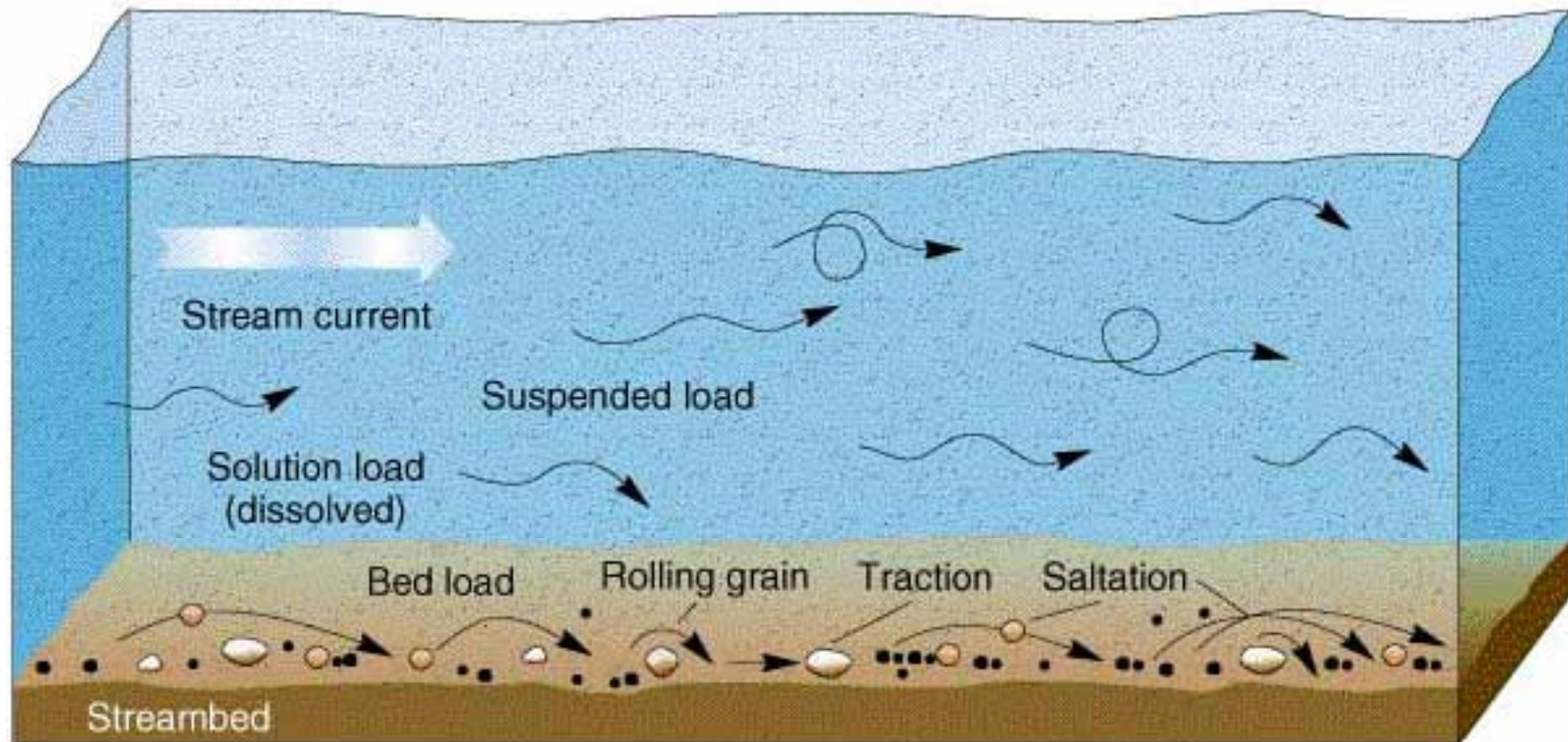


Water and Erosion

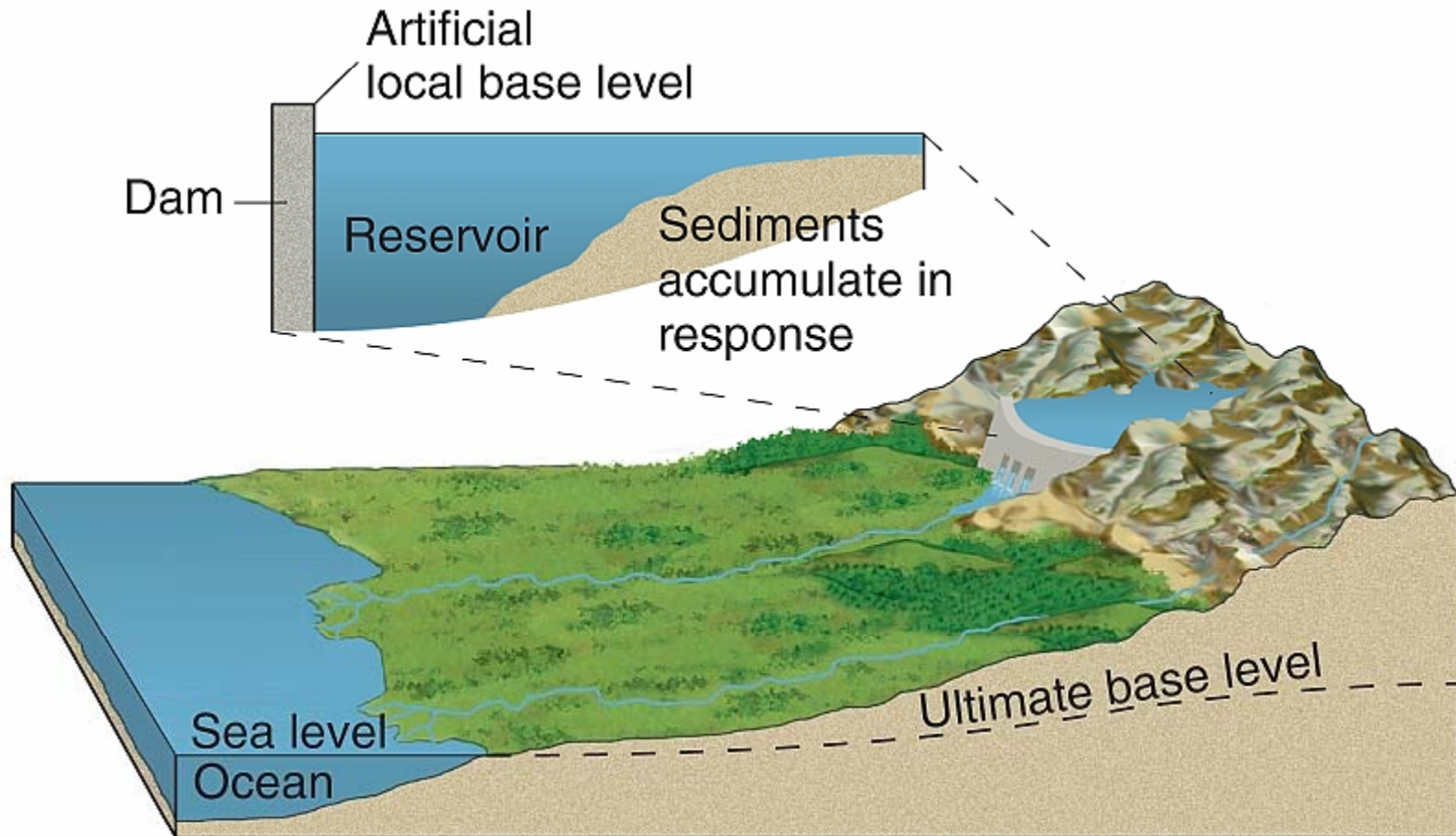
Moving water erodes as it flows and picks up sediment which is later deposited somewhere downstream.

