

## HYDROLOGICAL CYCLE



# Rivers

## RIVER PROCESSES

**EROSION** where rocks are worn away and the land changes shape.

**TRANSPORTATION** where eroded material is carried by the river downstream.

**DEPOSITION** where transported material is dropped when the river loses energy, such as when it enters the sea.

## DRAINAGE BASIN

**SOURCE**  
The origin of the river

**CONFLUENCE**  
The point at which two rivers meet.

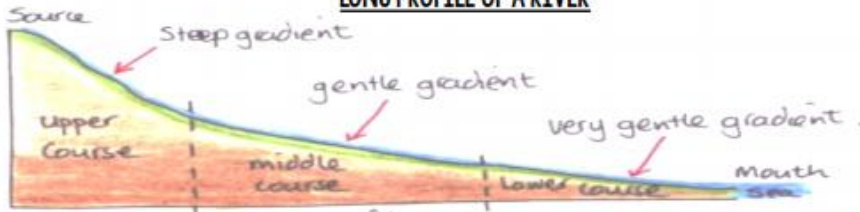
**TRIBUTARY**  
Smaller streams/ rivers that flow into a larger one.



**FLOODPLAIN**  
Flat land along the river that is prone to flooding.

**MOUTH**  
The end where the river meets the sea.

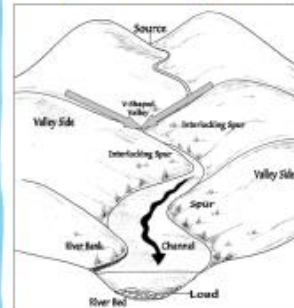
## LONG PROFILE OF A RIVER



## THE UPPER COURSE

### FEATURES

Steep-sided V-shaped valleys, interlocking spurs, rapids, waterfalls and gorges.



When a river is near its source, it often develops a V-shaped valley as the river erodes down (this is called **vertical erosion**).

At the same time, weathering breaks up material on the valley slopes. Weathered material from the valley sides gets deposited in the river.

## THE MIDDLE COURSE

### FEATURES

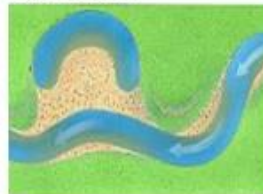
Wider, shallower valleys, meanders, and oxbow lakes

### MEANDERS

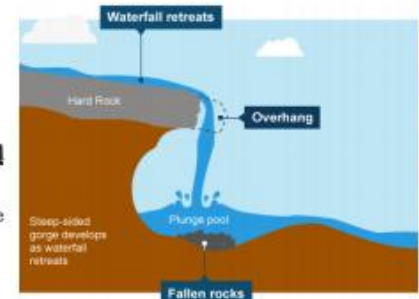


- The formation of meanders is due to both **deposition** and erosion and meanders gradually move downstream.
- The force of the water **erodes** and undercuts the river bank on the outside of the bend where water flow has most energy.
- On the inside of the bend, where the river flow is slower, material 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 the ends join, the loop is cut-off from the main channel.
- The cut-off loop is called an **oxbow lake**.

### OXBOW LAKE



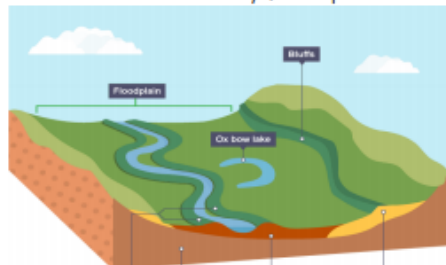
- The soft rock erodes more quickly, **undercutting** the hard rock.
- The hard rock is left **overhanging** and eventually collapses.
- The fallen rocks crash into the **plunge pool**. They swirl around, causing more erosion.
- Over time, this process is **repeated** and the waterfall moves upstream.
- A steep-sided **gorge** is formed as the waterfall retreats.



## THE LOWER COURSE

### FEATURES

Wide flat-bottomed valleys, floodplains and deltas

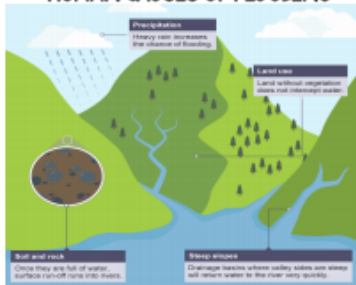


A floodplain is the area around a river that is covered in times of flood. It is a very fertile area. This makes floodplains a good place for agriculture. A build-up of alluvium on the banks of a river can create levees, which raise the riverbank.

