Rivers Knowledge Organiser

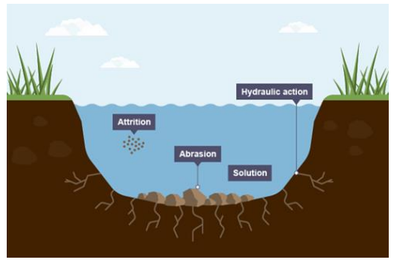
Physical Processes

Different processes act to change the river landscape

Weathering is the breakdown and decay of rock by natural processes. Types of weathering:

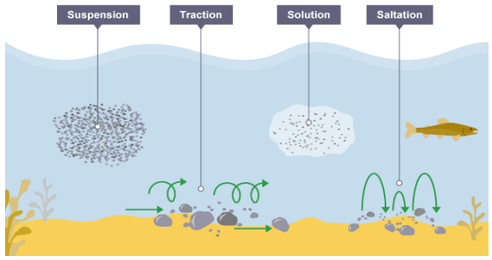
- Freeze thaw
- Acid rain
- Biological weathering

Erosion involves the action of water wearing away the rocks and soils on the bottom and sides of the river.



Mass movement is the movement of rocks and soil downslope due to gravity, helped by weaker rocks, steep slopes and heavy rainfall. It includes: soil creep, sliding and flows.

Transportation- A River picks up and carries material as it flows downstream. Types of transportation:



Deposition- When a river no longer has enough energy to carry its load, deposition occurs. The heaviest materials are deposited (dropped) first.

River Profile:

A river's long profile shows the height and distance downstream from the river's source to its mouth. There are three main stages of the river: upper course, middle course and lower course.

Flooding

Causes of flooding:

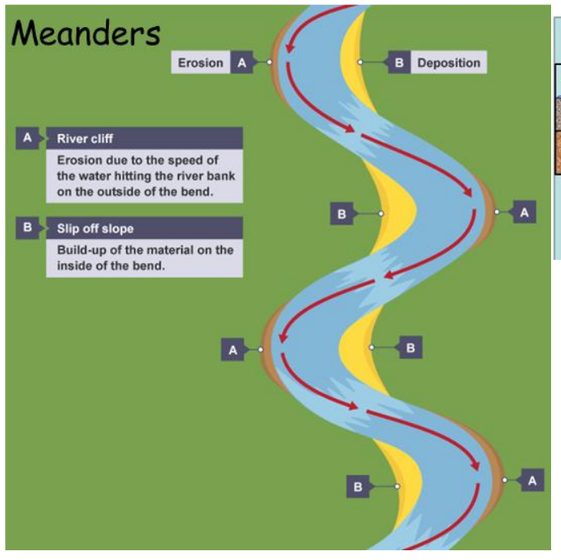
Physical:	Human:
- Rainfall intensity - Rainfall duration - Geology (type of rock) - Snow melt	- Deforestation - Urbanisation

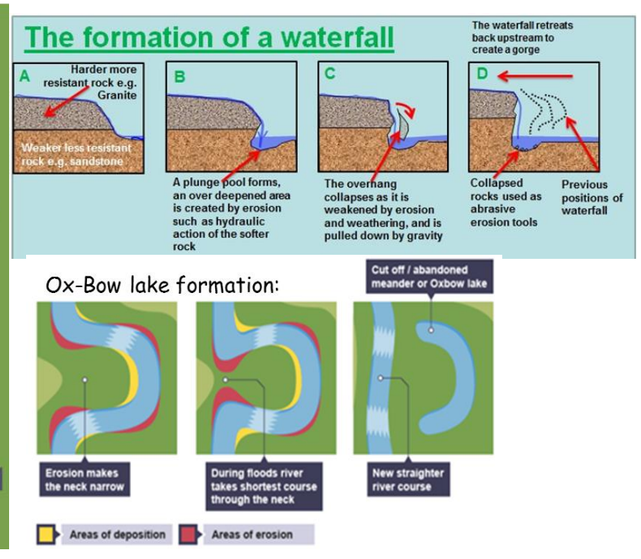
The flood risk in the UK is likely to increase in the future. The main causes are changes to land use, an increasing population and climate change. For example: In December 2013 and January 2014, the UK experienced the wettest two month period of rainfall since 1910.

