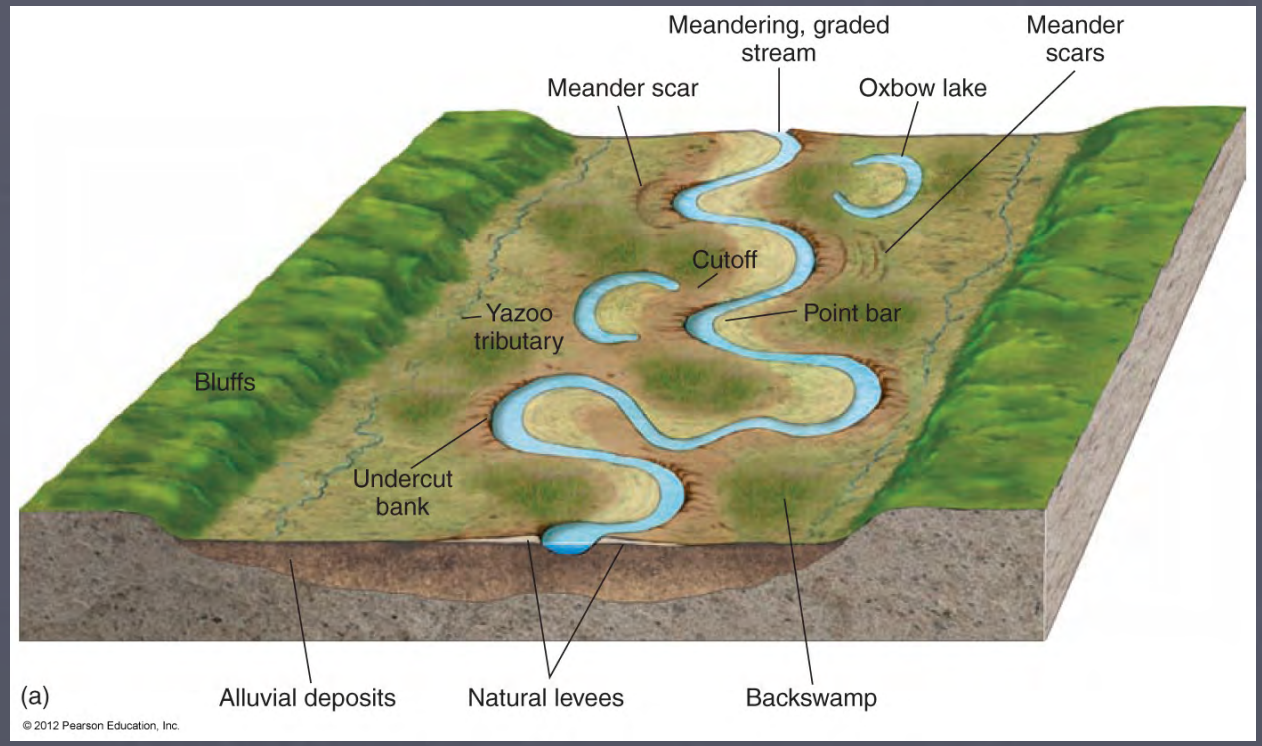
Erosion and Flooding

Chapter 14: River Systems

Floodplains

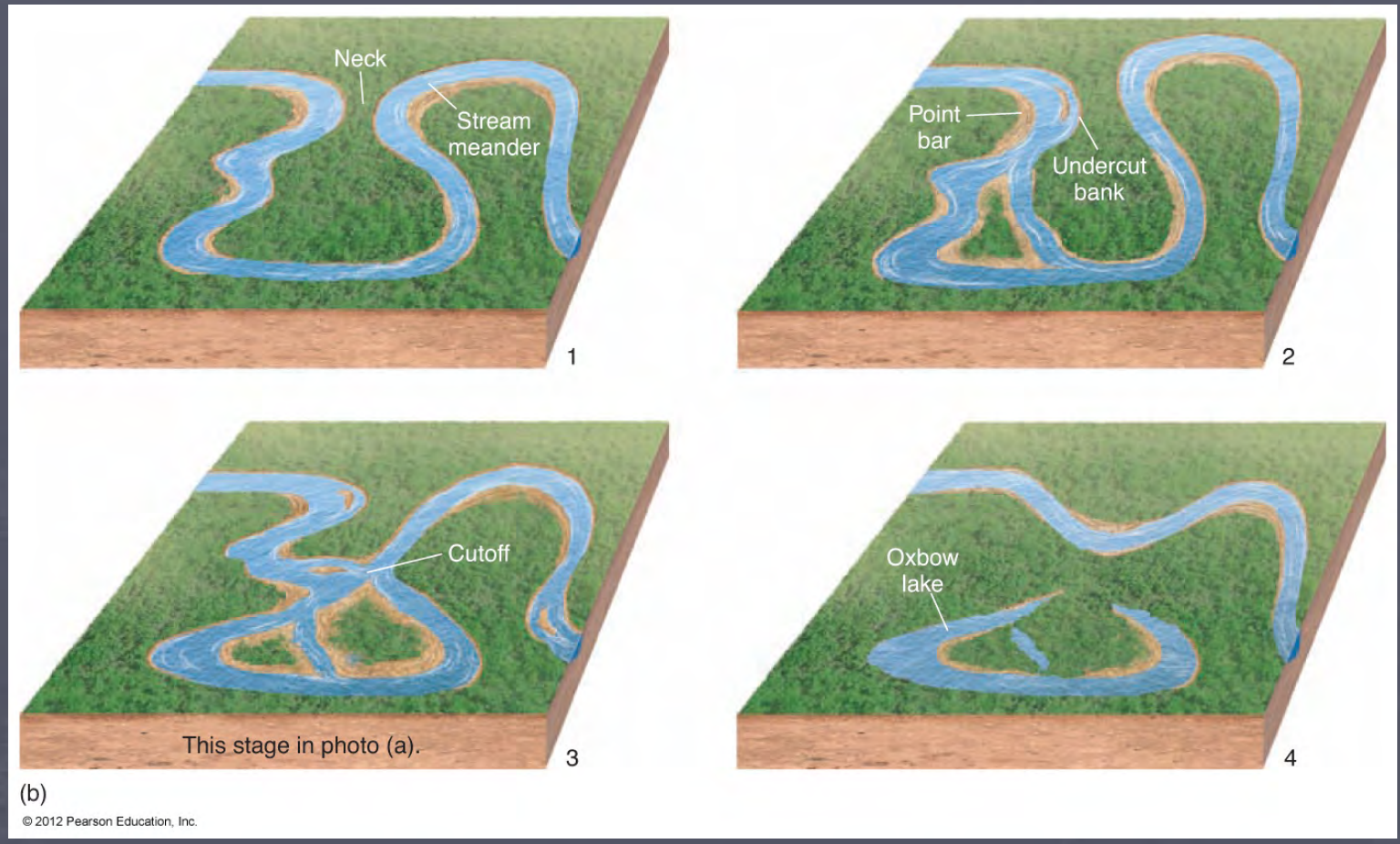
- Generally flat areas around a stream impacted by streams processes of erosion and aggradation
  - Floodplains vary in size depending on number of factors
- Constantly changing depending on characteristics of stream



