

## Introduction

As water moves along the earth, it erodes or carves out pathways on the surface. These pathways form many of our **river** systems—with all of their parts that we know as **tributaries**, **meanders**, and **streams**. As with rocks, rivers have characteristics that help us to unravel more of the mysteries of Earth. The development of a river passes through several stages—young, mature, and old. The physical characteristics of a river are a good gauge to use in determining the age of an area. Understanding the characteristics of our rivers helps us to better understand the topography of our environment.

## Development of Rivers



Most rivers have their **source**, or beginning, in the mountains. Water from rain and melting snow trickles downhill. At first, this water does not have a permanent path or **channel**. Eventually, enough trickles meet to cut a channel and a small *stream* is formed. River systems begin where runoff trickles downhill, following the same path over and over.

As a result of gravity, water moves downhill and gradually cuts a channel. The water flowing in the stream carves a V-shaped valley in the land. As water cuts deeper paths, it moves faster. Small streams meet to form *tributaries* which flow into a main river. The main river

eventually empties into a large body of water, such as a lake or ocean. The place where the river joins a lake or ocean is called its **mouth**.

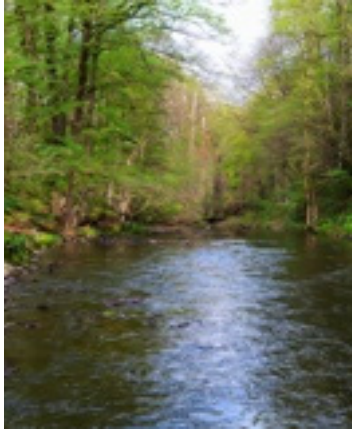
This network of streams and tributaries is called a *drainage system* because it drains an area of its runoff. Many drainage systems have a treelike pattern. Small currents and streams resemble small twigs and branches. Larger tributaries form the main branches, while the main river is the trunk.



All rivers are not the same age. You can tell the approximate age of a river by its characteristics. Some characteristics of a river at different stages are listed below.

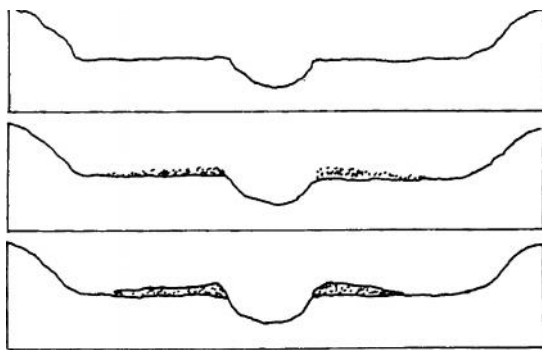
- A young river**
- has a V-shaped valley
  - is usually found in the mountains
  - has very fast flowing water
  - cuts downward, making a deep valley
  - often has rapids and waterfalls
  - erodes the land very quickly
  - carries large particles as it erodes the land
- A mature river**
- has been developing for thousands of years
  - has formed a wider valley
  - has valley walls that are farther from the river
  - no longer has rapids or waterfalls
  - has both slow and fast moving water in different areas
  - has many tributaries
  - develops a flat **floodplain** on both sides of the channel
- An old river**
- has a floodplain several times wider than the channel
  - has a valley floor that is flat and wide (U-shaped)
  - is curved and winding with many loops called meanders
  - has slower waters
  - has a very wide floodplain
  - carries small particles as it erodes the land

## Erosion and Deposition



The fast flow of a young river carries large amounts of soil and rocks. Old rivers, on the other hand, move more slowly and carry smaller particles of soil and rock. The particles of soil and rock that a stream or river carries are called its **load**. Rivers deposit the soil and rock particles, or **deposition**, in new locations. Rivers that carry a lot of soil and rocks appear muddy.

**Deltas** are formed at the mouth of rivers that empty into quiet bodies of water. As the river flows into a lake or an ocean, it slows down. It cannot carry as much material at a slower speed, so it deposits much of the material. The fan-shaped deposition is largely fertile top soil. For this reason, deltas make fertile growing areas. The deposits build up above the river's water level and add land to a coastal area. The delta formed at the mouth of the Mississippi River, for example, extends the area hundreds of kilometers into the Gulf of Mexico. In this region, cotton and rice are grown.



*A river may deposit its load along the riverbank. Over time levees develop.*

When a river's speed slows down, it can no longer carry as much of a load. Some of this material is then deposited on the bottom of the river channel, which is called the **riverbed**. These deposits are called **sediments**. Levees develop when sediments are deposited on the sides of the river or along the **riverbank**.

*Floodplains* are flat areas on both sides of the river. When a flood causes a river to overflow, it deposits sediments on the floodplains. These areas are very fertile and are often used for farming.

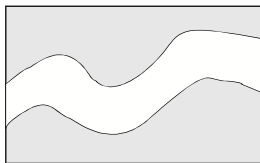


Rivers begin to *meander*, or wander, from side to side across the land. The movement creates curves or loop-like bends in the river known as *meanders*. The river usually erodes or cuts away the bank more when the river curves. The river flows faster on the outside of the curve and cuts away the bank.

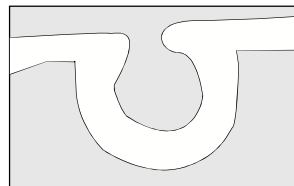
Sediments are deposited on the inside of the curve, where the river flows more slowly.

Sometimes U-shaped bends are formed as the river winds. Erosion and deposition along the bends can eventually cut part of the bend off from the rest of the river. When this happens, small lakes called **oxbow lakes** form. The diagram below shows the formation of an oxbow lake.

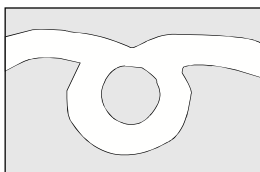
1. meandering river



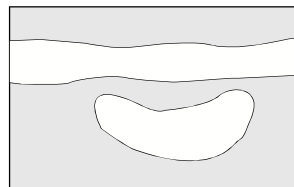
2. U-shaped bend forms



3. sediments deposit



4. lake cut off from river



## Summary

Most rivers are formed as precipitation moves downhill in small streams. The flowing water cuts a channel in the land. Streams flow together to form tributaries, which flow into the main river. At the mouth of the river, the water empties into a larger body of water. The age of a river can be

determined by its physical characteristics. Rivers erode the land over which they flow. As rivers move they pick up soil and rocks and deposit the load in new locations. The deposition of soil and rock in the riverbed is called sediment. Along the riverbank, a levee may be formed from the deposition. At the mouth of the river a delta may build up over time, creating fertile growing areas. Rivers may meander across the land. The erosion and depositions in the river curves may result in an oxbow lake.