Hard Engineering:	Advantages	Disadvantages
Channelisation	This allows more water to run through the channel more quickly, taking it away from places at risk.	Water taken downstream may put other places at risk.
Dams	They are long lasting and can be used to produce HEP and provide a local water supply	They are expensive to build and can cause the displacement of people (the Three Gorges Dam)
Embankments	They stop water from spreading into areas where it could cause problems such as housing	They can burst under pressure.

Soft Engineering:	Advantages	Disadvantages
Washlands	These give a safe place for flood water to go and helps slow the water down	Allowing land to flood may limit the use of land
Flood plain zoning	Flood risk management aims to prevent building homes in at risk areas. Flooding is less costly.	The land has limited use.

Landforms





Waterfalls can be found in the upper course of the river where the river is eroding vertically (downwards), with the gradient being steep and the channel being narrow.

Meanders and ox-bow lakes are landforms created by the interaction of deposition and erosion processes in the middle and lower course of a river.

Case Studies:

River Dee:

Location: The source of the River Dee is in Dduallt, Snowdonia in North Wales
River Features: upland landscape formed of igneous and metamorphic rocks, meanders, wide flood plain **Human factors causing change**:

- 1732-1736- Channelisation of 8km improved navigation, increasing discharge and velocity and creating an artificial landscape
- Under the River Dee regulation scheme a series of reservoirs was built e.g. Llyn Celyn
- Earth embankments were built along the middle course to protect agricultural land and properties.

Physical factors causing change:

- Flood plain landscapes near Holt has high deposition and erosion causing meanders to form
- If sea levels rise by 1m by the year 2100, coastal landscapes will replace salt-and freshwater marsh landscapes

Tewkesbury Flooding (2007):

Cause: Heavy rainfall caused the rivers Severn and Avon to flood
Impacts:

- 48,000 homes affected which cost between £20,000- £30,000 to repair each of them.
- For the local council's economy the flood cost £140,000
- British economy- £3.2 billion
- Many schools and businesses were closed

Rivers Knowledge Organiser

Physical Processes- Key words

Weathering- the breakdown and decay of rock by natural processes

- Freeze-Thaw- The process of rocks breaking up from repeated freezing and thawing
- Acid Rain – when acidic rain falls on rain, the acid reacts with weak minerals causing them to dissolve or decay
- Biological weathering- When the roots of plants, especially trees can grow into rocks and crack them.

Erosion- The wearing away and removal of material by a moving force

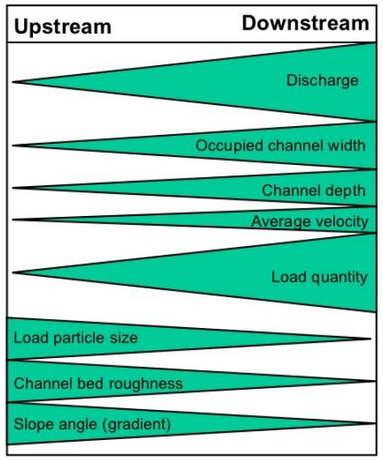
- Hydraulic action- This results from the sheer force of moving water wearing away the river bed and banks
- Attrition – Particles carried by rivers are worn down as they collide with each other causing them to become smaller
- Abrasion- Caused by rivers picking up sediments and rubbing them against rocks in the bed of the river
- Solution- The process where some rock minerals slowly dissolve in water which is slightly acidic