## FLOODING

A flood occurs whenever a river overflows its banks (exceeds its 'bankfull' discharge). However, a flood becomes a problem when the water rises to a level where it threatens property and/or life. Rivers usually flood due to a range of physical factors. These physical factors can be divided into **climatic factors** and **drainage basin characteristics**. **Human intervention** can also make flooding worse.

### HUMAN CAUSES OF FLOODING



### PHYSICAL CAUSES OF FLOODING



CAUSE	SOURCE	KEYWORDS	DEPOSITION	WATERSHED
EFFECT	MOUTH	CONFLUENCE	MEANDER	V-SHAPED VALLEY
RESPONSE	LONG PROFILE	WATERFALL	OXBOW LAKE	HYDROLOGICAL CYCLE
DRAINAGE	FLOODPLAIN	EROSION	DELTA	

## BOSCASTLE



### CAUSES

There was a spell of heavy localised rainfall - 89 mm of rain fell in an hour on saturated ground from previous rainfall. Topography of the land. The landscape upstream of Boscastle, a steep-sided valley, acted as a funnel directing vast volumes of water into the village.

### WHAT HAS BEEN DONE?

- £45 million has been spent on a flood defence scheme.
- The scheme incorporates drainage, sewerage systems and land re-grading.
- Boscastle car park has been raised in height, which will stop the river from bursting its banks so easily.
- New drains allow water to run into the lower section of the river quickly.
- The river channel has been made deeper and wider so that it can accommodate more water.

## BANGLADESH



### CAUSES

Much of Bangladesh lies on a floodplain. Over half of the country lies 6m below sea level. There are 3 major rivers: The Ganges, Brahmaputra and Meghna. Meltwater from the Himalayas.

### RESPONSES - SHORT TERM

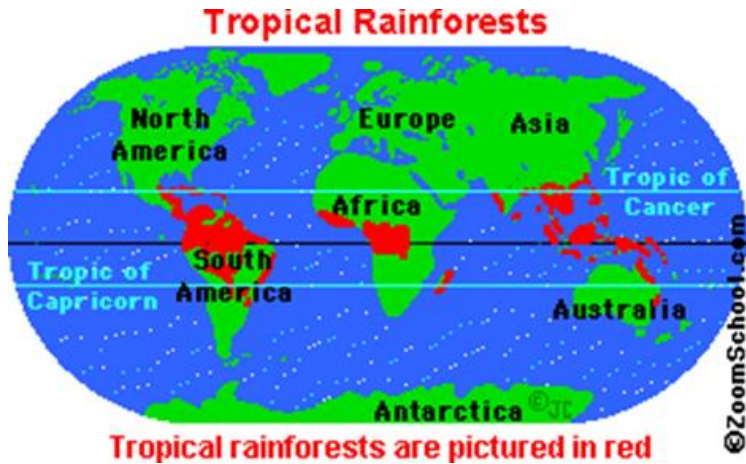
- Food aid from the Government and other countries.
- Water purification tablets.
- People repaired embankments and helped to rescue people.
- Free seed given to farmers.

### RESPONSES - LONG TERM

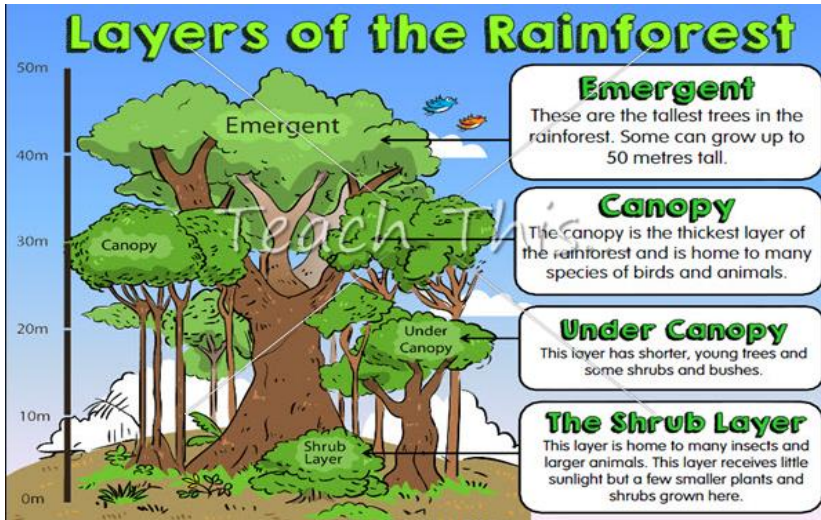
- Introducing flood warning systems.
- Emergency planning.
- Dams planned.
- Reducing deforestation.
- Building embankments.
- Building raised flood shelters.