- Water flows down-hill*
- Water is heavy, and therefore has tremendous power to erode.*
- The faster water moves, the larger particles it can carry.*
- As water slows down, the suspended particles drop to the bottom, the largest first, the smallest last. Thus sediments are often sorted by particle size.*

The Stream Carries Material as Suspended, Dissolved and Bed Load



Sediments Are Deposited in a Reservoir. Clear Water Released Then Picks Up Material from River Below Dam

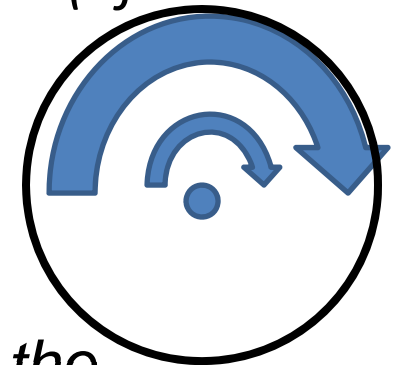


(a)

Flood Plains, Stream Networks and Drainage Basins

- *These processes also create a whole network of connected stream channels that carry water from anywhere within the drainage basin all the way to the ocean.*

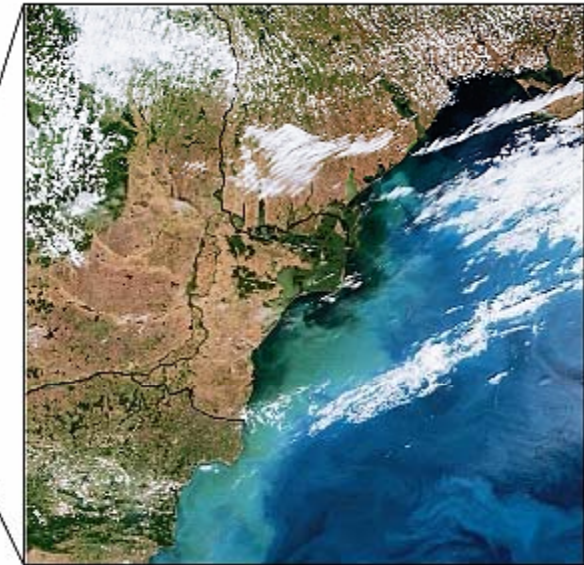
- *Water never flows in a straight line for long. Water meanders as it flows resulting in constant erosion on the outside bend (of a river) and deposition on the inside bend.*



- *These processes create the flood plain and all of the landform features associated with the flood plain.*



The Danube Drainage Basin of Southeastern Europe



Danube River delta

Copyright © 2009 Pearson Prentice Hall, Inc.

Meanders in the Mississippi River Below Memphis. Very Wide Floodplain Indicates Very Old River

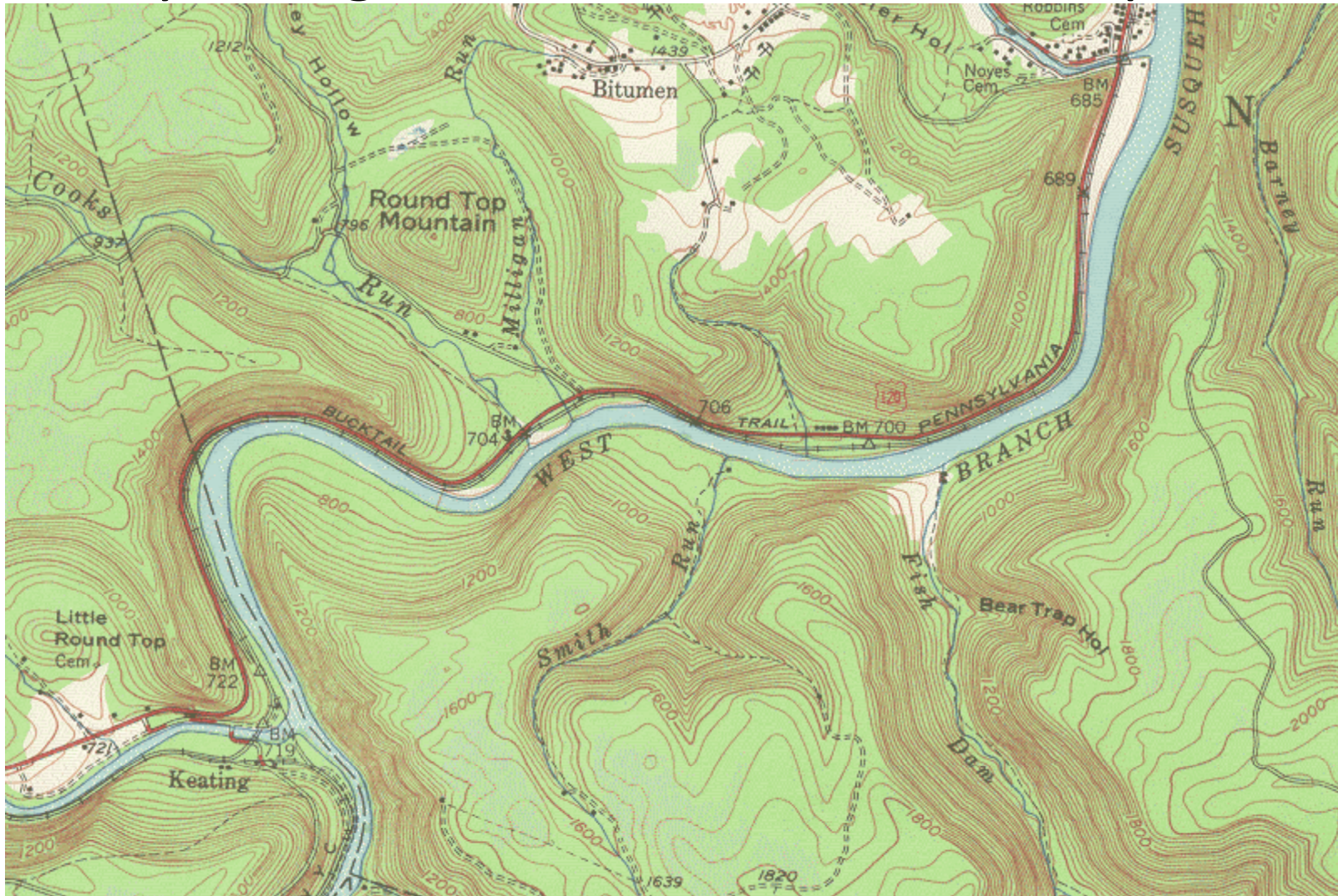


(a)



(b)

The Susquehanna River Is a Product of the Melting of the Continental Glacier 20,000 years Ago. It is Very Young and Has Almost No Floodplain