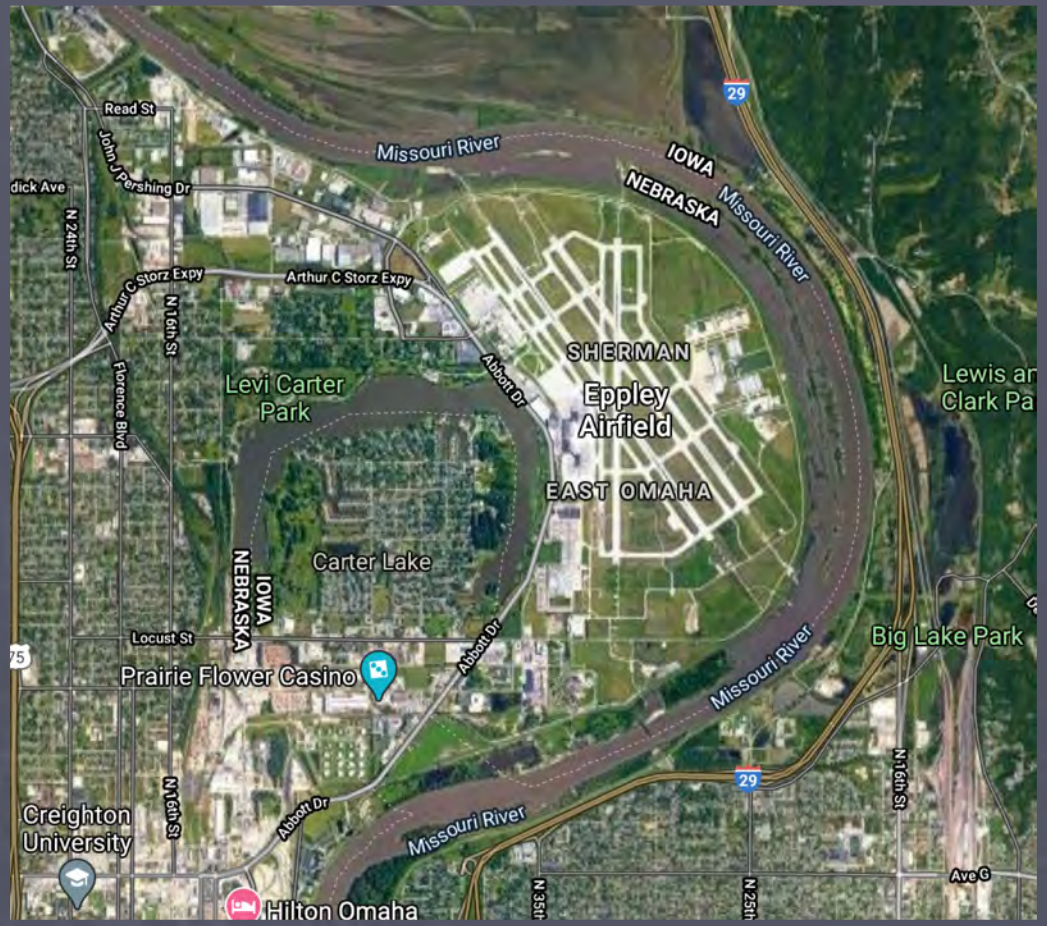
Case Study: Harriet Island (Minnesota)