### D1: Where are Rainforests Located?

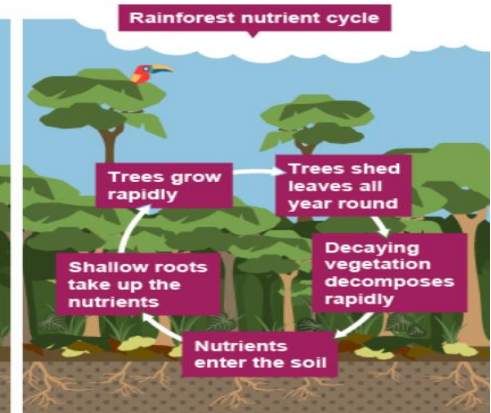
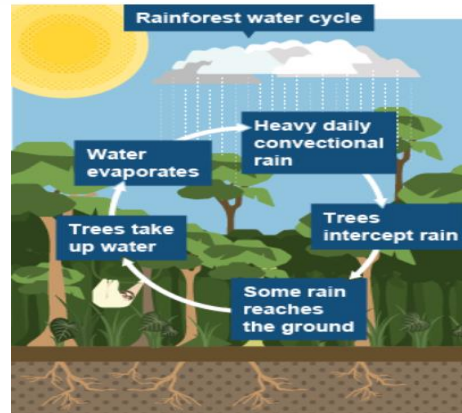
Tropical rainforests are found between the Tropics of Cancer and Capricorn, 23.5° north and south of the **equator**



### D2: Tropical Rainforest - Layers

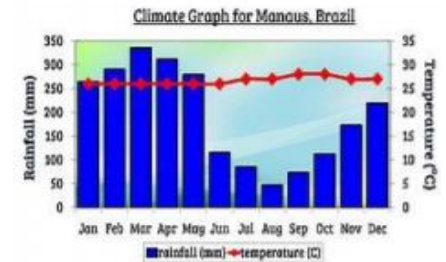


### D3: Water and Nutrient Cycle



### D4: Rainforest Climate

Temperatures are high all year (around 28°C). Rainfall is around 250mm per month



### D5: Plant Adaptations

#### Buttress Roots

Large roots have ridges which create a large surface area that helps to support large trees



#### Liana

These are woody vines that have roots in the ground but climb up the trees to reach the sunlight. Their leaves and flowers grow in the **canopy**.



#### Drip Tips

Plants have leaves with pointy tips. This allows water to run off the leaves quickly without damaging or breaking them.

### D7: Effect of Deforestation in the Amazon

- Fewer plant and animal species – **biodiversity**
- Loss of habitats – places for animals to live
- Loss of sources of medicine
- Soil erosion
- Flooding
- Global warming and rising sea levels



### D6: Causes of Deforestation

#### Commercial Farming



Farming to sell produce for a profit. Cattle and crops. Responsible for 80% of Amazon deforestation. Ruins soil and nutrients

#### Logging

The business of cutting down trees and transporting the logs to sawmills



#### Mineral Extraction

The removal of mineral resources from the earth, for example, gold. Pollutes rivers and air

#### Population



Population growth has resulted in the loss of tropical rainforest as land is cleared to build houses and infrastructure

#### Hydroelectricity

Dams have been built and large areas of rainforest destroyed by flooding



#### Roads



The construction of access roads for farmers, loggers and mines results in large parts of the tropical rainforest being destroyed

### D8: Protecting the Tropical Rainforest

- Selective logging – only some trees cut down
- Replanting trees – called afforestation
- Setting up **National Parks** and **Nature Reserves**
- Encouraging ecotourism
- Education – ensuring those involved in exploitation and management of the forest understand the consequences behind their actions

