbles "bounced" along.

**Suspension:** fine sediment carried in the water column.

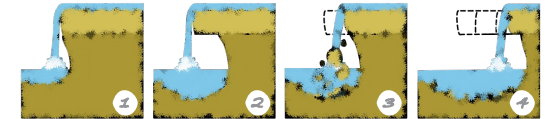
**Solution:** dissolved materials carried invisibly in water.

**Deposition**  
The process by which a river drops its load.

Occurs when a river loses energy (e.g., shallower water, decrease in velocity, or during low flow), e.g. during flooding, at the base of a waterfall, the inside of a meander, and at the mouth where it meets another body of water.

## 3. Landforms of Erosion

**Waterfalls and gorges**



1. Occur where hard rock overlies softer rock.
2. Undercutting of softer rock by hydraulic action and abrasion.
3. Undercutting leads to collapse of cap of more resistant rock.
4. Waterfall retreats upstream leaving a gorge.

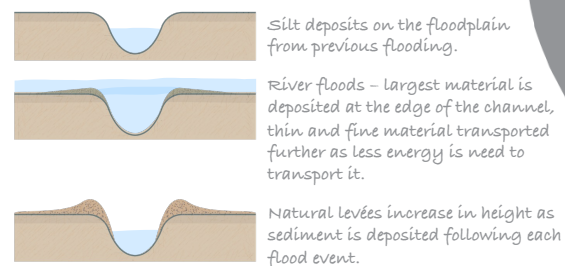
**Interlocking spurs**



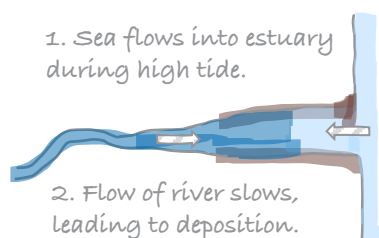
Projecting ridges of high land that alternate from each valley side where the river winds around more resistant rock in the upper course.

## 5. Depositional Landforms

**Levées:** Naturally raised riverbanks formed by coarse sediment deposited close to the channel edge during floods.



**Estuary:** A wide, sheltered body of water found at a river's mouth, where it broadens into the sea.



**Flood plain:** Flood plains are associated with rivers in their middle and lower course. They are extensive, flat areas of land covered mainly by grass. Flood plains are formed during flood conditions.

The width of the flood plain is due to meander migration. The outside bends erode laterally into the edge of the valley. Their position slowly moves downstream.

## 4. Landforms of erosion and deposition



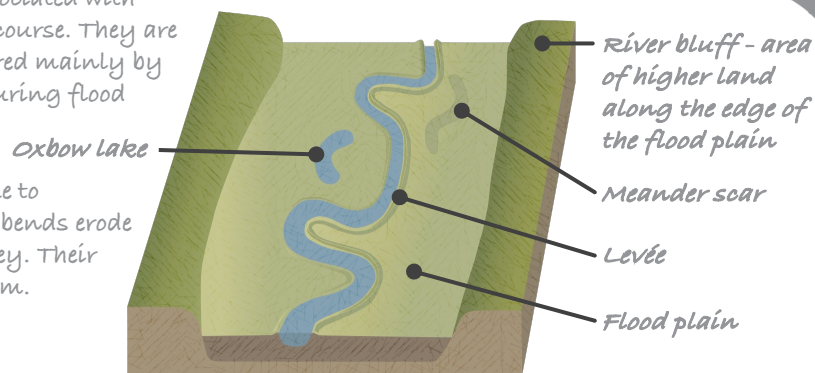
The river flows through alternating pools and riffles creating variations in velocity that begin to direct the river's flow side to side, initiating a bend.

The bend becomes more pronounced because ongoing outer bend erosion and inner bend deposition create a deeper curve.

Continued erosion (hydraulic action and abrasion) on the outer banks narrows the meander's neck, bringing opposite bends closer together.

In a high flow or flood event, the river may cut through the narrow neck, forming a new, straighter channel.

Deposition seals off the old loop, leaving an oxbow lake isolated from the main river.