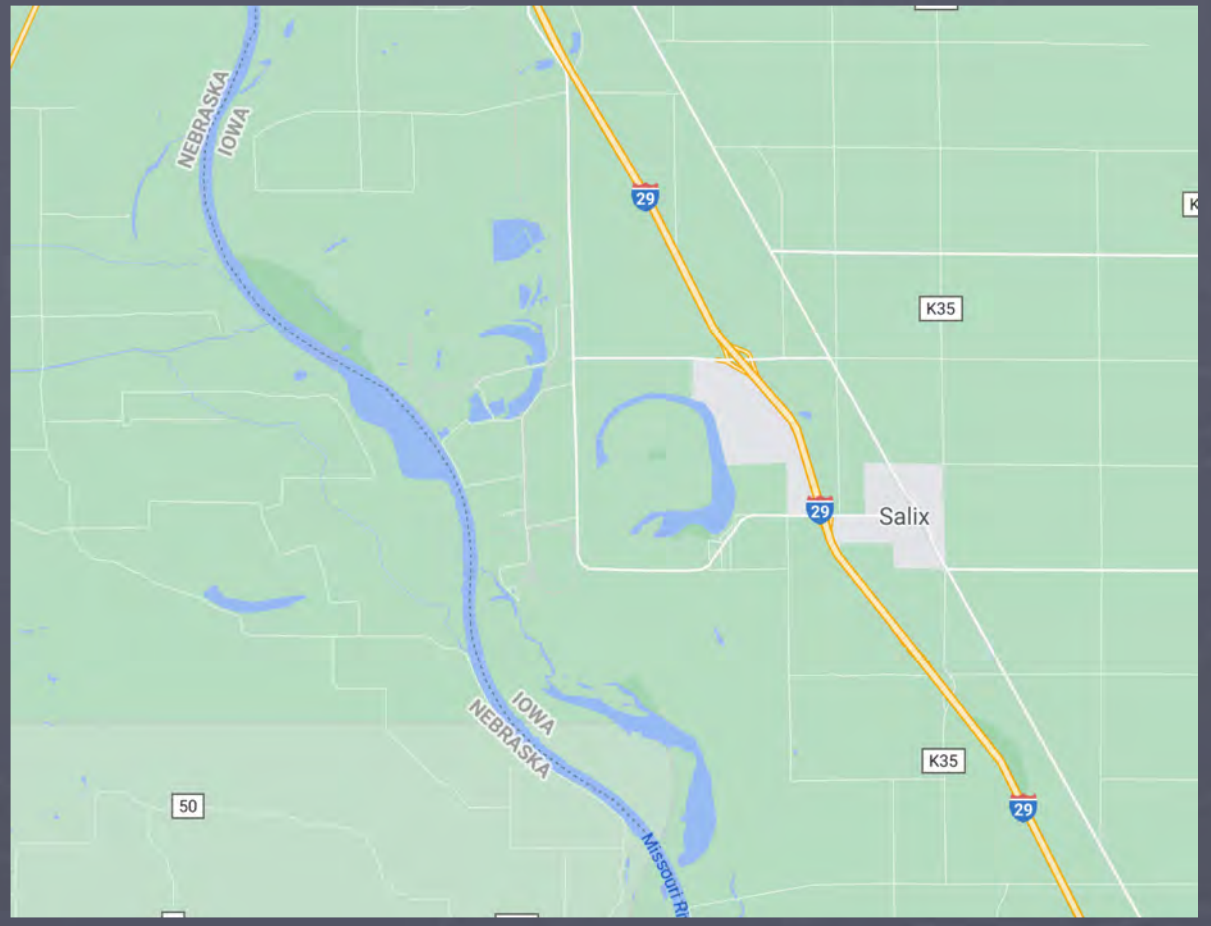
Case Study: Elk Horn River 2019

Oxbow Lakes



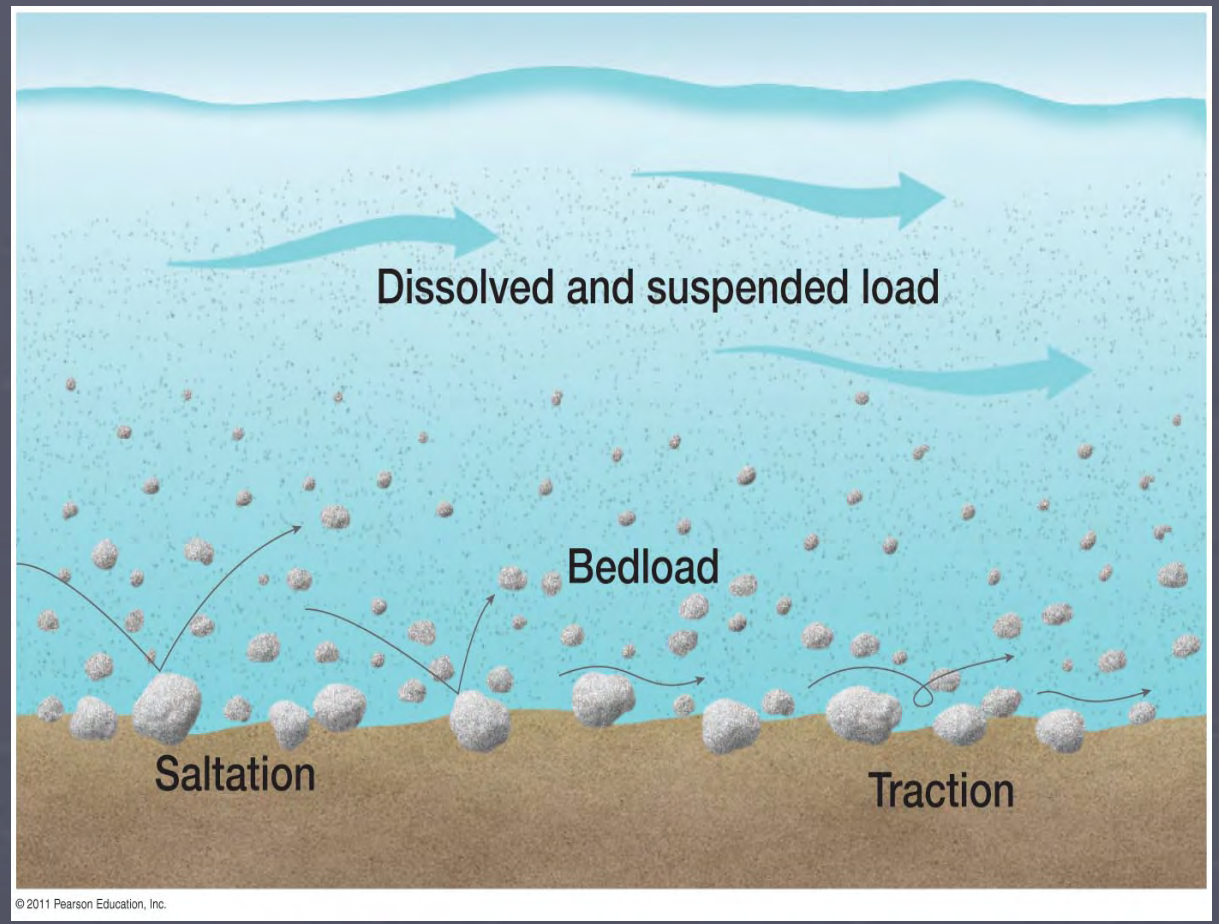
Case Study: Missouri River





Erosion

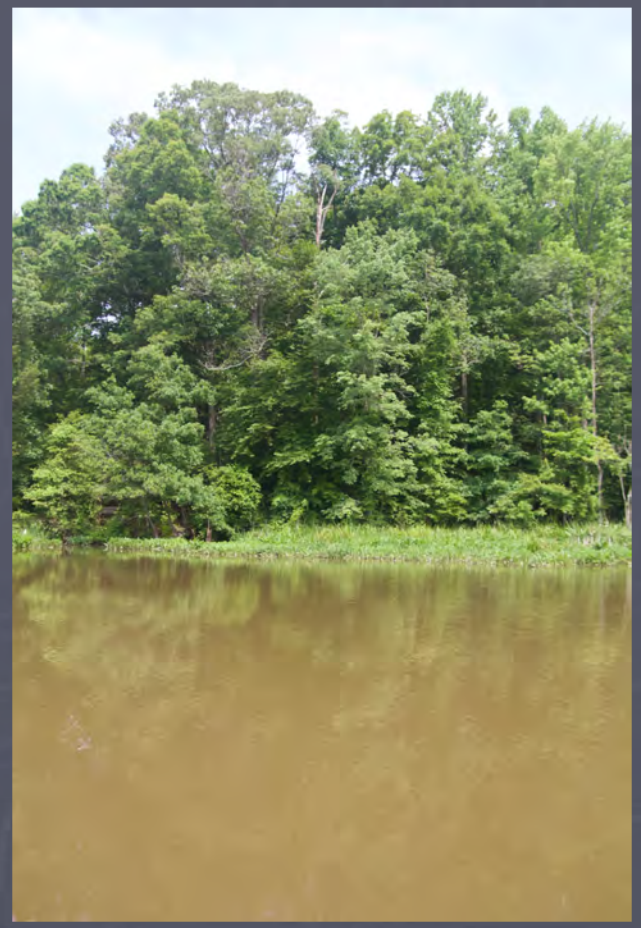
- Erosion: Removal and transport of earth
  - Rock, soil, sand etc.
- Transported material is called the stream's load
  - Dissolved load
  - Suspended load
  - Bed load



Case Study: Grand Canyon (Arizona)

Case Study: Blyde River Canyon (South Africa)

Case Study: Port Republic (Maryland)



