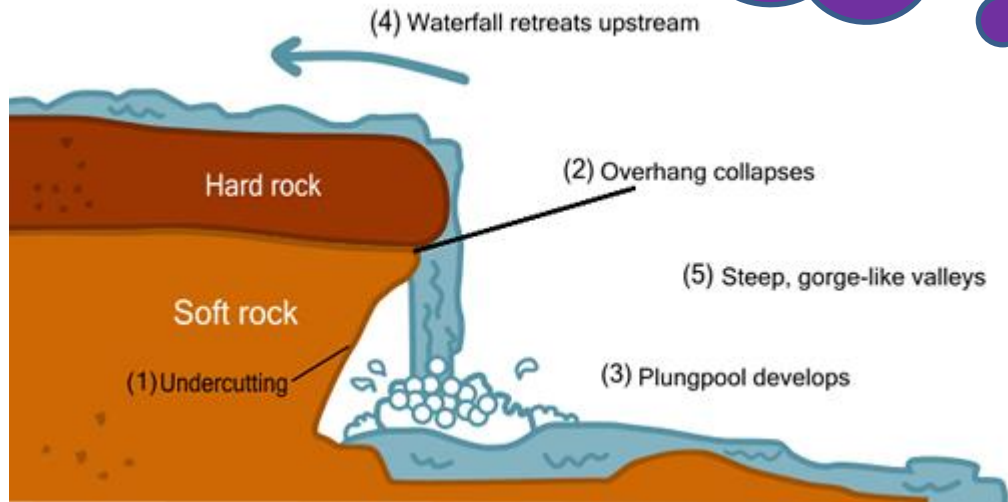


In the **upper course** of a river gradients are steep and river channels are narrow. **Vertical erosion** is greatest in the upper course of a river. As the result of this typical features include steep valley sides, interlocking spurs, rapids, aorae and waterfalls.

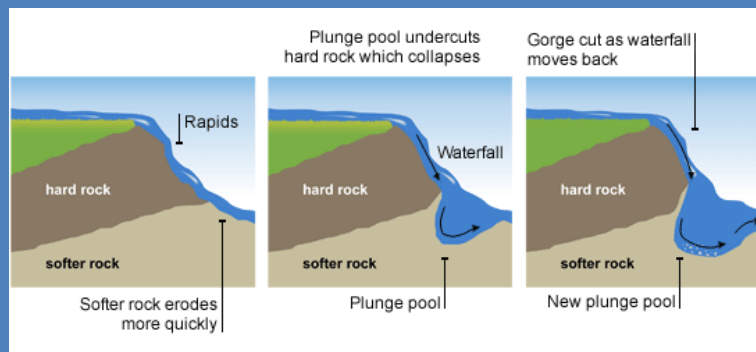
How does a waterfall form?

When a river runs over **alternating layers of hard and soft rock**, rapids and waterfalls may form. Waterfalls commonly form where water rushes down steep hillsides in upland areas and **quickly erodes** the rocks. The height and number of waterfalls along a stream or river depends upon the type of rocks that are being eroded by the water. Some types of rocks (shale, for example) wear away more easily (are **less resistant**) than others (such as sandstone or limestone).



source

The diagram shows the formation of a waterfall. The underlying rock is softer and is worn away by **HYDRAULIC ACTION**. This is called **undercutting** (1). This leaves a layer of hard rock which overhangs the layer of soft rock (2). The water flows over the overhang and the underlying, softer rock is worn away by **HYDRAULIC ACTION**, creating a **plunge pool** in the soft rock below. Eventually, the overhang will collapse due to the erosion of the soft rock beneath it. The large angular rocks which collapse into the river will swirl around and will **ABRADE (abrasion or corrasion)** the river bed sideways and downward, creating a larger plunge pool (3). The waterfall then retreats up stream (4).



### Independent Study

See more at:

[http://www.geography.learnontheinternet.co.uk/topics/river\\_upper\\_course.html](http://www.geography.learnontheinternet.co.uk/topics/river_upper_course.html)

[http://www.bbc.co.uk/bitesize/standard/geography/rivers/river\\_forming/revision](http://www.bbc.co.uk/bitesize/standard/geography/rivers/river_forming/revision)