

# RIVERS REVISION

**Erosion – When the river BREAKS AWAY material on the bed and banks.**

- **Abrasion** – the material carried by the river wears away the bed and banks.
- **Hydraulic action** – the power of the water forces air into gaps in the banks and weakens them so they eventually collapse.
- **Attrition** – the particles carried by the river (its 'load') are bashed against one another, making them smaller and rounder.
- **Solution** – particles are dissolved.

**River Transport - When the river MOVES the material**

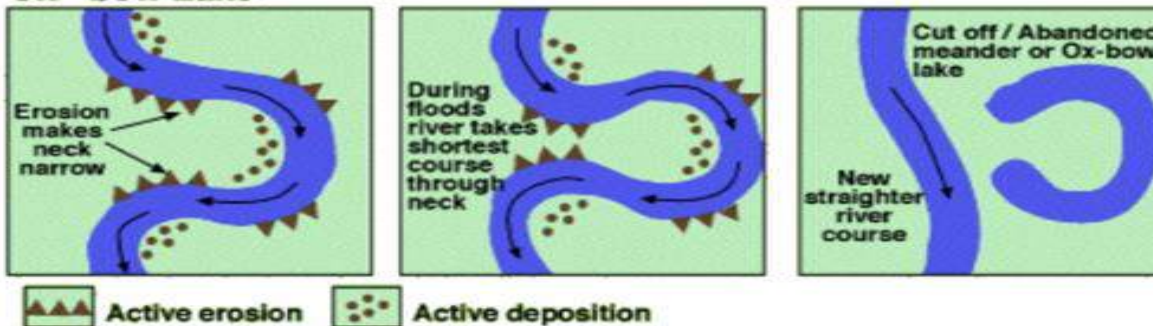
- Traction – rolling large stones along the bed of the river.
- Saltation – bouncing smaller particles along the bed.
- Suspension – sediment that floats within the river flow.
- Solution - minerals are dissolved in the water and carried along in

**Deposition – when the river DROPS the load that it is carrying**

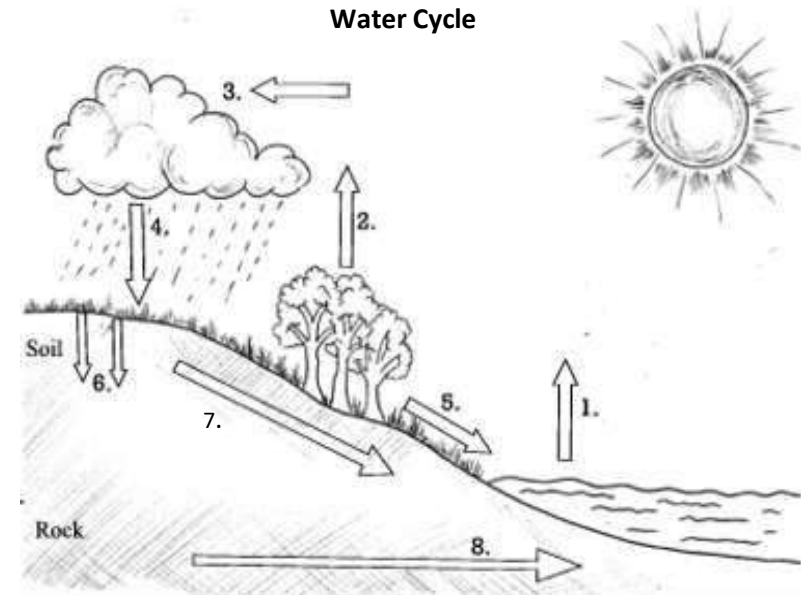
## How is a waterfall formed?

A waterfall is formed when there is hard rock over soft rock. The water falls into a plunge pool. The water erodes (breaks away) the soft rock faster than the hard rock, undercutting it. This leaves an overhang of hard rock. Due to gravity the hard rock eventually falls off into the plunge pool below. The process then repeats itself.