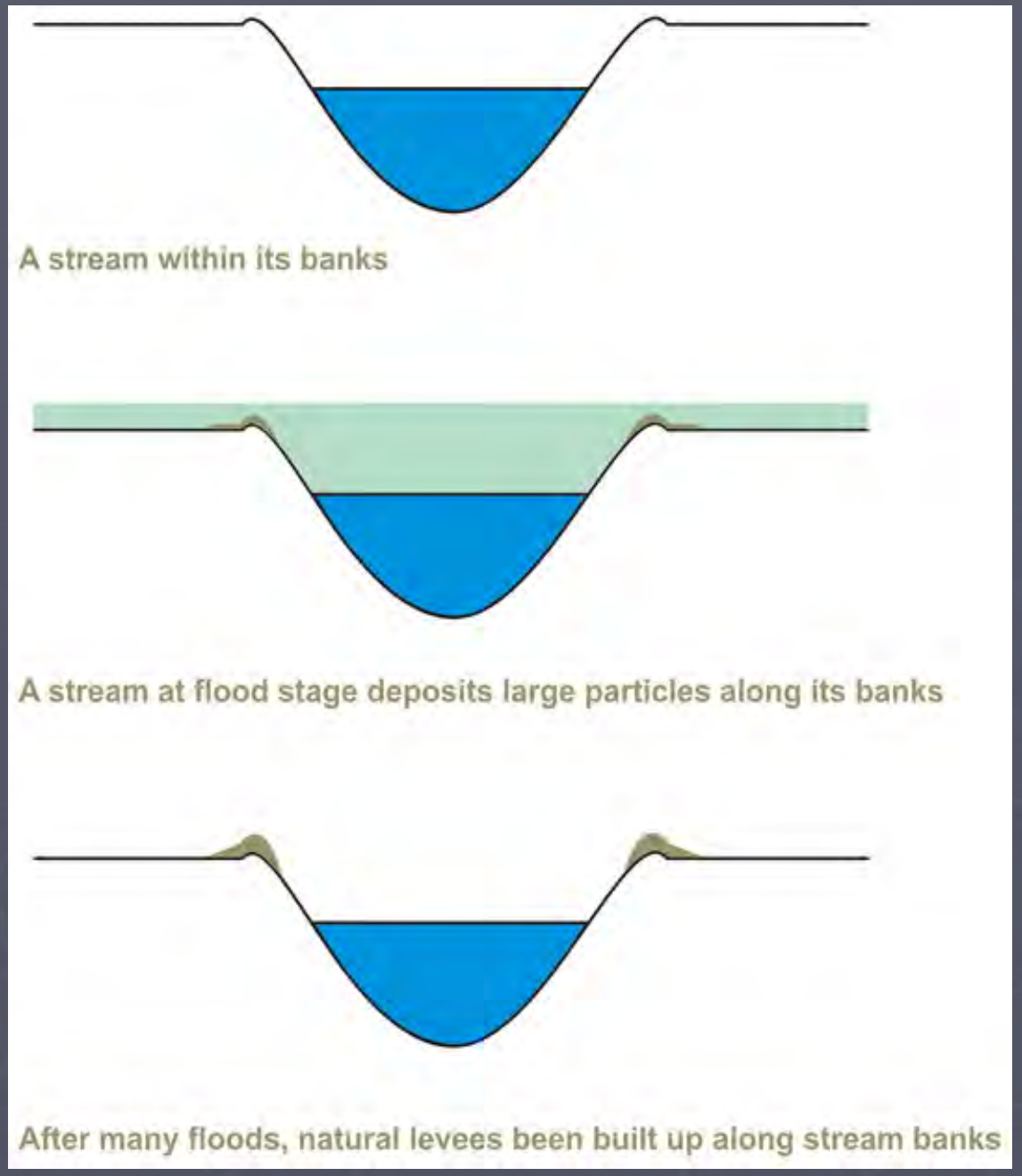
Deposition

- Streams deposit and redeposit their loads along their banks and streambeds
  - Sediment constantly working towards Base Level
  - Competence - maximum particle size
  - Capacity - maximum load; related to discharge
- Contributes to the natural building of levees

Case Study: Gooseberry River (Minnesota)

Levees

- Depositions of load along the banks of a river over time
  - Help with flood control



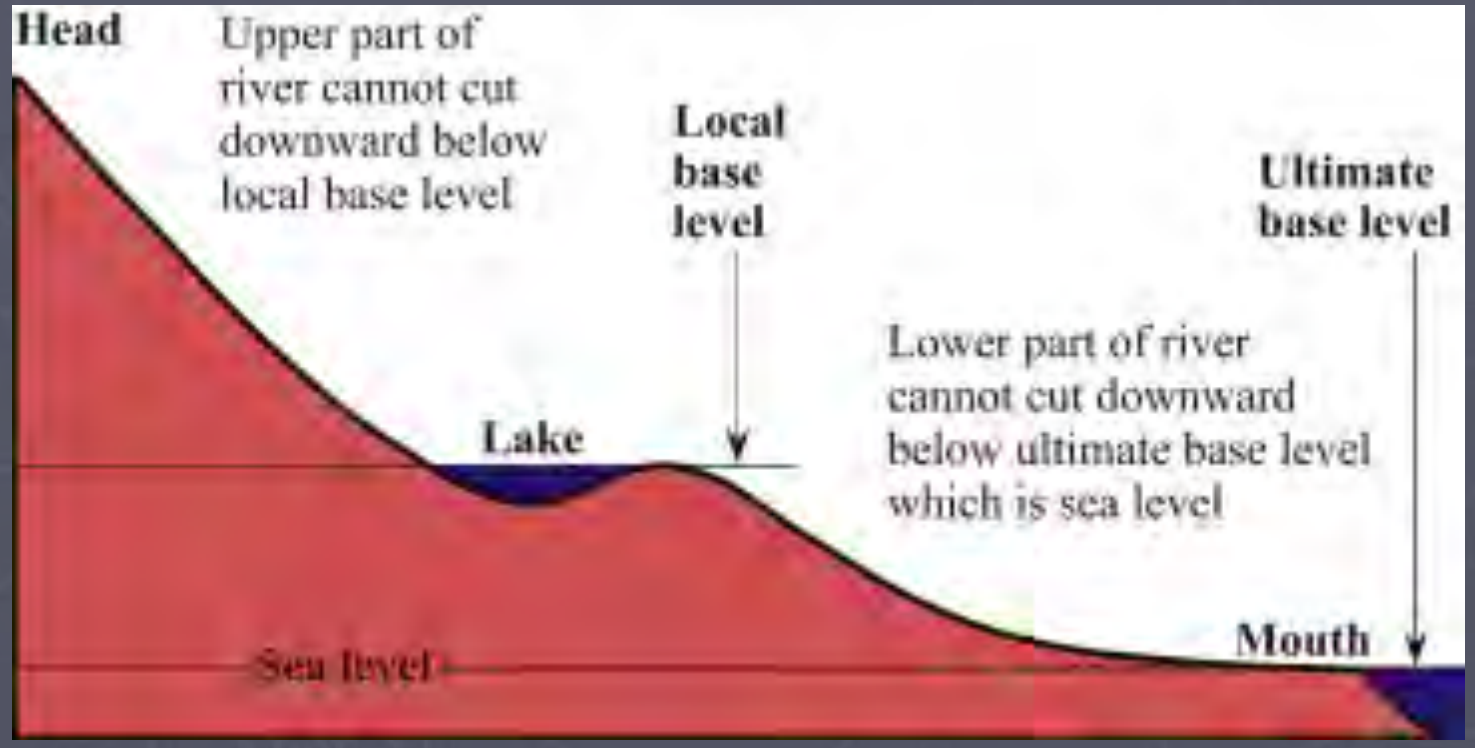
Erosion Control

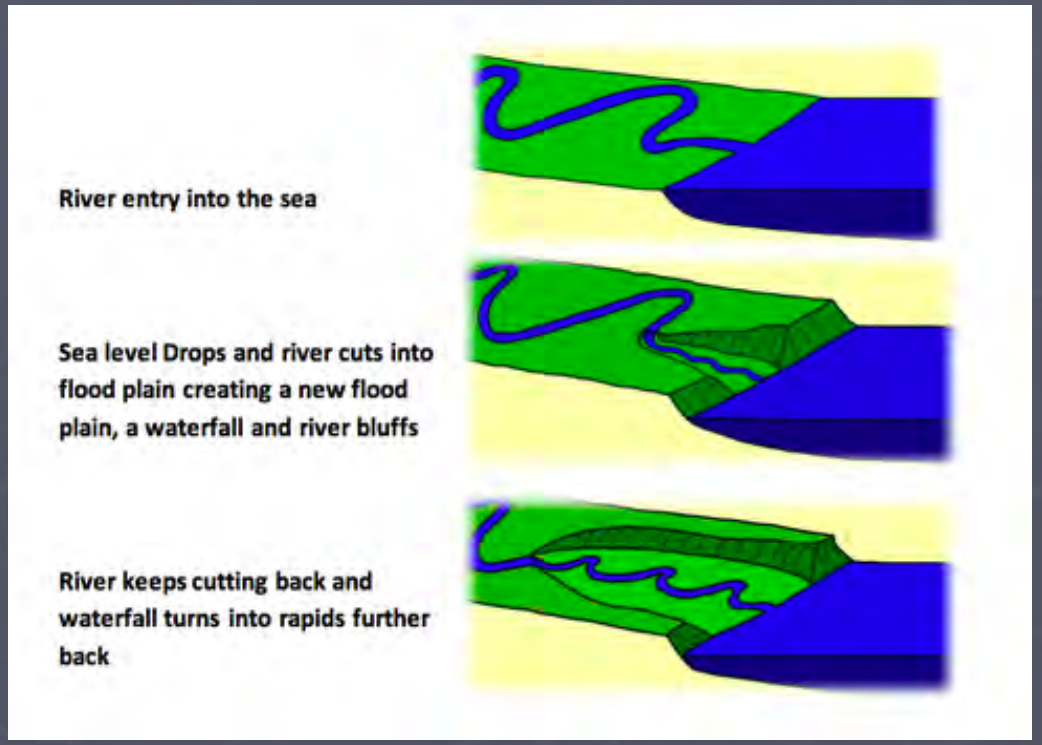
- Especially in urban/developed areas and areas that experience frequent flooding Erosion control used to protect riverbanks from further erosion
  - Using earthen embankments with vegetation, concrete/stone, and other materials