Transportation- The movement of sediment by rivers

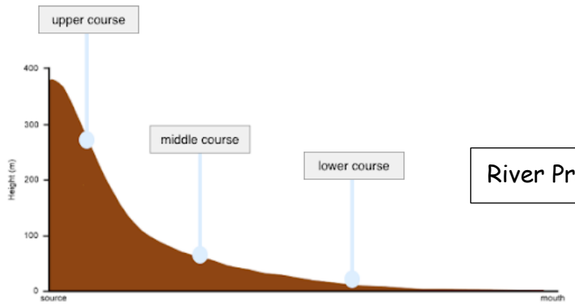
- Traction- The transport of sediment along a river bed by a rolling motion
- Suspension- Silt and clay sized particles are carried within the water flow
- Saltation- Sand sized particles bounce along the bed in a 'leap-frog' movement
- Traction- Rolling stones along the bed (this needs lots of energy)

Deposition- When a river no longer has enough energy to carry its load it drops it.

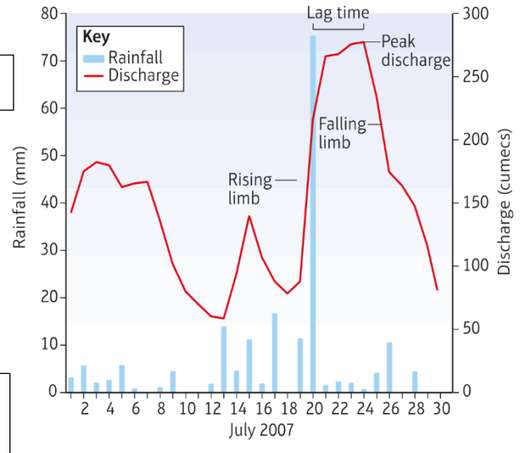
Bradshaw model:



River Profile



Flood Hydrograph:



Flooding- Key words

- Flooding- The covering or submerging of a normally dry area of land with a large amount of water
- Permeable – Rocks that allow water to pass through them e.g. chalk
- Impermeable – Rocks that do not allow water to pass through them e.g. clay
- Geology- The different types of rock that make up an area
- Deforestation- cutting down trees
- Urbanisation- The increase in the percentage of people living in towns and cities, causing them to grow
- Flood hydrograph- Shows how a river responds to a storm event
- Rising limb- the rapid rise in water after a period of heavy rainfall
- Lag time- the difference between the time of the heaviest rainfall and the point at which the river contains the largest amount of water
- Falling limb- the reduction in the amount of rainfall reaching the channel
- Hard Engineering- Strategies using artificial structure (e.g. concrete) to prevent river flooding
- Embankments- high banks built on or near the riverbanks
- Channelisation- this involves deepening and/or straightening the river
- Flood relief channels- extra channels can be built next to rivers or leading from them
- Dams- barriers constructed to hold back water in artificial lakes
- Soft engineering- flood defences that work with natural processes to reduce the risk and impact of river flooding
- Washlands- areas on the flood plain that are allowed to flood
- Flood-plain zoning- governments allocate area of land to different uses, according to their level of flood risk

Landforms- Key words

- Interlocking spurs- An area of higher land jutting out of steep valley sides in a rivers upper course
- Waterfalls- Water pouring downwards from a height, formed when a river flows over a steep incline.
- Floodplains- The flat land in the valley floor each side of a river channel (which is prone to flooding)
- Levees- A raised bank of sediment along the side of a river
- Meanders – A curve in the river caused by erosion and deposition
- Point bar- sediment laid down on the inside of a meander bend where the river flows slowly
- Ox-Bow Lakes- A curved lake formed next to the river because of a meander.
- Tributary- where two smaller rivers flow into one
- V-Shaped Valley- a valley with a V shaped cross section formed by river erosion

Stages of the river- Key words

- Gradient – The steepness of a river
- Discharge – The volume of water flowing in a river
- Velocity- The speed at which the river flows
- Bradshaw model- A geographic model which shows what 'should' happen in the different stages of the river.