

Stages of a River

The Upper Course

The upper course, also known as the **youthful** or **torrent stage**, can be compared to a young person - very active and filled with energy. Valley sides are steep with a **narrow, V-shaped cross-section**. The work of the river is **erosional** in its mountainous course.

Landforms Typical of the Upper Course

- **Waterfalls** - mostly formed as a result of the differences in the hardness of the rocks. Many waterfalls are used to generate **hydroelectric power**, as well as being tourist attractions.
- **Rapids** - occur where there is a sudden change in slope or an outcrop of more resistant rock. Some rapids develop into waterfalls. Faster erosion rates steepen the gradient, speeds up the flow of water and increases turbulence, thus creating rapids.
- **Plunge Pools** - rounded hollows excavated at the base of waterfalls by the falling and swirling action of the water.
- **Interlocking Spurs** - projecting masses or spurs of resistant rock around which the river winds.
- **Gorge** - a narrow, steep-sided rocky valley between hills or mountains.

The Middle Course

The middle course is also known as the **mature stage**. The river continues to erode and deposit, but vertical erosion, which is common in the upper or youthful stage of the river, becomes less pronounced. The V-shaped appearance and the gradient become less steep. This is **lateral erosion**. The river begins to meander. It flows in large loops and bends. **Meanders** develop as **erosion** is concentrated on one side, at the **concave** or **outer bank**, and **deposition** is concentrated on the **convex** or **inner bank** on the opposite side. Steep slopes, called **river cliffs** or **river bluffs**, are formed on the **concave side**, whilst the **convex side** develops into a **slip-off slope** with sand and shingle deposits.

The Lower Course

When a river reaches a flat area as it moves towards the sea, it is in its **lower course** or **old age**. The valley is wider and the sides are gentle. The landscape is characterized by **depositional features**. The river flows sluggishly, and its energy levels are **low**. In this stage, volume of water is **greatest**. The river is joined by many tributaries. Fine material may be transported to the river's mouth. Features such as **oxbow lakes** and **flood plains** begin to develop in the middle course, but they are well developed in the lower course.

Features of the Lower Course

- **Levees** - raised river banks. During floods, sediments or alluvium are deposited on the banks of the river. Over time, the banks are built up and form raised **levees** or **embankments**. The bed of the river is also raised as layers of sediment are deposited. In times of flood, the river may overflow its banks. Then, sediments are deposited over the surrounding area to form a **flood plain**.
- **Flood plain** - the area of low land, surrounding the river, which is subject to flooding. **Levees** are sometimes broken during heavy rains and this results in serious flooding. **Flood plains** provide **good, fertile alluvial soil**, which can be intensively cultivated. Settlements built in flood plains are at risk if the river overflows its banks.
- **Deltas** - may be formed at a river's mouth. It is a low-lying plain of **silt** or **alluvium**, which is fine material eroded, transported, and deposited by the water. **Deltas** develop in **tideless seas** and in **shallow water**, where the sediment deposited by the river, will not be removed by the sea. Deltas grow **seaward**. As it flows across the delta, the river breaks up into smaller channels that diverge from the main river. These channels are called **distributaries**.