3-5 GRADE BAND

EDUCATION
GEORGIA AQUARIUM

Flowing Landscapes

Georgia Standards of Excellence:

- **S5E1.** Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive processes.

  a. Construct an argument supported by scientific evidence to identify surface features (examples could include deltas, sand dunes, mountains, volcanoes) as being caused by constructive and/or destructive processes (examples could include deposition, weathering, erosion, and impact of organisms).

Next Generation Science Standards:

- **4-ESS2-1.** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Learning Objective:

- Students will determine physical changes in a landscape caused by waterways.
- Students will analyze satellite imagery of a region.

Essential Question:

- How can water change a landscape?

Key Vocabulary:

- Deposition
- Erosion
- Meandering
- Oxbow Lake
- Island
- Peninsula
- Constructive
- Destructive

Materials:

- Mississippi River Example Sheet (two pages)
- Altered Landscape Worksheet (two pages)
- Pencil, pen, maker, crayon or colored pencil

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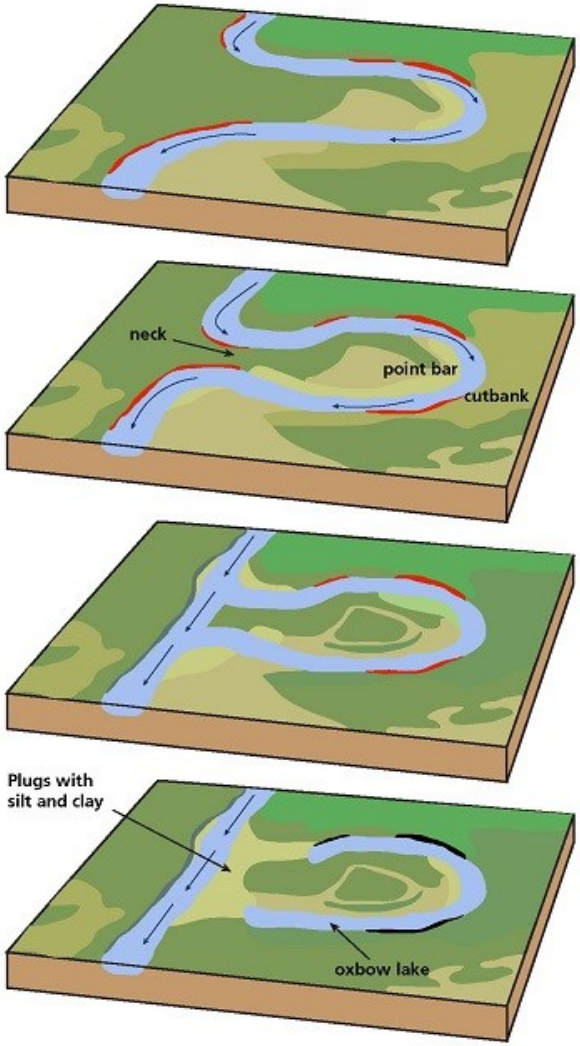
Background Information:

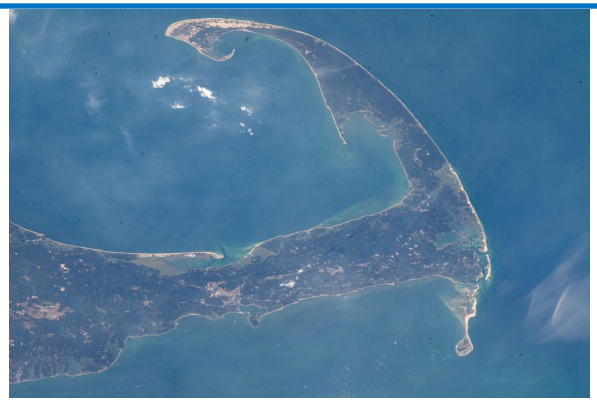
- Water is all around us and is constantly changing the features of land through constructive and destructive processes. Water weathering and erosion is an example of a destructive process.
    - It is the detachment and removal of soil material by water. The process may be natural or accelerated by human activity. The rate of erosion may be very slow to very rapid, depending on the soil, the local landscape, and weather conditions.
- Through erosion, water carries those rocks, sand, pebbles, etc. down the water way until it runs out of energy or encounters an obstacle. At these locations water deposition begins. Whole features and landscape changes can occur from these items building up.
    - This is an example of constructive processes.
- Meandering rivers are an excellent example of both processes occurring at once. These tend to be on gently sloped locations, so the river winds or meanders around. As water flows around these curves, the outer edge of water is moving faster than the inner. This creates an erosional surface on the outer edge (a cut bank) and a depositional surface on the inner edge (a point bar). Where the bends of two meanders meet, they bypass the curve of river, creating an oxbow lake which may then be filled with over-wash sediment (National Park Services).
    - Oxbow lakes often become bogs/ swamps or dry up and evaporate.