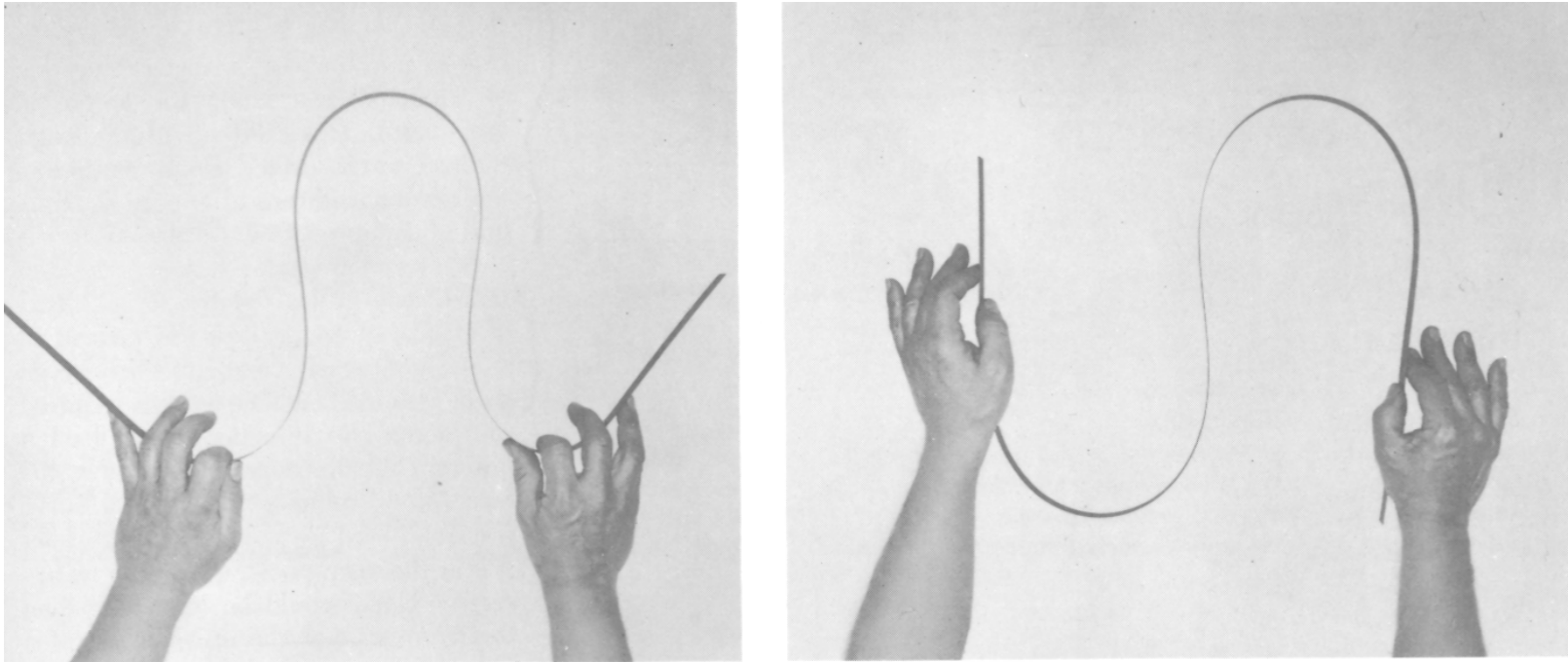


Missouri River at Kansas City.
Each Successive Meander is Cutting Away at the Bluff
Widening the Floodplain. It is about 4 Miles Wide



Why Do Rivers Meander?

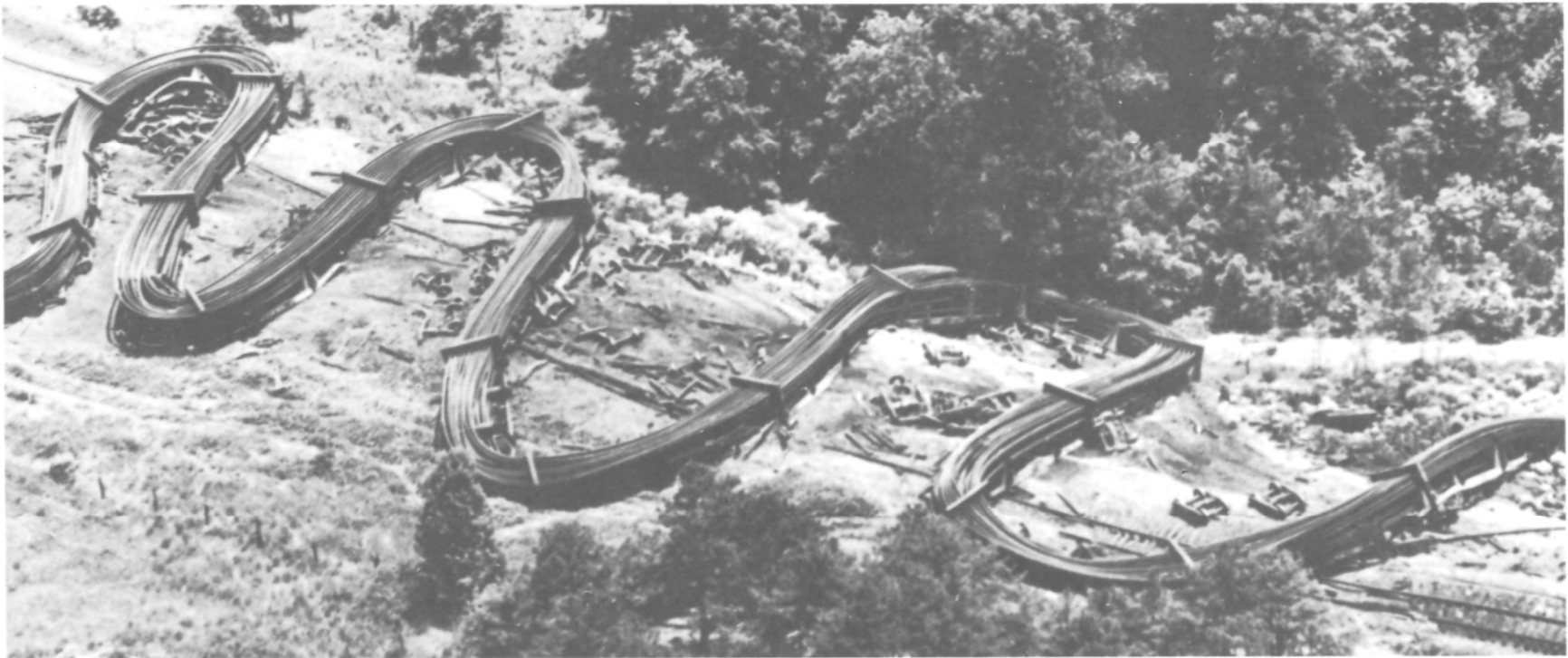
Spring Steel Strip Bends Uniformly Approximating a Sine Curve and Modeling a River's Shape



The spring steel distributes the force uniformly along its length. The river follows a curved path to insure uniform energy loss for each mile of flow along the channel.

Dramatic Illustration of Energy Spread Evenly Along 700 ft. of Railroad Rails.