## Ox-bow Lake

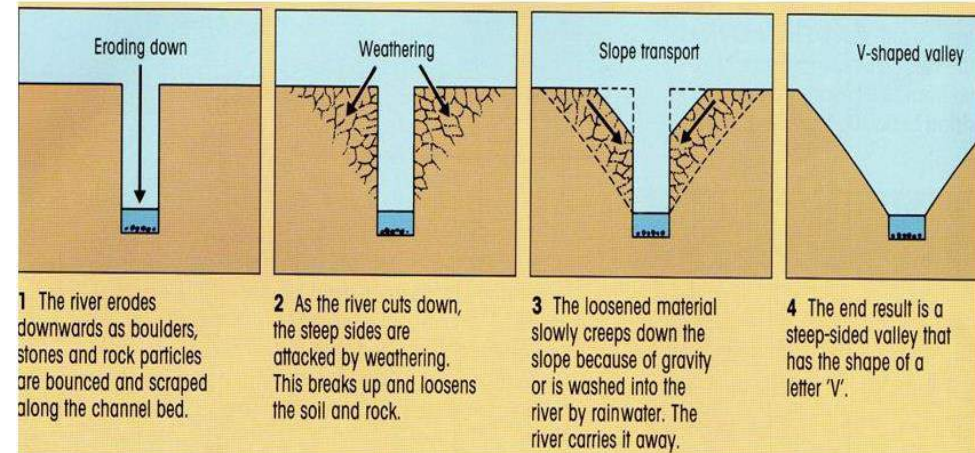


## Water Cycle

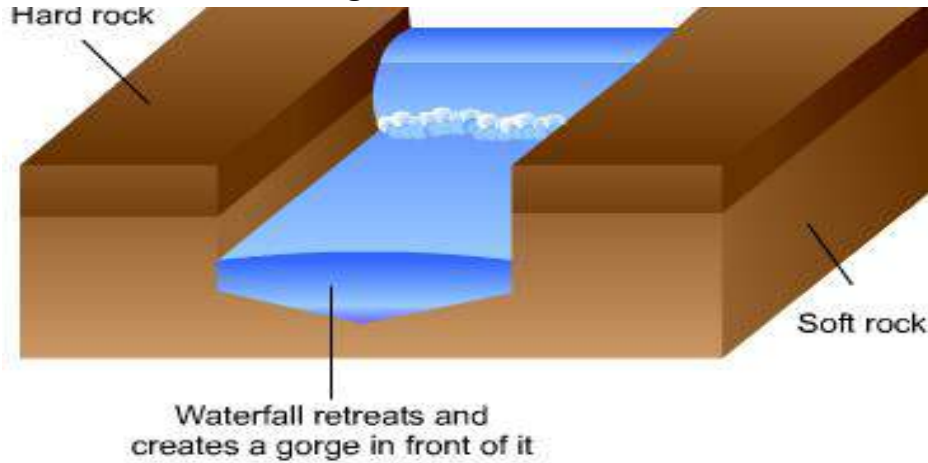


- 1 = Evaporation (When the sun heats the water and turns it into water vapour)
- 2 = Evapotranspiration (When water is evaporated from the leaves of plants)
- 3 = Condensation (When water vapour cools and turns into liquid)
- 4 = Precipitation (When water falls from clouds as rain, snow, sleet or hail)
- 5 = Surface Run off (When water flows over the surface of the land)
- 6 = Infiltration (When water sinks into the soil)
- 7 = Through flow – movement of water in the soil
- 8 = Ground water Flow (when water flows underground back towards the sea)

## V Shaped Valley Formation



## Gorge formation



## Causes of flooding

- **A steep-sided channel** - a river channel surrounded by steep slopes causes fast surface run-off.
- A drainage basin, consisting of mainly **impermeable rock** - this will mean that water cannot percolate through the rock layer, and so will run faster over the surface.
- A **drainage basin in an urban** area - these consist largely of impermeable concrete, which encourages overland flow. Drains and sewers take water quickly and directly to the river channel.
- **A lack of vegetation or woodland** - trees and plants intercept precipitation (ie they catch or drink water).
- **Very wet soil** – soil that is already saturated allows water to build up on the surface
- **Very dry soil** – this prevents water from sinking in