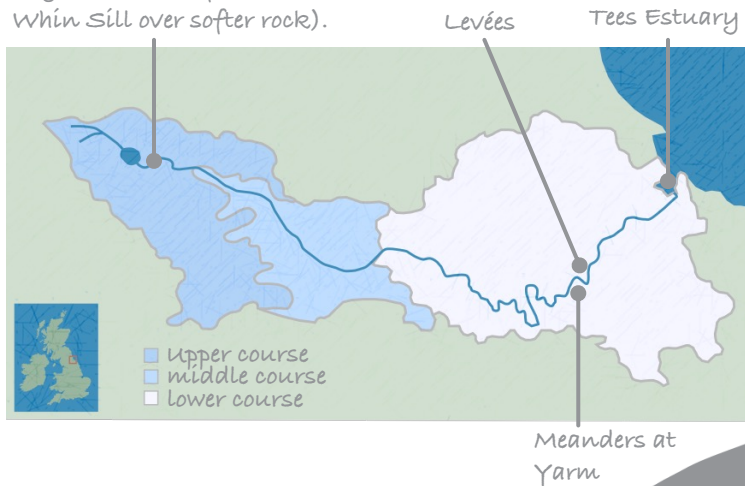
Notes

Quizzes

# 6. UK River Valley

**TEES** Northeast England | 137 km (85 miles)  
 The River Tees flows east from its source in the Pennines to its mouth on the North Sea coast.

High Force waterfall (hard Whin Sill over softer rock).



# UK River Landscapes

## 7. Flood Risk

An increase in discharge causes river levels to increase. Flooding occurs when the bank full capacity of a river is exceeded (water spills over the banks of the river). Human and physical factors cause flooding.

### Physical Factors

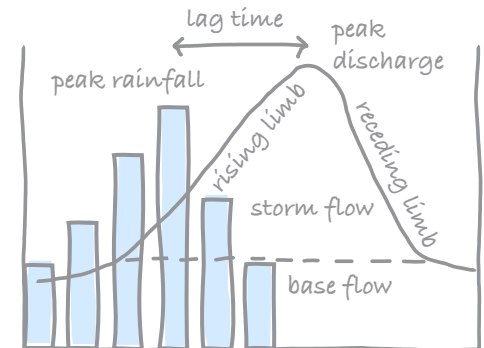
- Heavy rainfall, prolonged rainfall (saturated ground), snowmelt, geology (impermeable rock), relief (steep slopes increase run-off).

### Human Factors

- urbanisation (impermeable surfaces), deforestation (less interception), agriculture (reduced vegetation cover).

## 8. Hydrographs

**Hydrograph** A graph which shows the discharge of a river, related to rainfall, over a period of time.



**Flashy hydrographs** have a steep rising limb and a small lag time. This indicates that river discharge increases rapidly over a short period, indicating rainwater reaches the river very quickly. This means the river is more likely to flood.

A **gentle hydrograph** shows the river is at low risk of flooding. These types of hydrographs have a gentle rising limb and a long lag time, which means it takes longer for the peak rainfall to reach the river channel, so the river discharge is increasing slowly.

Factors affecting the shape of a hydrograph:

- Basin shape
- Slope
- Land use
- Soil type
- Vegetation.

## 10. Soft Engineering

**Floodplain zoning:** Controls what can be built on floodplains to reduce damage.

- ✓ Low cost, reduces future damage.
- ✗ Restricts land use, may not be an option in existing urban areas.

**Planting trees (afforestation):** Increases interception, reduces surface runoff.

- ✓ Improves environment, reduces flood risk.
- ✗ Takes time for trees to mature.

**River restoration:** Allows river to return to natural state (re-meandering, removing hard defences)

- ✓ creates habitats, aesthetically pleasing, can slow flow.
- ✗ Can conflict with existing land use, initial costs.

## 9. Hard Engineering

**Hard engineering** involves the building of entirely artificial structures using various materials such as rock, concrete and steel to reduce, disrupt or stop the impact of river processes.

Strategies	Advantages	Disadvantages
Dams and reservoirs	Store water, can generate hydroelectric power, controls flow.	Expensive, displaces people, can affect ecosystems downstream.
Channel straightening	Speeds flow away from flood-prone areas.	Can increase flooding downstream, expensive, unnatural.
Embankments	Increases channel capacity.	Risk of severe flooding if they fail.
Flood-relief channels	Diverts water away from high-value areas.	Expensive, requires significant maintenance.

## 11. Flood Management


**Jubilee River Flood Relief Channel** | River Thames | Funded by the EA - £330 million  
 The Jubilee River is a flood relief channel. It was constructed to reduce the risk of flooding high-value areas such as Windsor and Eton by diverting water from the River Thames.


### Management strategy:

- An 11.7 km artificial channel diverts excess water from the Thames.
- Designed to reduce flood risk for vulnerable communities.

### Issues:

- **Social:** Protects thousands of homes but raises fairness concerns for downstream areas.
- **Economic:** High construction and maintenance costs (~£110 million), though can reduce insurance premiums.
- **Environmental:** Blends natural features but alters river habitats downstream.

 **Notes**

 **Quizzes**