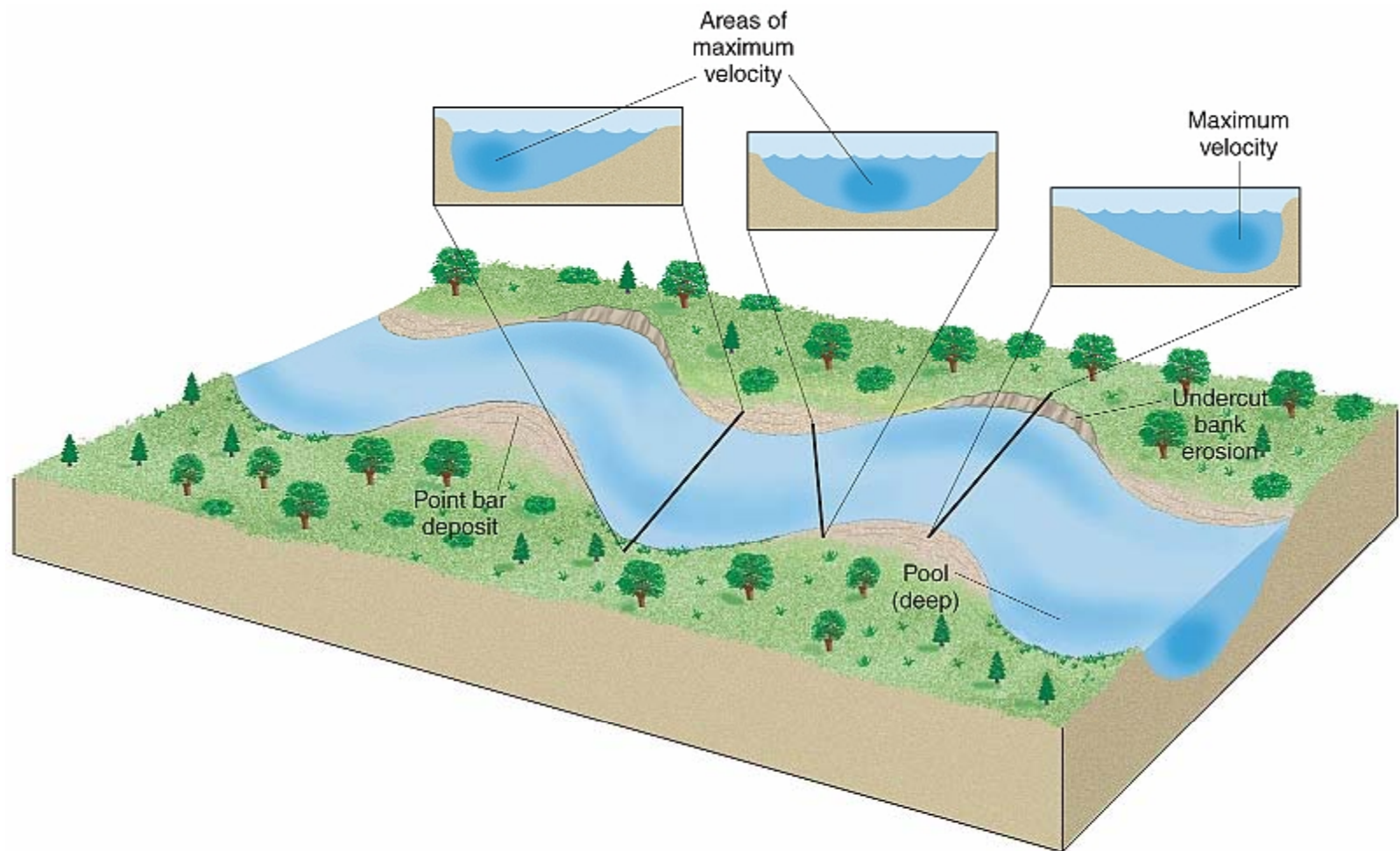
Look at the Number of railroad car wheels strewn about the site.



CATASTROPHIC EXAMPLE of a sine-generated curve on a much larger scale was provided by the wreck of a Southern Railway freight train near Greenville, S.C., on May 31, 1965. Thirty adjacent flatcars carried as their load 700-foot sections of track rails chained in a bundle to the car beds. The train, pulled by five locomotives, collided with a bulldozer and was derailed. The violent

compressive strain folded the trainload of rails into the drastically foreshortened configuration shown in this aerial photograph. The elastic properties of the steel rails tended to minimize total bending exactly as in the case of the spring-steel strip shown at top of these two pages, and the wrecked train assumed the shape of a sine-generated curve that distributed the bending as uniformly as possible.

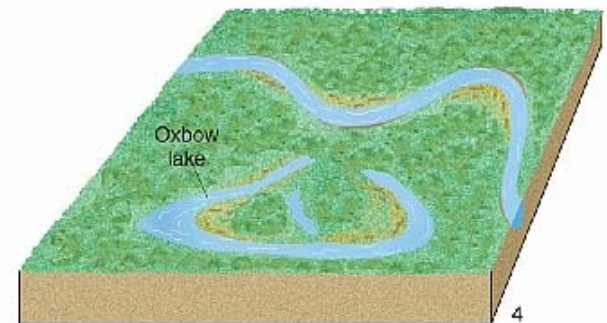
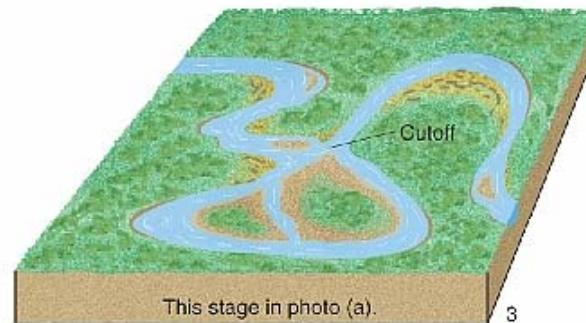
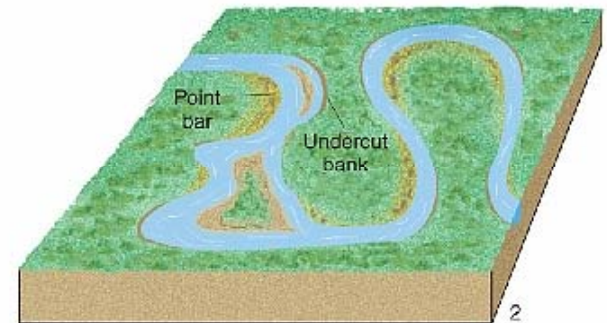
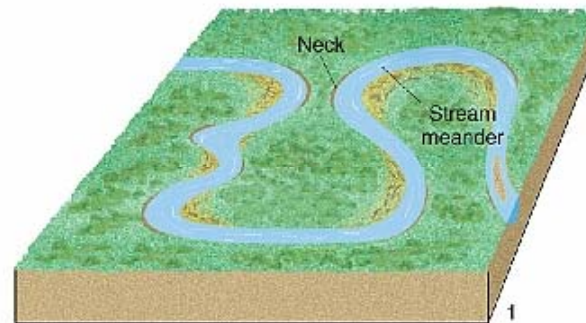
River Erodes on Outside Bend Where Water Flows Faster and Deposits on Inside Bend Where Water is Slower. Outside Bend Is Also Deepest Part of River.



A Cutoff Develops Where Two Outside Bends Cut Towards Each Other. This Leaves the Old Meander Bend Cutoff from the Channel of the River Creating an Oxbow Lake.