Case Study: Malecon on Guayas River (Ecuador)

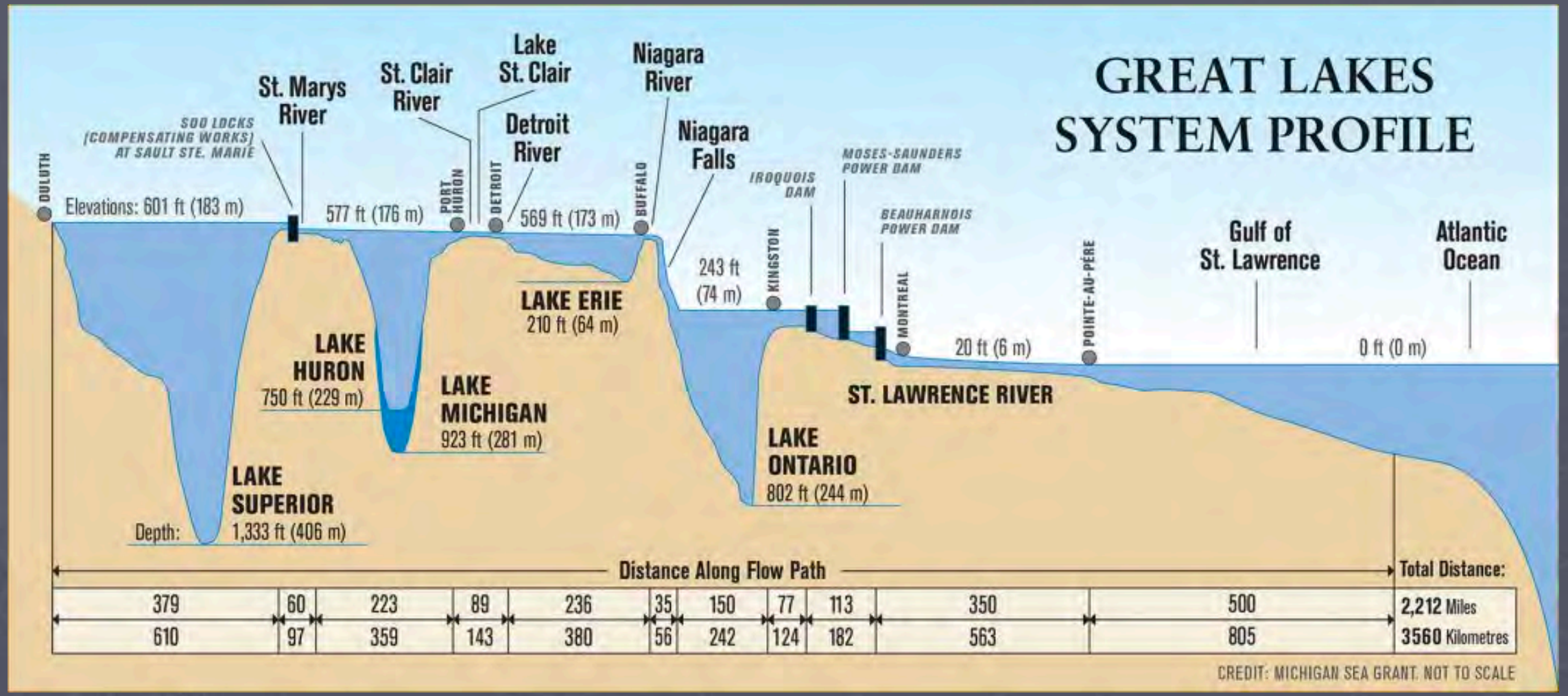
Base Level

- The lowest level which water can erode to
  - Also spots of heavy Deposition
- Leads to the creation of floodplains, waterfalls, and other features



