

## Notes – River Erosion Video

- 1. What is the hydrologic or water cycle?** *The water cycle starts with (1) evaporation from the ocean, land or even plants (transpiration), followed by (2) condensation of the water vapor into clouds. The clouds are then (3) transported by the wind, to a point where the updrafts in the cloud can no longer support the water droplets. The water droplets then (4) fall as precipitation (rain, sleet, hail or snow). Some of the precipitation sinks into the ground, while the remainder (5) forms the runoff in rivers flowing back to the ocean.*
- 2. What is runoff, and how is it collected and transported back to the ocean?** *Runoff is the flow of water on the surface of the earth from the point where it lands as precipitation, to the point where it enters the ocean. It begins in rills and gullies (small temporary channels) into small creeks and streams and eventually into larger rivers. All of the smaller watercourses that feed a river are called tributaries. The entire system of tributaries that feed a river makes up the drainage basin (the land area drained by a river). The line dividing two different drainage basins is called a divide. An example is the continental divide.*
- 3. What factors affect the speed that water flows in a river?** *The three factors that affect the speed of water flow are (1) the shape and cross sectional area of the river channel; (2) the volume of water (discharge) passing a point each second (measured in cubic feet per second); and (3) the slope or gradient of the river bed, measured in feet per mile. As the cross-sectional area of the river channel gets bigger, the water flow gets slower. As the river channel narrows, the water speeds up. As the gradient of the river gets steeper and the water volume gets higher, the water flow gets faster.*
- 4. What difference in cross-section shape is there between the upper and lower parts of a river?** *Generally, the upper part of a river has a narrow valley with steep V-shaped side walls and very narrow flood plain. The lower part of a river has a much wider flood plain enclosed by a series of terraces. The lower river course is much less straight, with meanders and oxbows.*
- 5. What are the three functions of a river?** *The three functions of rivers are (1) transportation of water, (2) erosion (carrying sediment) and (3) deposition (depositing the sediment).*
- 6. What is the load that a river carries? What are the three ways it is carried?** *Load is the volume of sediment that a river carries. The three methods of carrying load include solution (dissolved minerals carried in the river water), suspension (particles of sediment that are suspended in the water, and bed load (the larger sediment that bounces along on the bottom of the river).*
- 7. What features do rivers create in narrow, steep valleys?** *Narrow, steep valleys generally have a large gradient (i.e., they are very steep), have numerous rapids and some waterfalls, and carve potholes in the river bed under the waterfalls. The sides of the valley are V-shaped, and in some places may form canyons with nearly vertical walls.*
- 8. What features do rivers create in wide, shallow valleys?** *Wide, shallow river valleys generally have very wide flood plains and a winding river course with meanders and oxbow lakes. The banks of the river often have natural levees. In places where the river gradient*

suddenly flattens and the water slows down, braided stream beds with sand and gravel bars will form. At the mouth of the river into the sea, deltas form where the water slows and drops its sediment.

9. **How do meanders and oxbow lakes form?** *A meander in a river is series of sharp bends back in forth, looking like a winding snake on the map. They form because a river creates erosion on the outside of the bank, causing collapsing cut banks. That created sediment is deposited on the inside of the river bend, because the current is slower there and the water cannot carry the full load of sediment. Over time, the river becomes more and more bending, thus creating meanders. Eventually, the bend in a meander almost creates a complete circle, and the river cuts through the neck of the meander, leaving a oxbow shaped abandoned river bed, which may just fill in and become dry land, or if it stays filled with water, it becomes an oxbow lake.*
10. **How is a braided stream formed?** *In parts of the world where there are wide valleys between ranges of mountains, the rivers flowing out of the mountains suddenly lose their gradient and flatten out. As the water slows, the sediment load carried by the river is dropped into sand and gravel bars. The water from the river has to constantly fight its way through the bars, and often splits into many "braided" crisscrossing channels. When the gradient of the river increases again, the many braided channels come together into one channel.*
11. **How is a natural levee formed?** *Natural levees are formed when a river goes into flood and spreads into the flood plain. As the water rises and leaves the main river channel, it slows down and drops part of its sediment load on the banks of the river. Over time, this sediment builds up a high strip of land along the river banks that acts as a natural levee to contain the water of the river. The lower part of the Mississippi River has natural levees up to 15' high.*
12. **How are deltas and alluvial fans formed?** *Deltas form when a river enters a large, still body of water such as the ocean or a large lake. As the water flow stops, the sediment load is dropped in stages, with the largest sediment particles (gravel and sand) dropped first, followed by the silt and then clay. These beds of sediment form triangular shapes between the dividing river channels. Deltas do not form when there is a strong current along the coast of the ocean, because the sediment is carried away from the river mouth. Alluvial fans occur in desert mountain valleys, when the water carrying the sediment sinks into the ground, leaving fans of sediment at the mouths of side canyons.*
13. **What are the three stages of river development?** *Rivers generally can be described as having three stages of development, young, mature and old, which correspond to the upper, middle and lower parts of the river. In the young, upper section of the river, the valley is narrow and V-shaped, with many waterfalls and rapids, and a large gradient. In the middle, mature section of the river, the valley is somewhat wider with a flood plain and some meanders, but few rapids and waterfalls. In the old, lower section of the river, the river valley is very flat and wide with a deep layer of sediment. The flood plain is enclosed by a series of terraces built from sediment. There will be many meanders and oxbow lakes, with natural levees enclosing the river.*