(a)

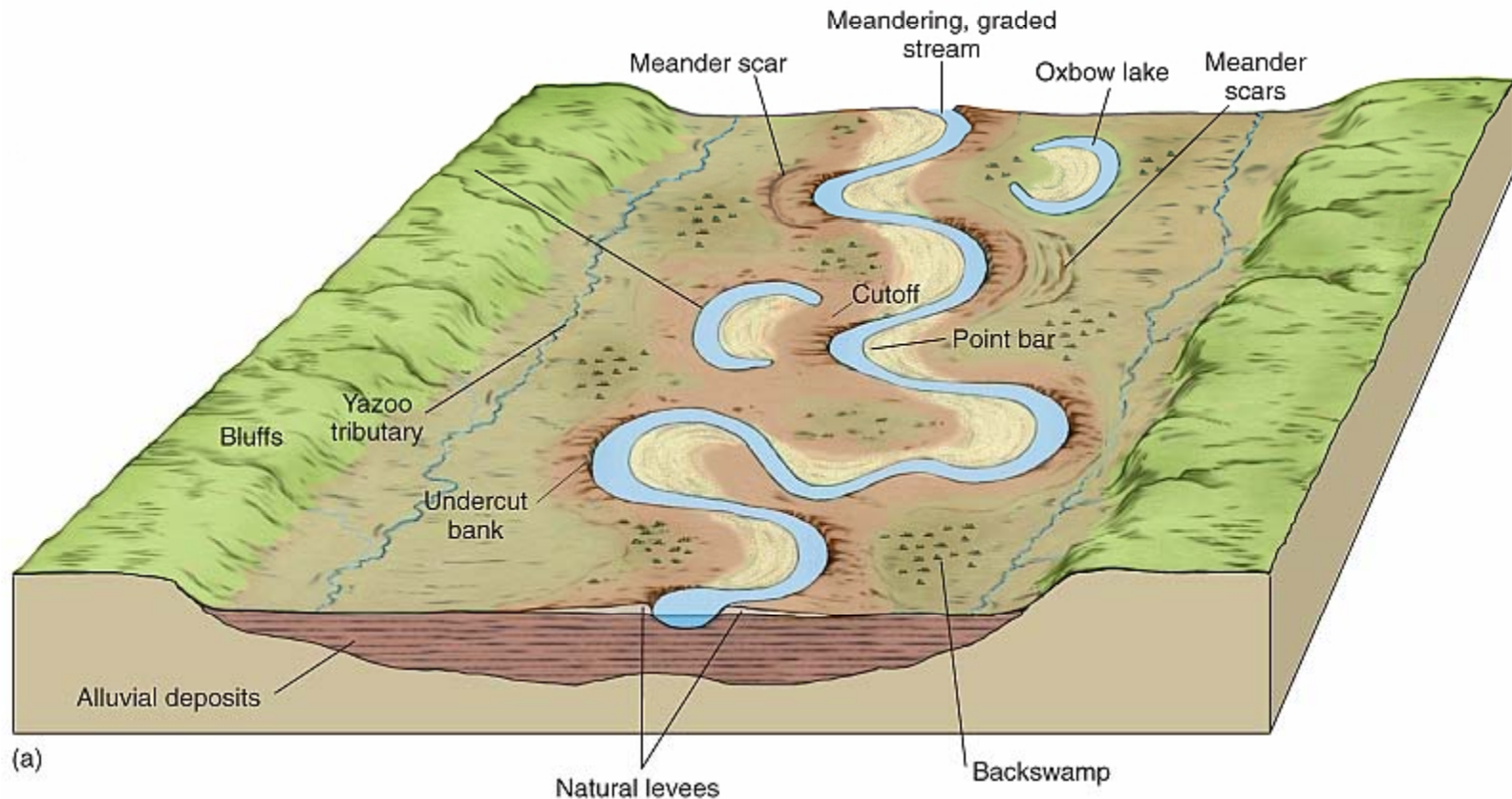


(b)

U-Shaped Oxbows Attached the Ox to the Yoke



The Processes of Erosion, Transportation and Deposition Create All of the Landform Features in the Floodplain Environment



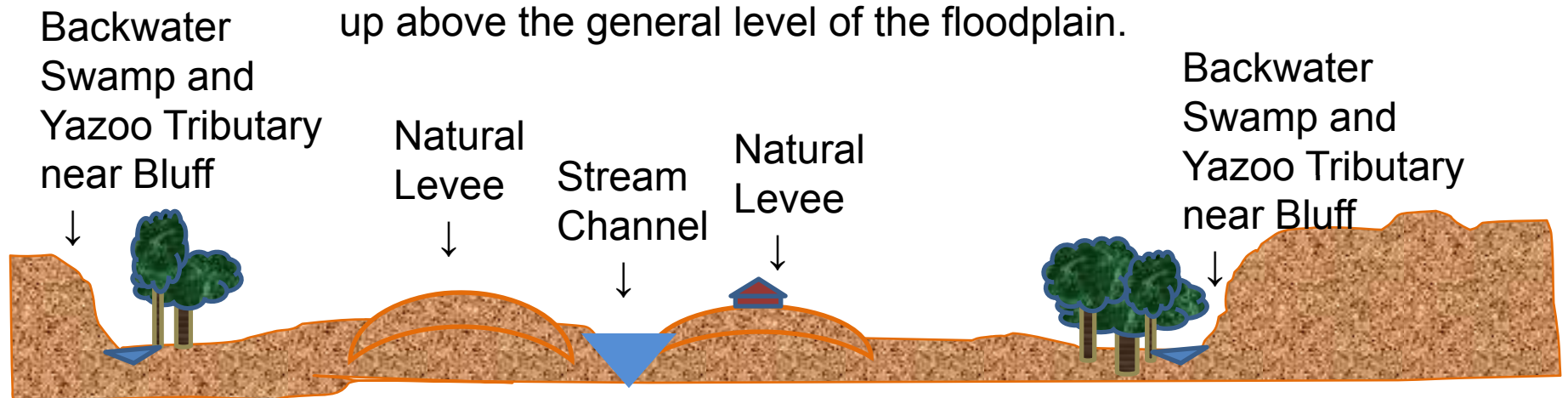
Copyright © 2009 Pearson Prentice Hall, Inc.

Levee of Earth Built by the Corps of Engineers to Prevent Flooding on Sacramento River, CA.