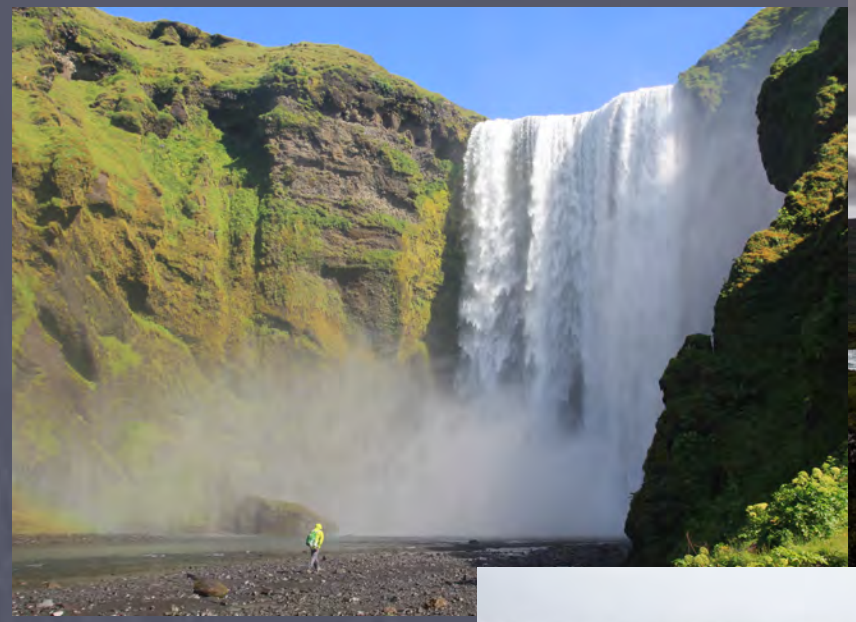


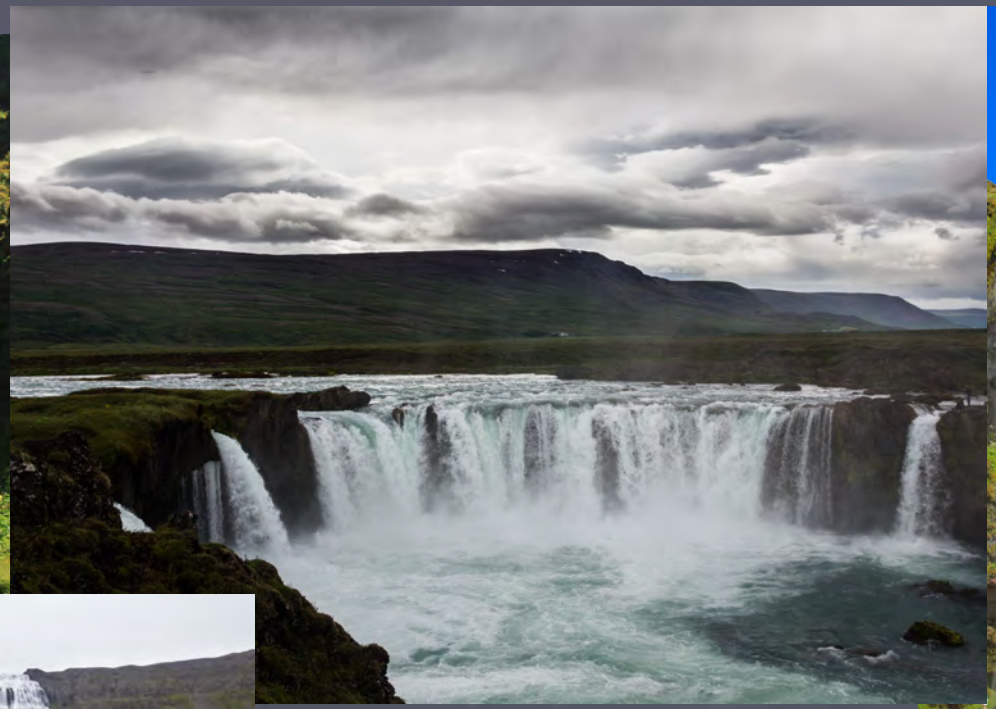
Achieving Base Level



Case Study: Minnesota's "North Shore"

Case Study: Iceland

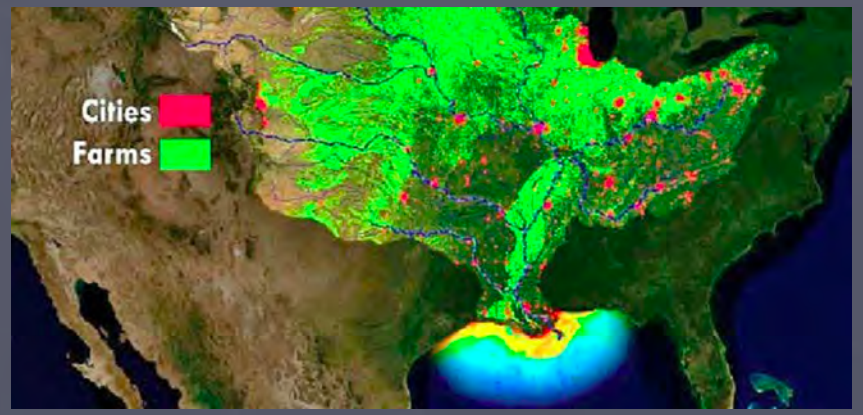


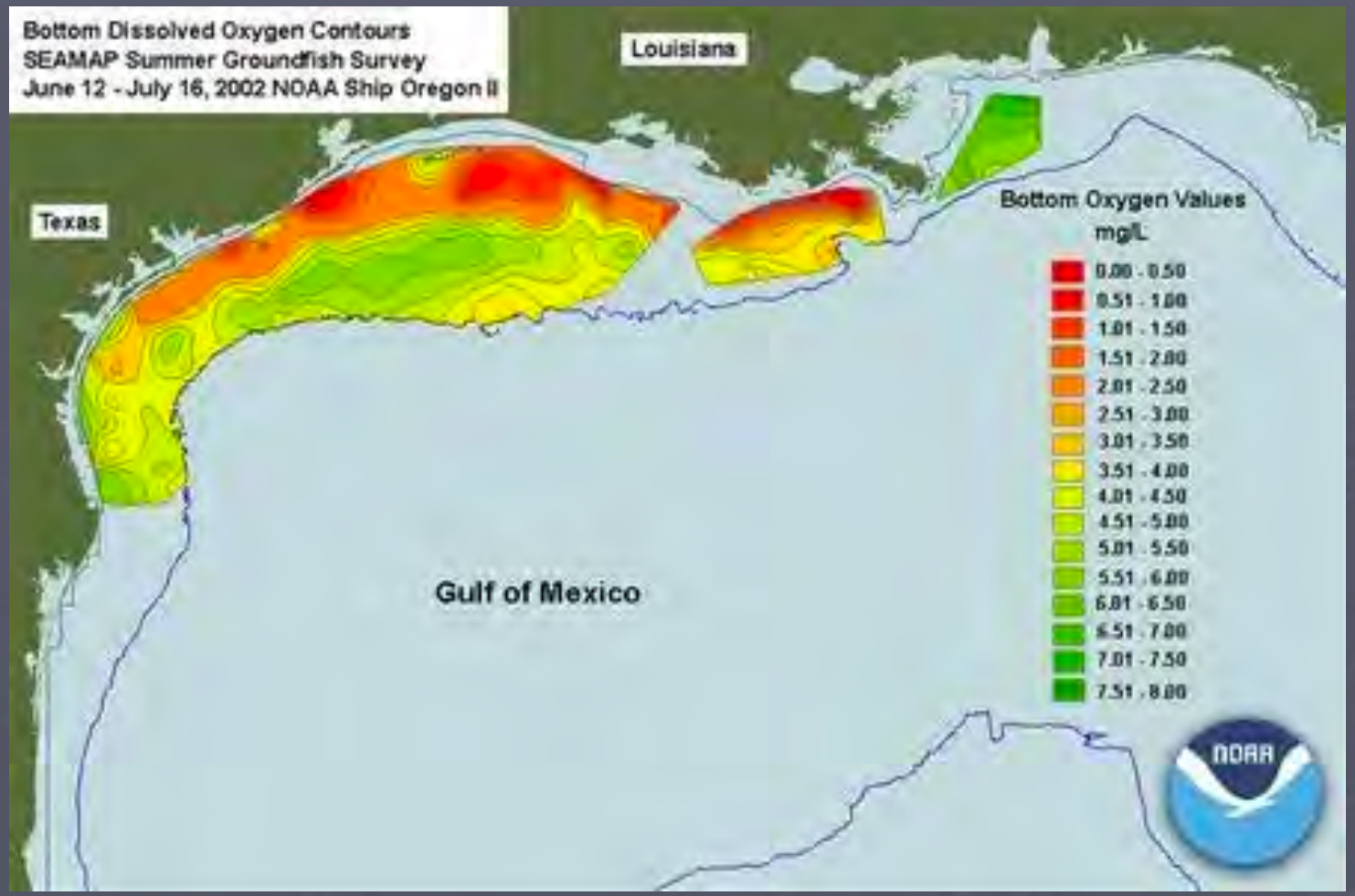


Runoff

- As part of water cycle water runs overland and eventually ends up in streams
  - Carries soil, trash, and any other substances it can with it

