

# Rivers Shape Landscapes

## Flowing Water

The moving water of rivers greatly affects the shape of the land. As they flow, rivers carve out and sculpt the land. The flowing water creates valleys and canyons. Have you ever seen pictures of the Grand Canyon? It is the result of millions of years of abrasion and erosion by the Colorado River!



Grand Canyon with Colorado River.

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## Think About It!

Rivers shape the landscape in many ways, but how does a river get its shape? Are all rivers the same? If not, what causes rivers to be different from one another?

Besides making canyons, rivers create **floodplains** and **deltas** as they deposit their sediment in new locations. Usually this takes hundreds, thousands, or millions of years. Most of the rivers you see around you formed many, many years ago. Ever since then they have been shaping the landscape.

### Our Geosphere Fact

The New River flows through West Virginia, Virginia, North Carolina, and Tennessee. It is considered one of the oldest rivers in the world. While it is impossible to determine its exact age, scientists believe the New River may be as old as 300 million years. The New River is actually what remains of a vast, ancient river called the Teays River. It carved the Earth and shaped parts of the eastern United States when dinosaurs roamed the land.

Sometimes heavy rains or rapid snowmelt cause a river to overflow its banks. When an event such as a flood occurs, the landscape may change in a short period of time.

## How Rivers Get Their Shape

How much, and how quickly, the landscape changes when a river takes another course depends on these factors:

- Slope of the land
- Speed of the water
- Hardness of the Earth's surface
- Amount of water

All of these factors can affect the shape of rivers. Let's look at each of these factors in more detail.

### Slope Affects the Speed of Water

**Slope** refers to how steep the land is. The greater the slope, the steeper the land is. The slope of the land affects a river's speed. The greater the slope, the faster a river flows.

#### Word Connection

**slope**—The inclined surface of a hill or mountain.



Steep river.

When a river starts in the mountains, its path is usually very steep, so it flows quickly. Just as you can coast faster when riding a bike down a steep hill, water flows faster when it is on a steep slope. As the slope decreases, so does the speed of the water.

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### Speed of Water Affects a River's Shape

The speed of the water also affects the shape of a river. Often the water may carve deep channels or canyons in the rock. Over many thousands of years, the river can change the shape of the mountains themselves. A V-shaped valley is the result of this type of erosion.



V-shaped valley in Yellowstone National Park, Wyoming.

Faster moving water can carry larger pieces of sediment than slower moving water. As water carries sediment, the sediment bumps and grinds against the riverbed. This abrades the rock in the riverbed and carries it downstream.

As the river reaches level ground, it slows down. It deposits some of its sediment and may no longer flow in a straight path. The river may **meander**, or curve. This further slows the speed of the water, and changes the shape of the landscape.



Meandering river.

By the time a river reaches its **mouth**, its speed may be very slow. It enters the relatively still water of another river, a lake, or the ocean. Then it slows down even more. This causes the river to deposit the rest of its sediment, often creating deltas in the process.

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A delta may take several different shapes. One shape is called a Bird's Foot. This shape forms when the deposited sediment divides the mouth of the river into river **channels**. It takes the shape of a bird's foot. An example is the Mississippi River Delta.



Mississippi River Delta.

Another delta shape is known as a Fan-Shape. This is the most common form of a delta. It usually has the shape of a triangle. An example is the Nile River Delta.



Nile River Delta.

### Hardness of the Earth's Surface Affects a River's Shape

The type of rock in the area where a river flows also affects the shape of a river. Soft rocks, such as sandstone, wear down and erode much more easily than hard rocks, such as granite. If an area is mostly soft rocks, then a river's moving water can wear down and erode the riverbed more quickly than a hard rock riverbed.

### Amount of Water Affects a River's Shape

The amount of water in a river affects the type of sediment it can carry. Sand, silt, and clay can be moved over time with just a small stream of water. These small or fine pieces of sediment are easiest to move.

## Types of Sediment

The following table shows the sizes of sediment and what they are called.

Sediment	Diameter Size	Size Comparison
Boulder	Greater than 256 mm	Bigger than most adults' feet
Cobble	Between 64 mm and 256 mm	Between a baby's foot and an adult's foot
Pebbles	Between 2 mm and 64 mm	Between the head of a nail and a baby's foot
Sand	Between $\frac{1}{16}$ mm and 2 mm	Between the thickness of your fingernail and the head of a nail.
Silt	Between $\frac{1}{256}$ mm and $\frac{1}{16}$ mm	Between the thickness of your fingernail and the head of a nail.
Clay	Less than $\frac{1}{256}$ mm	Smaller than the thickness of a human hair

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Larger pieces of sediment, such as pebbles, require more water and faster-moving water to move them downstream. And large boulders can only be moved by a large amount of water rushing down a steep slope. Floods can also give rivers the power to move large objects — rocks, cars, and even houses!

### Our Geosphere Fact

Waterfalls can form when water erodes and carries away large amounts of rock. Niagara Falls in New York and Canada is the second largest waterfall in the world. It originally formed seven miles downstream from its current location.

Over time, the water continued to erode the rock away. The rubble of rocks that have broken off the top of the waterfall litters the base of the falls. This process continues to change the landscape. The falls can move up to six feet per year. But don't worry—it's taken 12,000 years for the falls to move seven miles!



Niagara Falls.



# Glossary

**channel**

The bed of a stream, river, or other waterway.

**delta**

A landscape at the mouth of a river made by the sand, silt, soil, and rocks deposited by moving water.

**flood**

An overflowing of water onto land; this occurs when there is more water than a river can hold.

**floodplain**

A flat area of land stretching out on either side of a river.

**meander**

To curve, or follow a winding path.

**mouth**

Where a river meets a lake, valley, or ocean.

**slope**

The inclined surface of a hill or mountain.

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