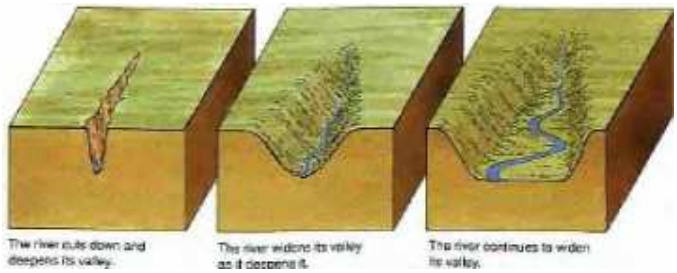
V-shaped valley

Rivers flow through V-shaped valleys in their upper course. V-shaped valleys are usually found in the mountains and hills. They are so called because they often have very steep sides.



V-shaped valleys are formed by erosion. The river carries stones and rocks in its water. The force of the water and the grinding of rocks and stones cut down into the river bed to carve out a valley. Over time the valley becomes deeper and wider.

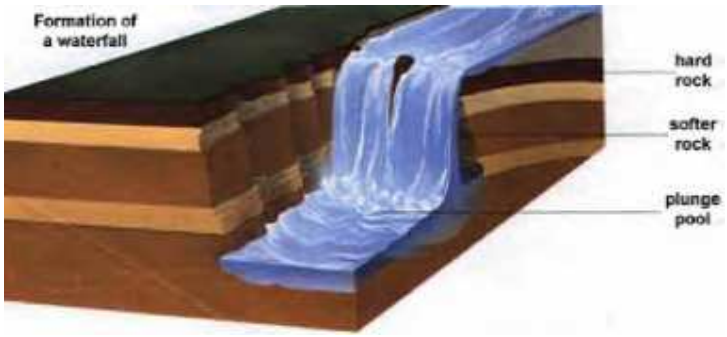
Waterfalls

A waterfall is formed where water flows over a cliff or very steep drop in the river's bed. There are two types of waterfall
1. Cataracts are found where there are many rapids in a large river. A large volume of water flows down these rapids.
2. Cascade waterfalls have a small volume of water. A series of falls may form one waterfall.

Formation

Different rates of erosion

Waterfalls are usually found in the upper course of a river in the hills or mountains. The Dunn's River Falls in Jamaica is the only known waterfall which forms the mouth of a river. Waterfalls form when there is a hard layer of rock covering a soft layer of rock.



Water flows over hard rock. When it reaches the soft rock, the water starts to erode or wear away the soft rock. Over thousands of years, the soft rock is eroded and the river begins to cut down vertically into the rock. This makes a cliff over which the water can topple. Over time, the cliff becomes steeper and deeper and a waterfall is formed. At the bottom of the waterfall a plunge pool is created. Some of the water splashes onto the cliff and makes a large, hollow plunge pool by a process called undercutting.

Source

The source is the start, or beginning, of a river. The source of a river is usually found in the hills or mountains. A river can have more than one source. The source is where a river begins its journey.

Types of source

There are many different ways in which rivers can begin:

Springs. Some rivers begin where water flows out of rocks. Rainwater sinks through the soil and trickles through the cracks and spaces in rocks such as chalk and limestone. These are called permeable rocks. The water continues to do this until it reaches a rock like clay. Clay is an impermeable rock.

The water gradually builds up between the boundary of impermeable and permeable rocks. Eventually, it trickles out of the rocks.

The source of the River Len is a spring.

Rills and streams. A lot of rain falls on mountains. Rainwater flows down slopes and quickly makes channels. At first the channels are small. They are called rills. These join together to make bigger rills. Finally a stream is formed. The streams join up to make a river.

Lakes. The source of some rivers is a lake. The source of the River Nile is Lake Victoria, in Burundi.

Melting snow and ice. Water from a melting glacier may be the source of a river. The snow and ice melt when the weather gets warmer. This forms a lake in front of the glacier. The water rushes into channels in the V-Shaped valley and eventually forms a river.

Bogs. In some places, rain water can't sink into the ground as the ground is too wet already. The water forms a bog. The soil and plants nearby soak up the water. The water flows out of the bog to form lakes and streams.

Gorge

A gorge is a steep-sided river valley which is very narrow and deep. Most gorges have rocky sides. The river cuts this deep valley by erosion. Gorges are created over thousands of years.

Famous gorges

The Grand Canyon is the best known of all the gorges in the world. It was created by erosion from the Colorado River over thousands of years. The Grand Canyon is 350 kilometers long. It is 1.6 kilometers deep in places, and as much as 25 kilometers wide. The rocky sides drop very steeply.

The Colorado River is very fast flowing, so has plenty of energy for erosion. Often the Colorado River has a reddish colour. This is caused by eroded pieces of rock which are carried in the water.

The Colorado River traveling through part of the Grand Canyon.

Plunge pool

A plunge pool is found at the bottom of a waterfall. It is a deep pool into which water from the waterfall plunges. A large pothole is formed by the water swirling and throwing boulders and stones around in circles. There is a lot of spray in a plunge pool at the bottom of a very large waterfall.

Rapids

At the rapids, the river is shallow and flowing very quickly over rocks, boulders and stones sticking out above the water level.

Formation

Rapids form in a similar way to waterfalls. The river bed drops down steeply, but not as a cliff, otherwise a waterfall would form. Rapids can often be found above waterfalls where the river bed is starting to drop. Rapids form a layer of hard rock on the river bed.

Interlocking Spurs

interlocking spurs are alternate hills in the river valley. The river does not have a high water volume at this point and even though it is fast flowing, the river cannot laterally erode (sideways) to remove the spurs. Because of this, the river has to flow around the spurs, eroding vertically.

Potholes

as the river is vertically eroding in the Upper Course, potholes can be created when larger pieces of load that the river cannot remove by traction are twisted around by eddy currents. The river is not strong enough here to pull the large boulder in the diagram, and the obstruction creates a swirling motion in the water. Eventually, the boulder creates a pothole, by abrasion on the river bed.