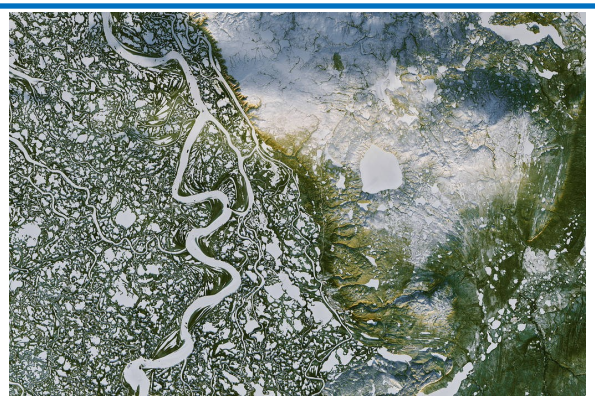


Flowing Landscapes

Activity Instructions:

1. Cover the background information with the students.
2. Distribute the Mississippi River Example sheet (page one) to each student. '
3. Explain these were taken by satellites way above earth from different years.
4. Ask students to point out spots of deposition, erosion and oxbow lakes.
5. Distribute the Mississippi River Example sheet (page two) to each student (or ask students to flip over if printed double sided).
    a. Discuss the provided examples and explain there are more than pointed out here. If desired, discuss further examples.
5. Distribute the Altering Landscape Worksheets (both pages) to each student. Work through it as a class or individually.





Flowing Landscapes

Evaluate:

- Confirm students circled and labeled examples of the landscape changing as well as offered explanations to what changed the landscape.
- Have students hypothesis how each landscape might change in another 40 years.
- Have students hypothesis what each landscape looked like in the early 1900s.

Extensions:

Visit Nasa's Earth Observatory to see various time-line photos of regions changing over time. The linked example is for Cape Cod, additional options are available on the right side. Before playing the video, have students hypothesis how the landscape will change.

https://earthobservatory.nasa.gov/world-of-change/CapeCod

References:

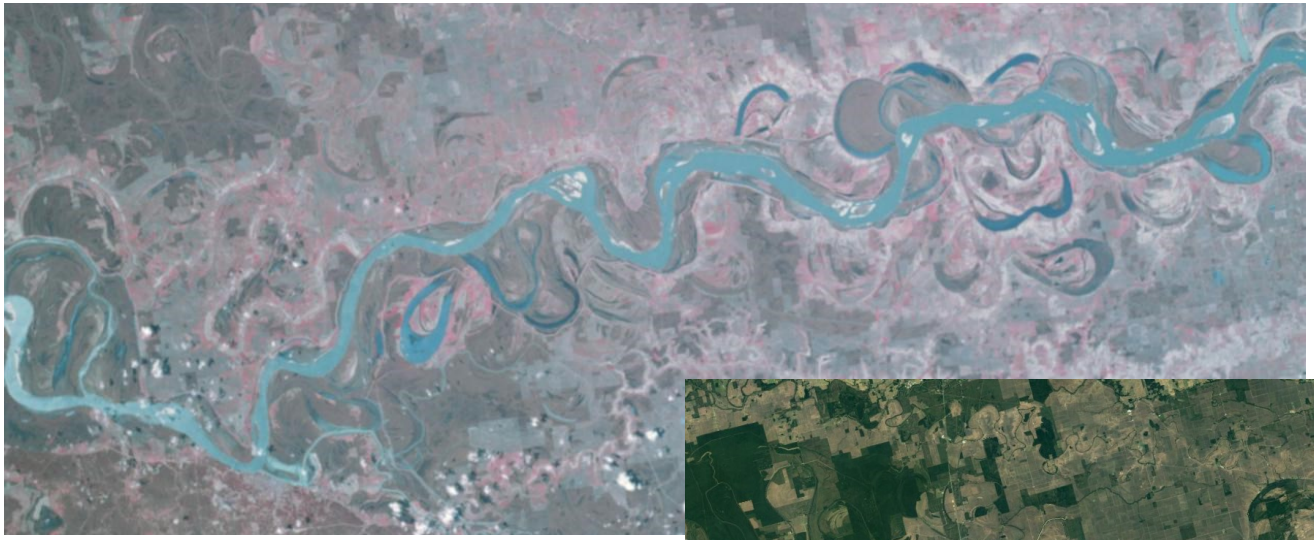
USGS, "Earth Explorer" August 18, 2020. https://earthexplorer.usgs.gov/

NASA, "NASA Image and Video Library" August 18,2020 https://images.nasa.gov/

Google Earth, "Google Earth" August 28,2020 https://www.google.com/earth/

Mississippi River Example

Compare and contrast the images below, ignore differences in colors, focus on the shape of the river, islands and bends. How has it changed in the 40 years difference between the time these pictures were taken?