Cross Section of Floodplain

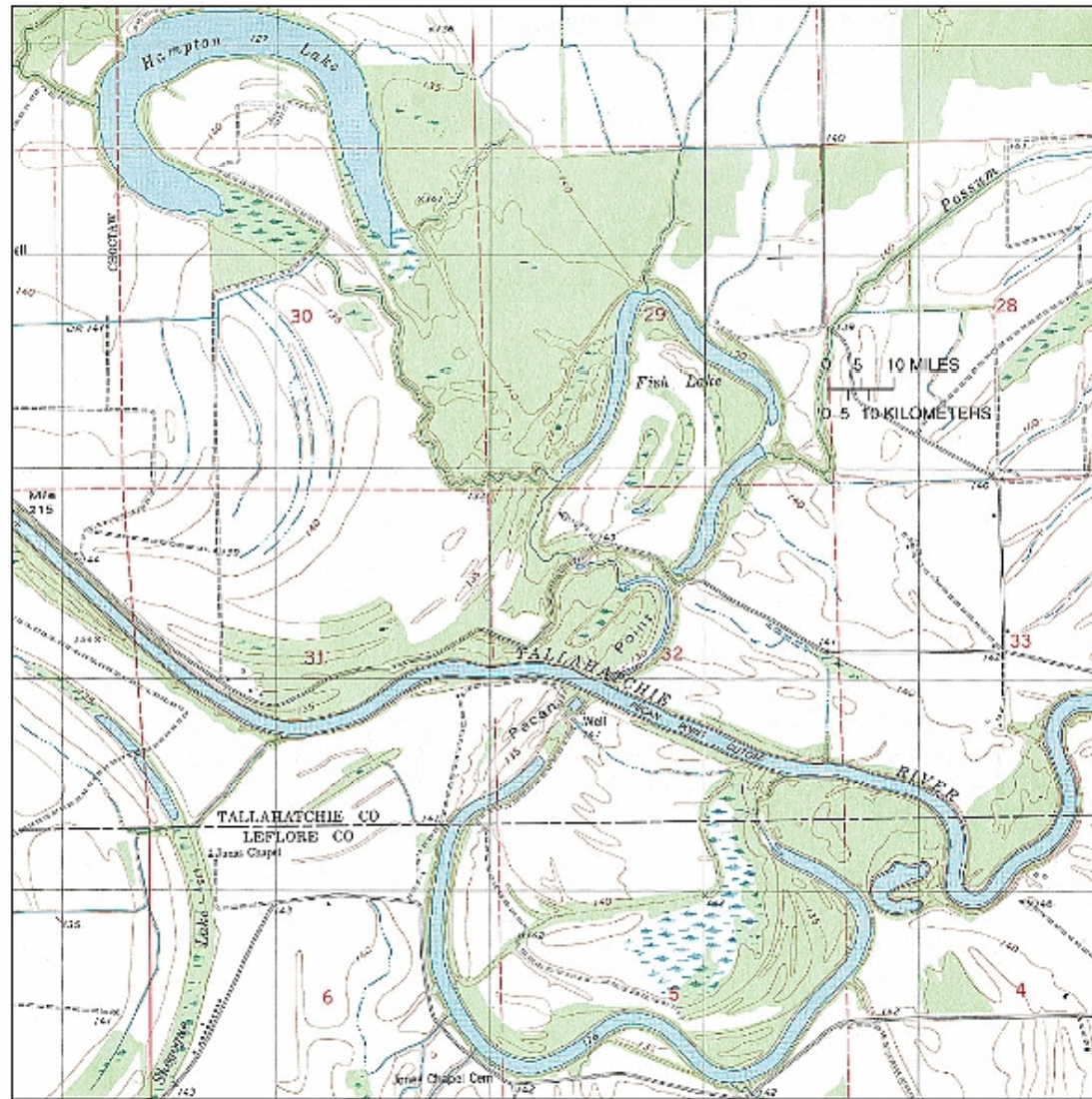
While a floodplain is relatively flat, there are differences in elevation. The highest part of the floodplain is the natural levee. When a river floods (gets out of its channel), it slows down immediately and the sediment starts falling out. Over time, these deposits build up above the general level of the floodplain.



The lowest part of the floodplain is the backwater swamp away from the natural levee and closer to the bluff at the edge of the floodplain. Often these swamps are connected by a yazoo stream that flows down the edge of the floodplain parallel to the main river.

Flood Plain Showing Meander Scars and Oxbow Lakes

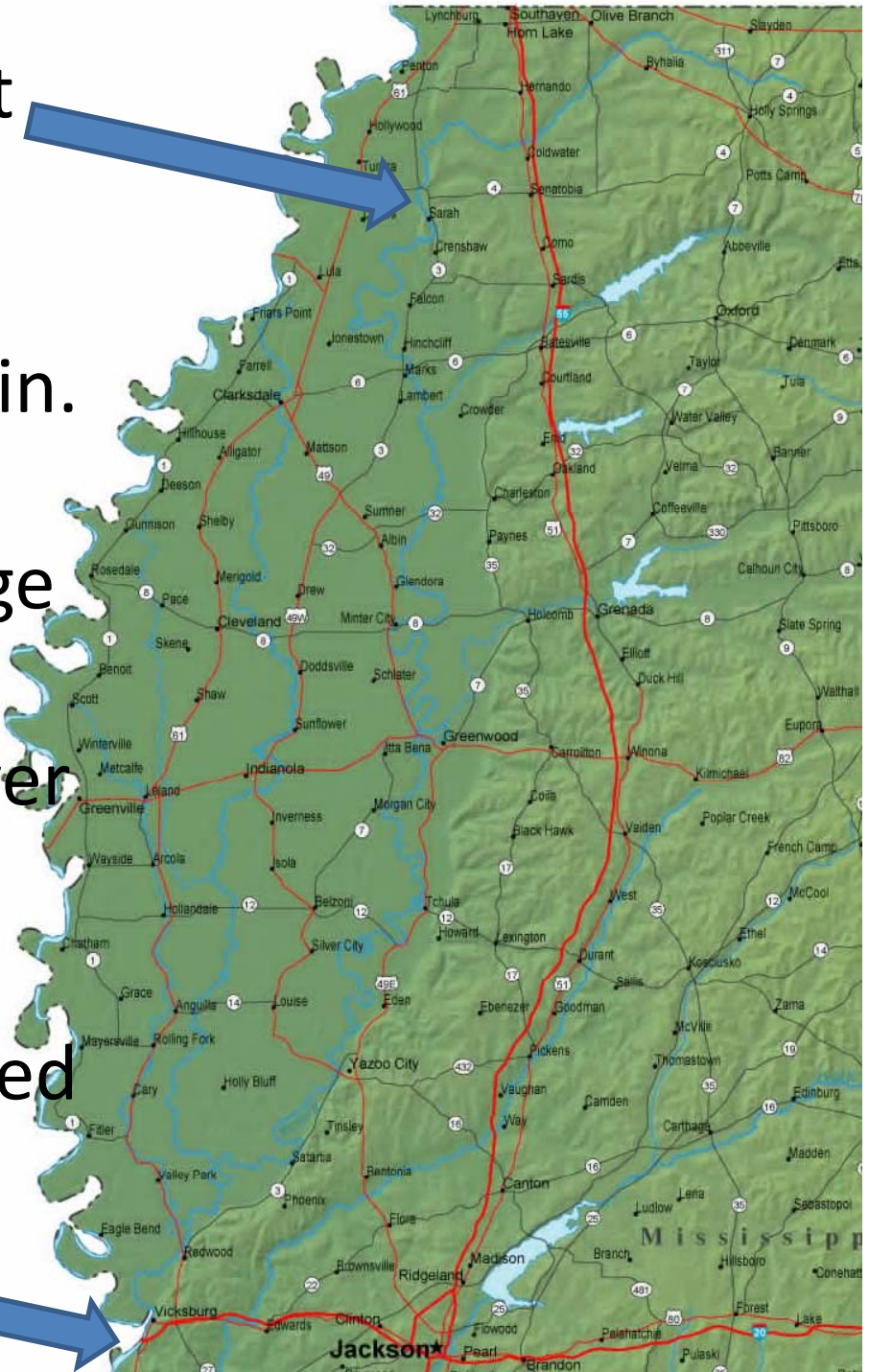
There is an error on this map.
Can you find it?