Floods can cause **damage to homes and possessions** as well as **disruption to communications**. However, flooding can also have **positive impacts** on an area. Flooding deposits fine silt (alluvium) onto the floodplain, making it very fertile and excellent for agriculture. People living on or near floodplains may rely upon regular flooding to help support their farming and therefore provide food

## Rivers revision

[http://www.bbc.co.uk/schools/gcsebitesize/geography/water\\_rivers/river\\_flooding\\_management\\_rev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_flooding_management_rev1.shtml)

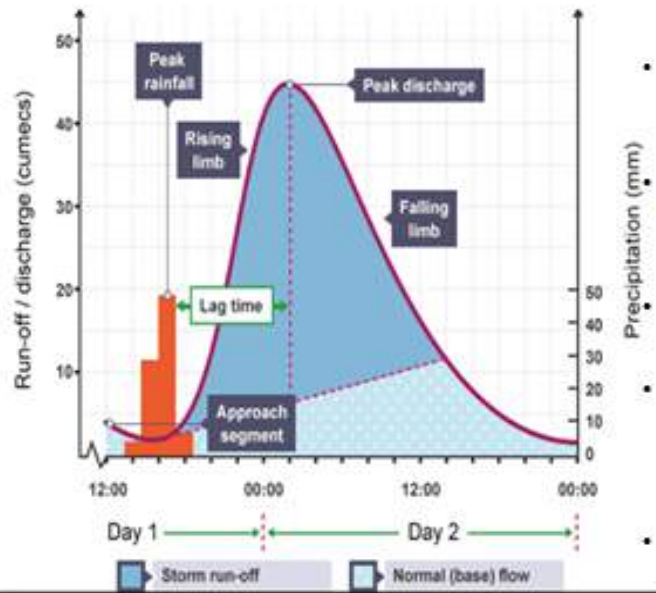
## Flood management techniques

<b>River engineering</b>	<ul style="list-style-type: none"> <li>• The river channel may be widened or deepened allowing it to carry more water.</li> </ul>	<ul style="list-style-type: none"> <li>• Altering the river channel may lead to a greater risk of flooding downstream, as the water is carried there faster</li> </ul>
<b>Afforestation</b>	<ul style="list-style-type: none"> <li>• Trees are planted near to the river. This means greater interception of rainwater and lower river discharge.</li> <li>• This is a relatively low cost option, which enhances the environmental quality of the drainage basin.</li> </ul>	<ul style="list-style-type: none"> <li>• Trees take a long time to grow</li> <li>• Will need a lot of trees to be effective</li> </ul>
<b>Dams</b>	<ul style="list-style-type: none"> <li>• Water is held back by the dam and released in a controlled way. This controls flooding.</li> <li>• Water is usually stored in a reservoir behind the dam. This water can then be used to generate hydroelectric power or for recreation purposes</li> </ul>	<ul style="list-style-type: none"> <li>• Building a dam can be very expensive.</li> <li>• Sediment is often trapped behind the wall of the dam, leading to erosion further downstream.</li> <li>• Settlements and agricultural land may be lost when the river valley is flooded to form a reservoir</li> </ul>
<b>Managed Flooding</b>	<ul style="list-style-type: none"> <li>• The river is allowed to flood naturally in places, to prevent flooding in other areas - for example, near settlements.</li> </ul>	<ul style="list-style-type: none"> <li>• Some land may be wasted and not used effectively</li> <li>•</li> </ul>
<b>Land use zoning for flood plains</b>	<ul style="list-style-type: none"> <li>• This reduces the chance of flooding and the risk of damage to property.</li> </ul>	<ul style="list-style-type: none"> <li>• There can be resistance to development restrictions in areas where there is a shortage of housing.</li> <li>• Enforcing planning regulations and controls may be harder in LEDCs.</li> </ul>