Case Study: Gulf of Mexico Dead Zone



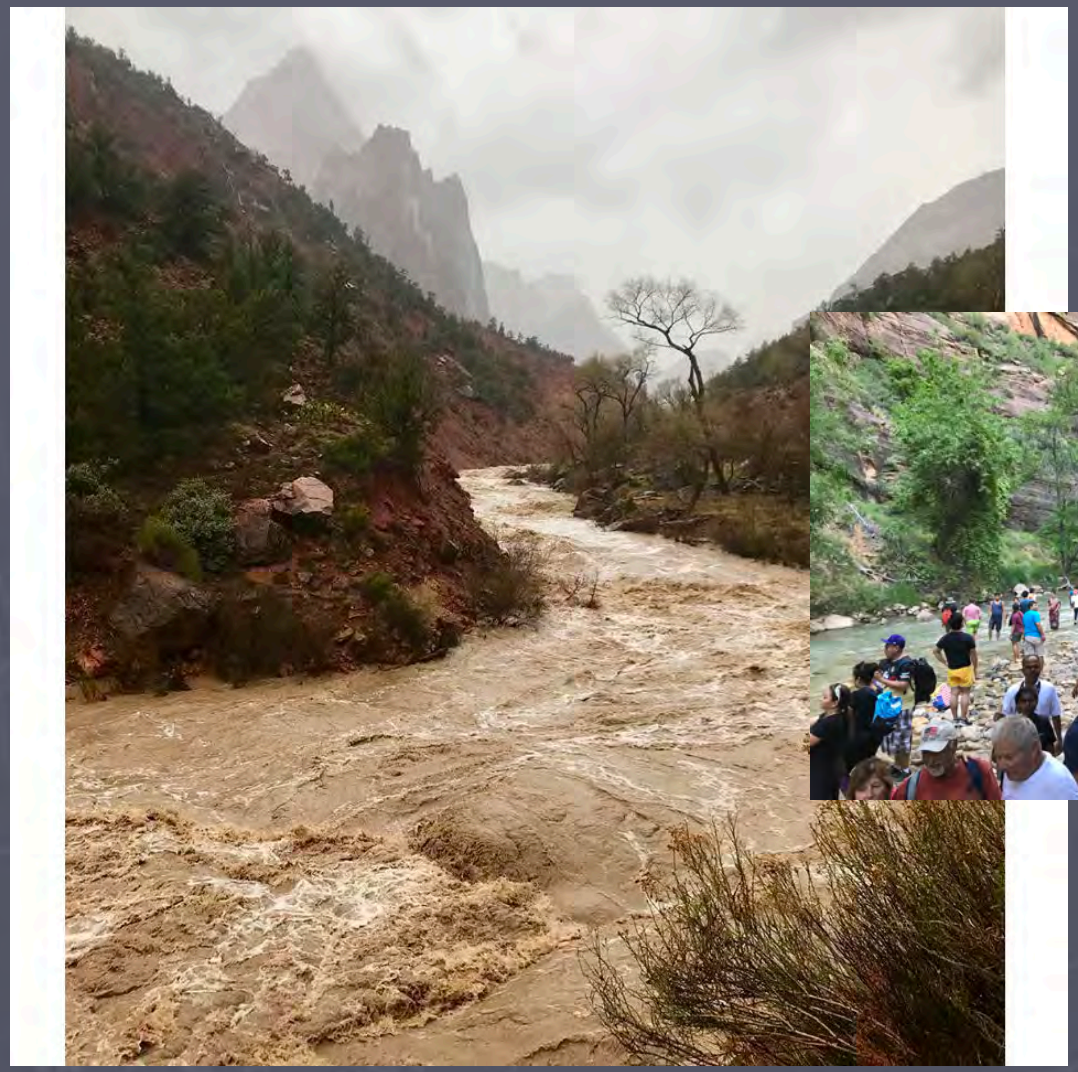


Flooding

- Caused by changes in precipitation and snow melt
  - Flash floods: Connected to sudden concentrations in precipitation

2019 Flood Before and After

Case Study: Zion National Park (Utah)

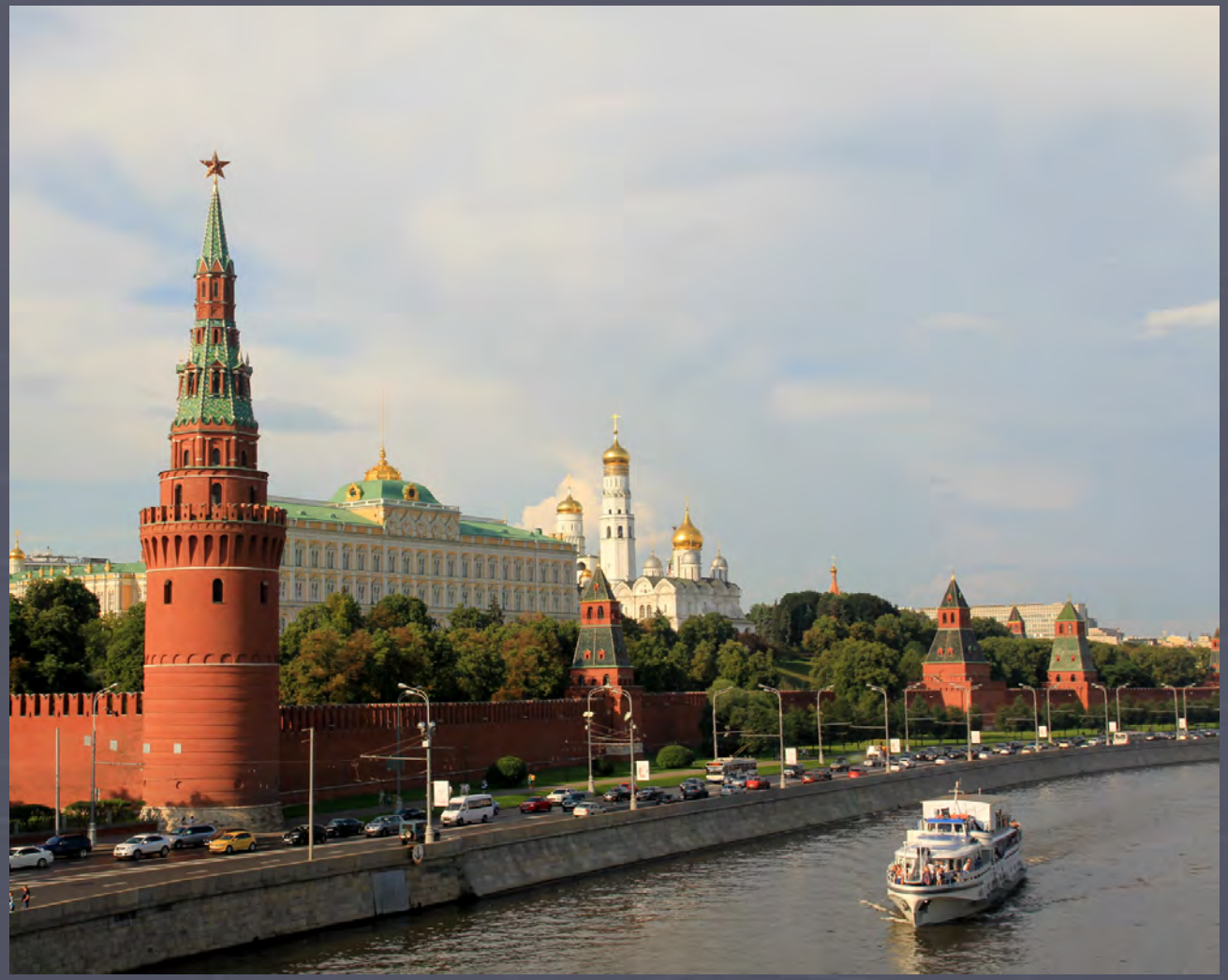


Flood Control/Floodplain Management

- Artificial levees
- Flood-control dams
- Channelization
- Nonstructural approach through good floodplain management

Case Study: Saint Cloud (Minnesota)