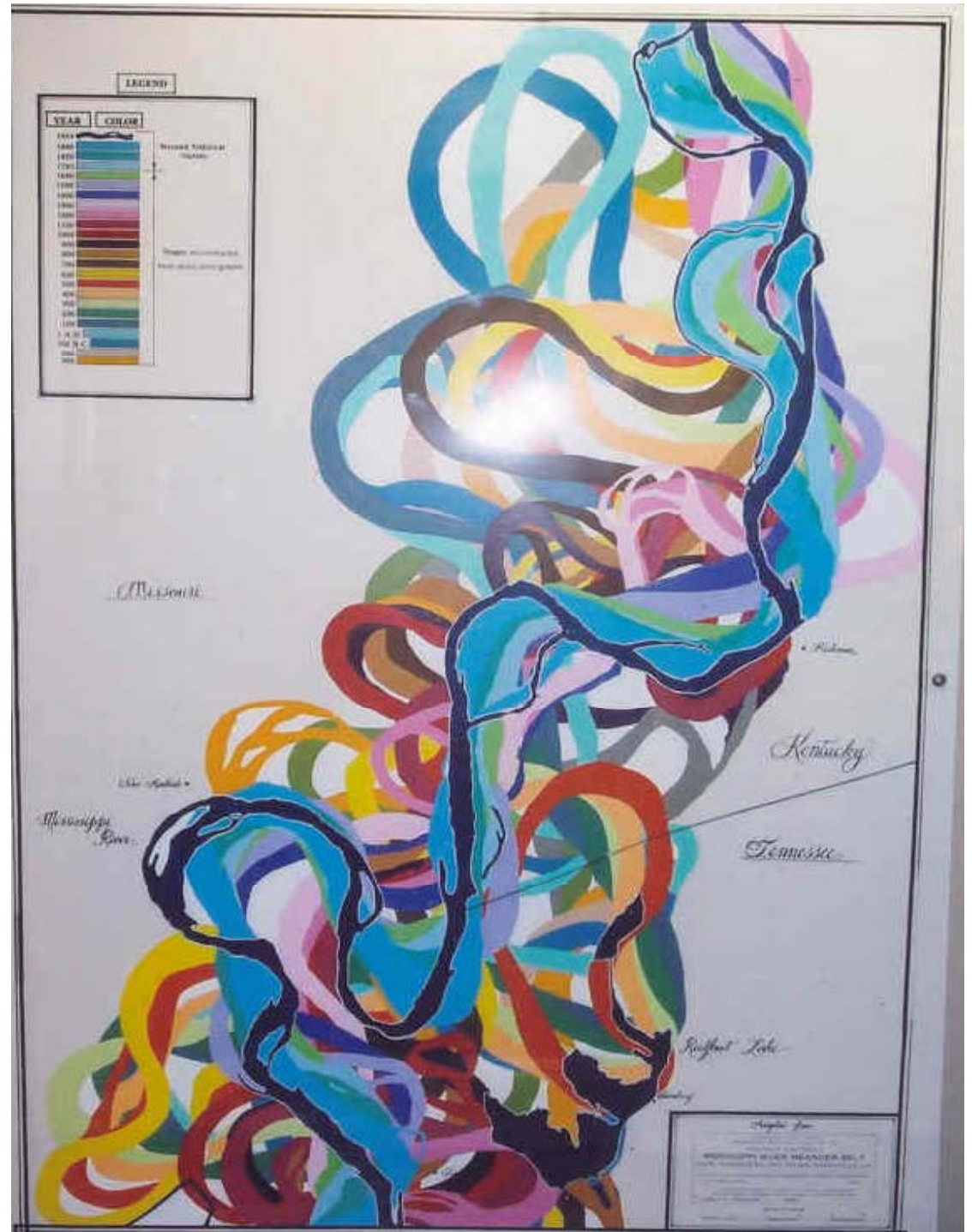
(d)



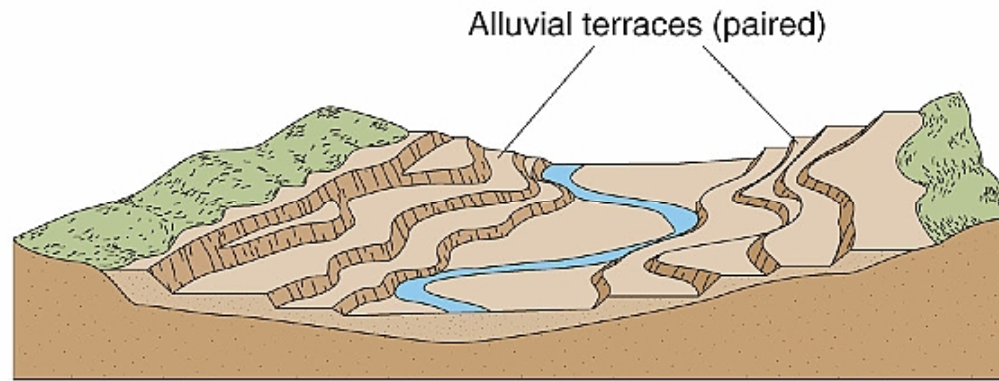
The Yazoo River Flows Out of the Uplands of Central Mississippi and On To the Mississippi River Floodplain. It Then Flows about 200 Miles South Along the Edge of the Floodplain Finally Joining the Mississippi River at Vicksburg. The Place Where a Tributary River Joins Another River is Called a Confluence.



Over Time, the Mississippi River Meanders Across the Entire Width of the Floodplain



Some
Floodplains Are
Terraced Where
Old Floodplain
Was at a Higher
Elevation



(a)



(b)