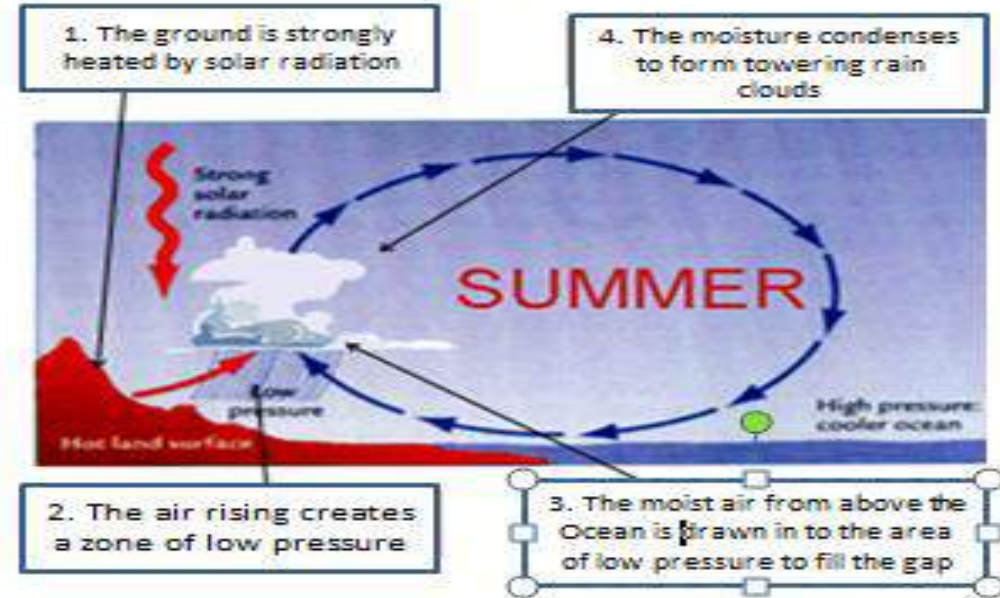
# What is a flood hydrograph?

A flood hydrograph shows the discharge of a river over the period of a flood.



- Peak rainfall = highest amount of rainfall
- Discharge = The amount of water passing through a gauging station on a river (measured in cumecs)
- Lag time = The gap between the time of peak rainfall and peak discharge.
- Peak Discharge = The highest river level.
- The rising limb = rapid increase in river level resulting from rainfall causing surface runoff and then later through flow.
- The falling limb = is when discharge decreases and the river's level falls.

## Monsoons causes



## Stakeholder views on dredging.

- Rivers should be allowed to flood naturally. Nature needs to come before economics and people.
- People object to paying more tax due to the cost of dredging programmes.
- It is a waste of money because climate change could create more issues anyway.
- Dredging has a negative impact on habitats and fish are severely disturbed.

## Causes of flooding at Boscastle 16th August 2004

- One month's rain fell in two hours
- Boscastle is surrounded by steep sided valleys
- Two rivers join at Boscastle
- Bridges
- Trees and vegetation had been cleared from the valley
- Small drainage basin

## Short term responses

- Debris and silt was cleared from buildings (1850 tonnes in total)
- Rescue helicopters sent in and saved 150 people.
- People worked together to clear the destruction.
- People were put up in temporary accommodation.
- Sand bags put down.
- People donated money to the red-cross appeal.

## Long term responses

- The relief channel for the river Jordan was made wider.
- River banks and flood walls were raised.
- Height of the bridge raised.
- Damaged roads and bridges restored.

## Stakeholder views on dredging.

- Dredging will make the rivers 90% more effective at flushing out the water.
- Dredging programmes will create more jobs

## The concept of annual regime. River regime

- The variability in its discharge throughout the course of a year in response to precipitation, temperature, evapotranspiration and drainage basin characteristics.