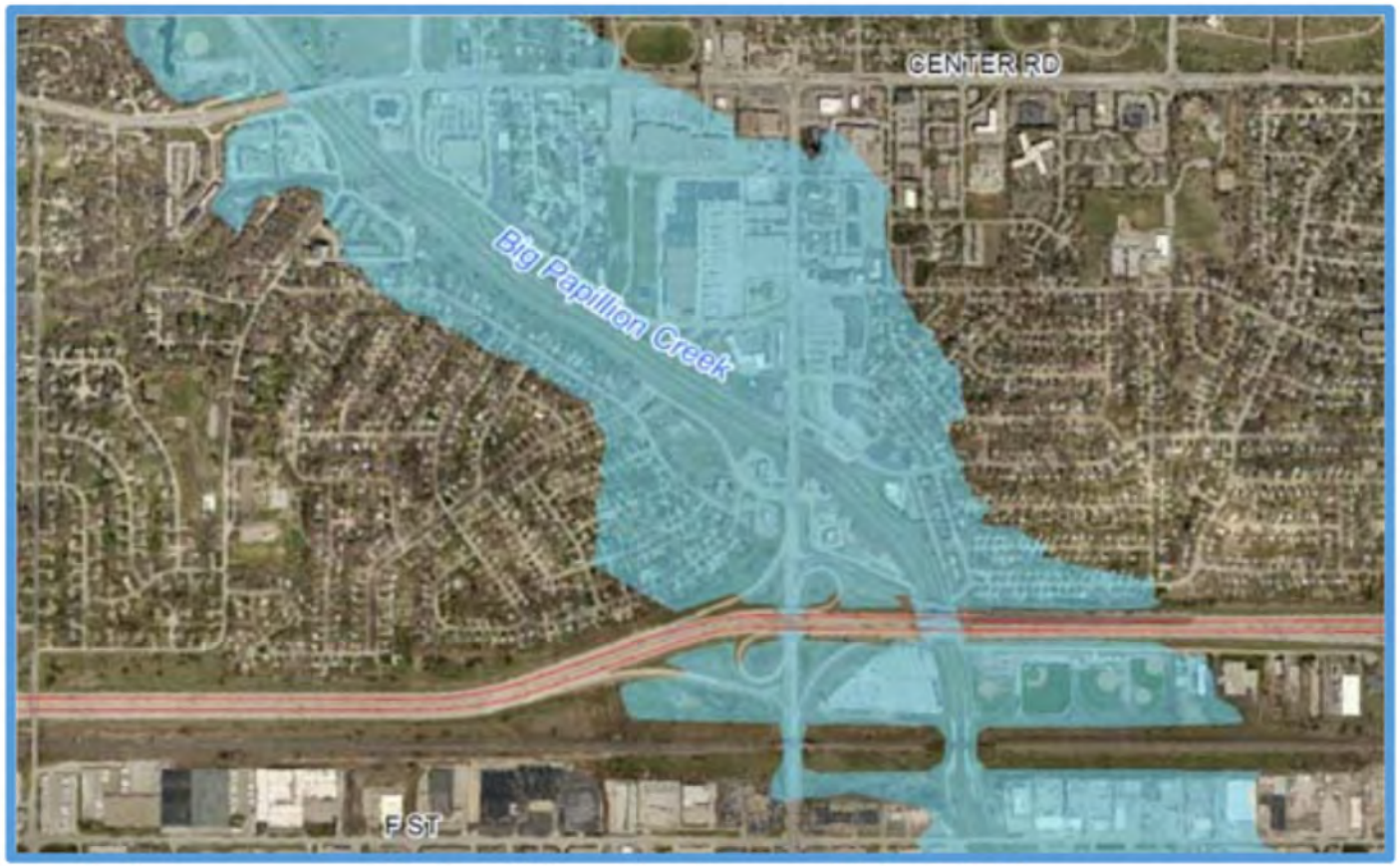
Case Study: Moscow River (Russia)



Case Study: Cheonggyecheon Stream (South Korea)

Case Study: Dusseldorf Rhine Park (Germany)

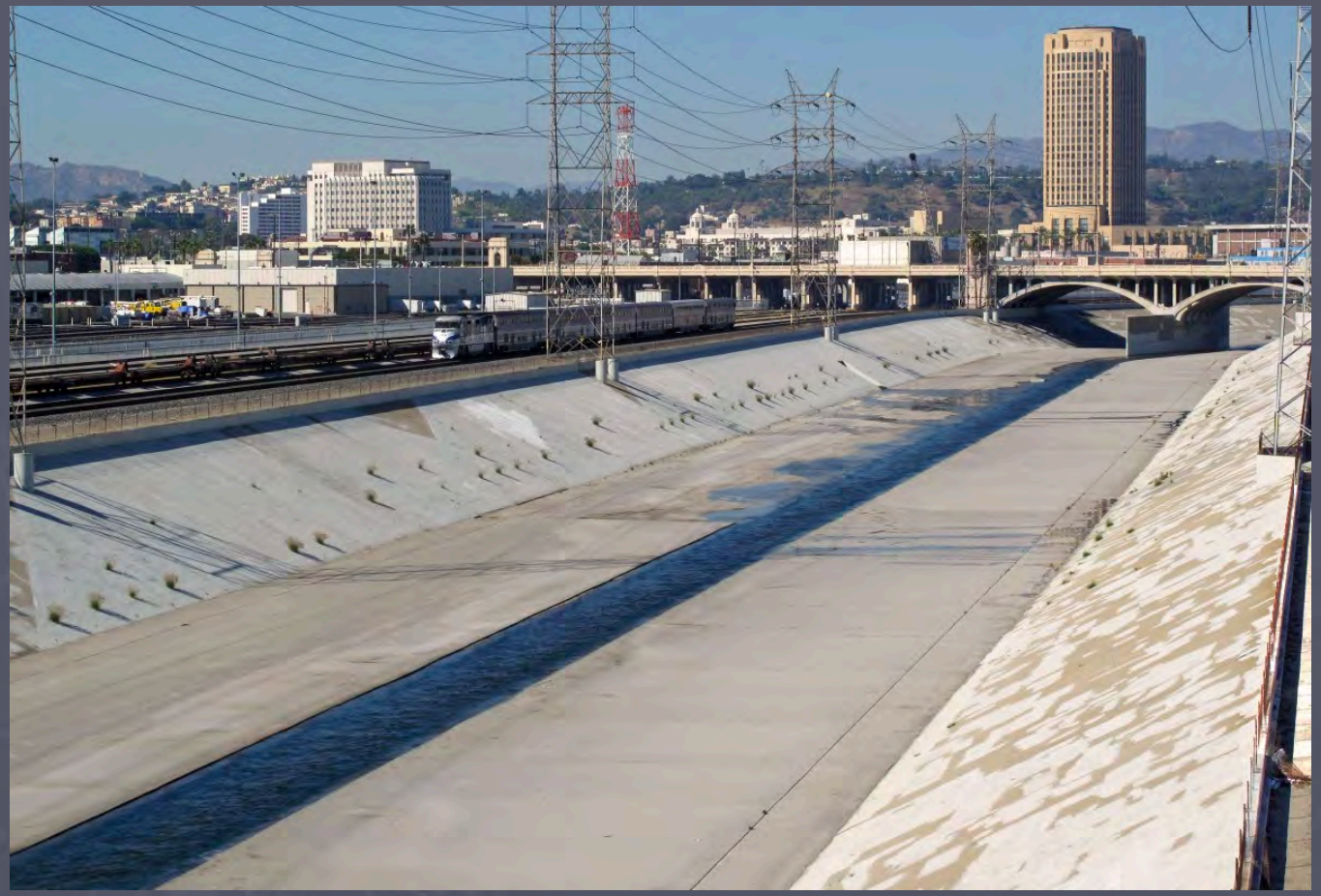
Case Study: Papillion Creek



Inundation areas on Big Papillion Creek near 84th & I-80

Simulation of 2010 Ames Flood in Omaha

Case Study: Los Angeles River (California)



1938 flood

Beavers and Healthy Streams