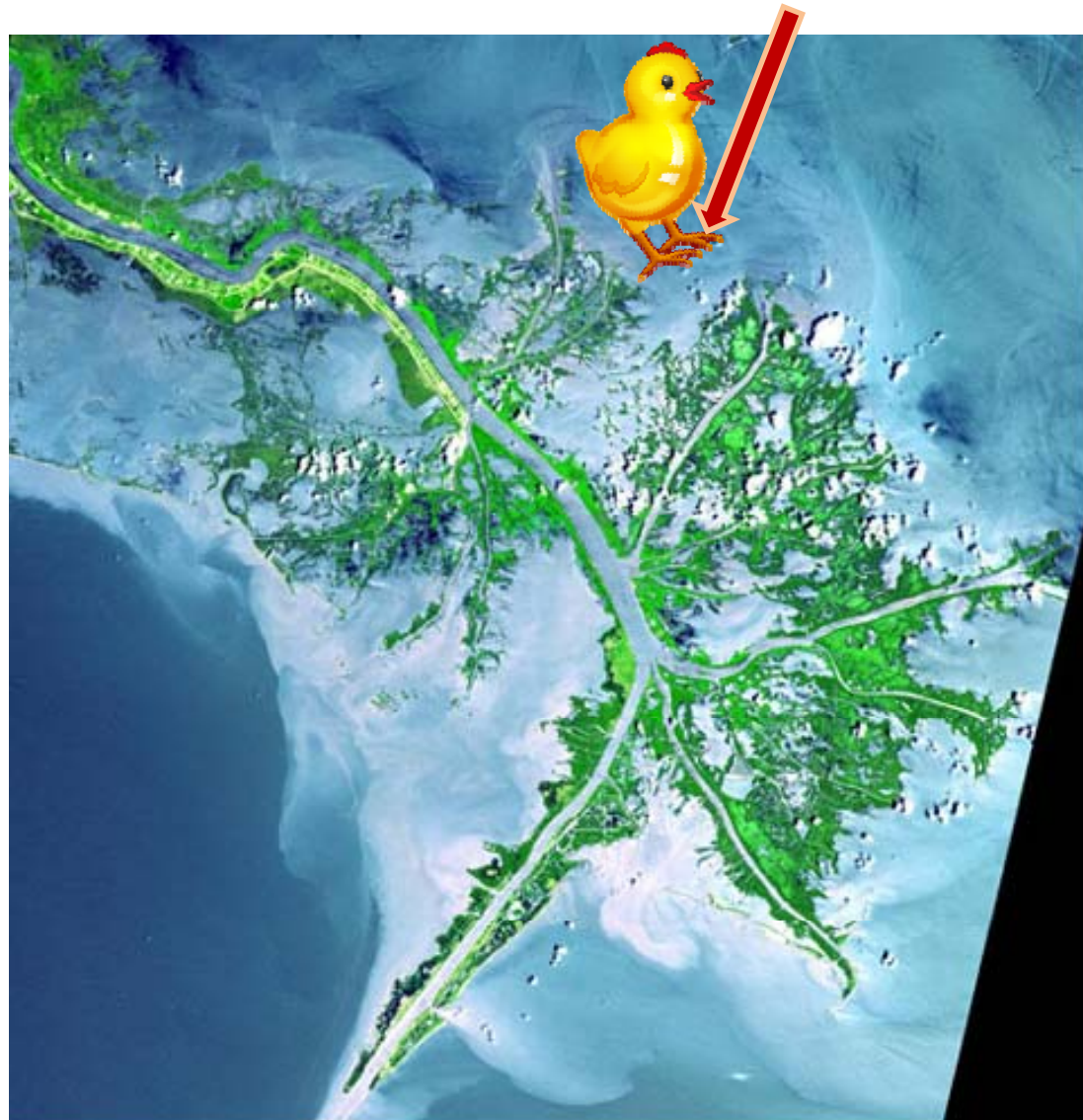
The Term Delta is Derived from the Shape of the Nile Delta. It Is Shaped Like a Triangle, Δ , which is the Greek Letter Delta. However, Not all Deltas Are Delta Shaped. In Fact, Some Rivers, Like the Amazon, Do Not Have Deltas.



The scale of each image was adjusted to show equal distance and area.



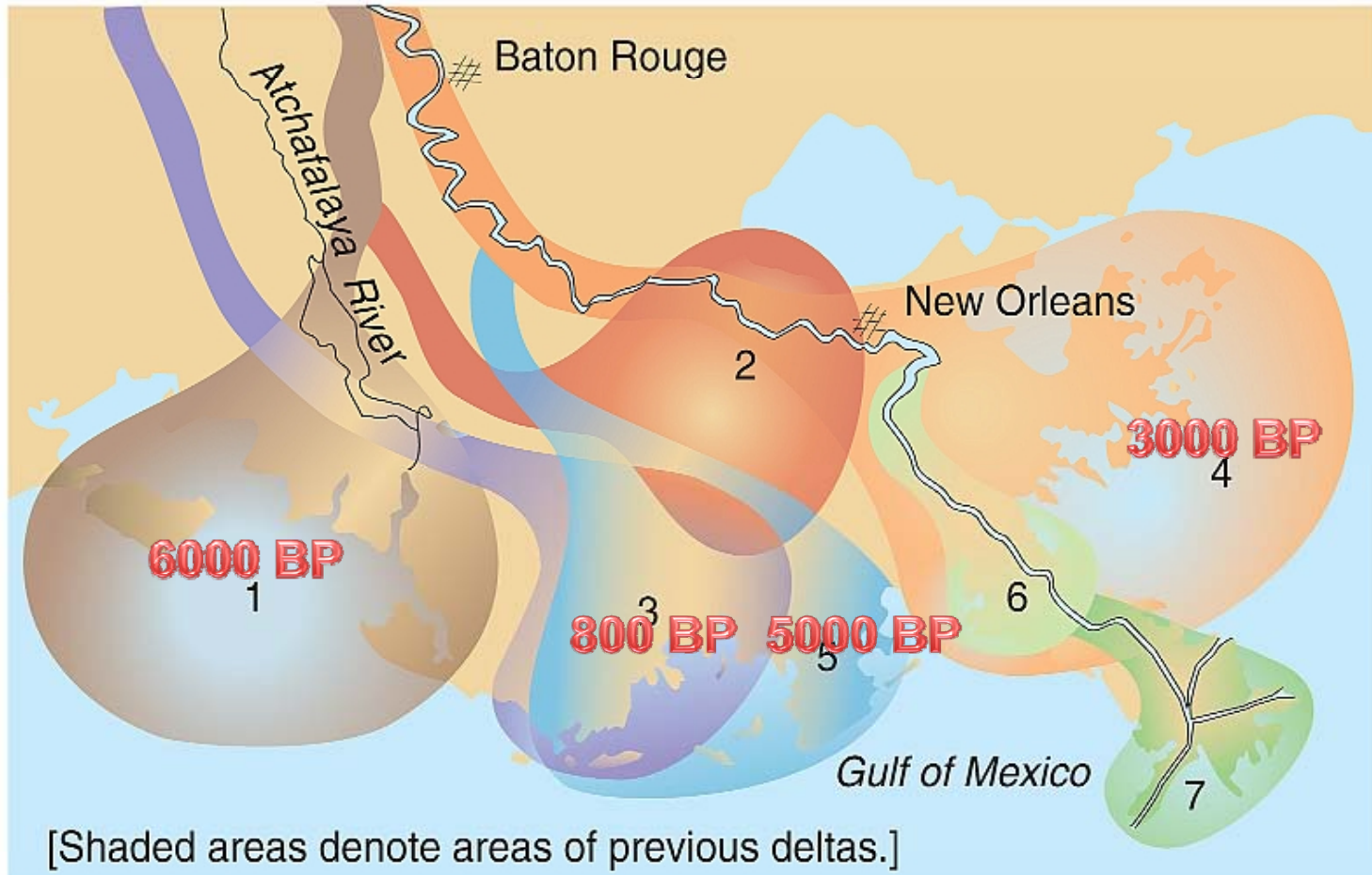
The Delta of the Mississippi Is Called a Birds Foot Delta. The Distributaries Take the Form of a Birds Foot.



The Delta of the Mississippi River.
The Blue Color Shows Sediment
Entering the Gulf of Mexico.



The Delta is a Deposit of Silt Where the River Flows into the Ocean. Current Delta of Mississippi River is at Location #7 Below. River Has Had Many other Deltas in the Past.



(a)

The Mississippi Would Like to Change Course and Flow down the Atchafalaya Channel in a More Direct Route to the Ocean.

So, the U. S. Army Corps of Engineers has built several structures to keep the Mississippi in its present channel. The best known is the Old River Control Project.



(c)

This Structure Helps Divert about 1/3rd of the Flow of the Mississippi River to the Atchafalaya Channel. Strangely Enough, This Keeps Most of the Flow in its Historical Channel Going to New Orleans.



The Old River Project Was Necessary to Keep New Orleans Viable as a Port City. No port, no economy, no city. The flooding from Hurricane Katrina came from Lake Pontchartrain and not from the river.



(a) April 24, 2005



(b) August 30, 2005