March 9, 1969: Color infrared photograph of the Mississippi River between Vicksburg and Greenville as photographed from the Apollo 9. Image courtesy of NASA.

August 18, 2020: Color photograph of the same location from the Copernicus satellite. Image courtesy of Google Earth.

Mississippi River Example

1. This spot had was once a large peninsula called Davis Bend. Deposition started building up, decreasing the peninsula.

2. An island was present in the middle of this bend.

3. This bend of the river was fairly straight and consistent in water flow.

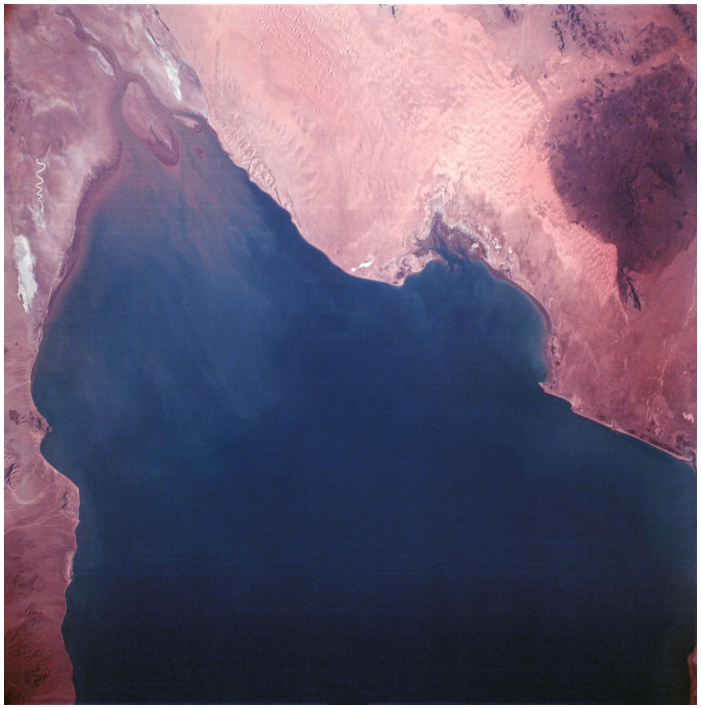
2. The island comprised mostly of sand, easily eroded in the center to create two smaller separate islands.

3. Over 40 years time this bend has eroded to make a small point and deposited on the left side to create a small island.

1. Over time, more silt, clay and sand built up covering this region in land. It is now referred to as Davis island. Very little traces of water remain in this region with the exception of occasional flooding.

Altered Landscapes Worksheet

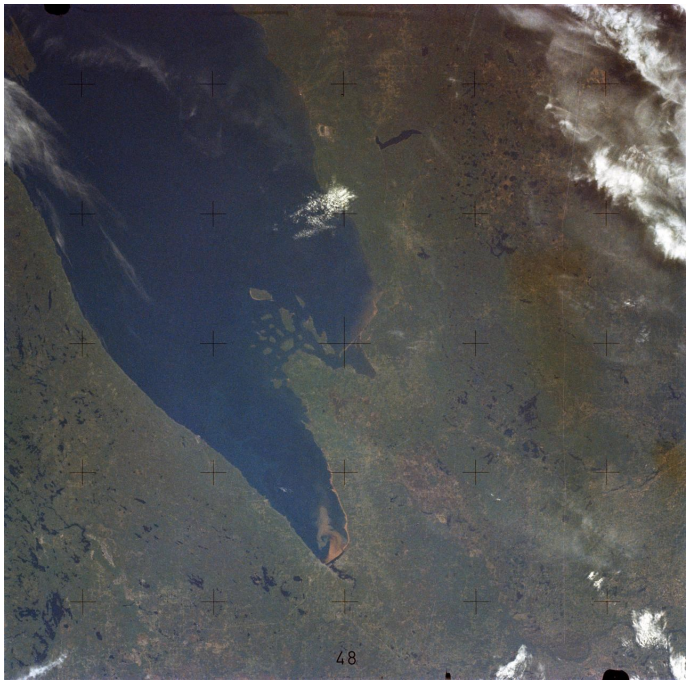
Compare and contrast the images below, ignore differences in colors. Using the Mississippi River Example as a guide, label examples of deposition and erosion. Research may be required. NOTE: The images aren't aligned perfectly so be careful in explanations.



View of the mouth of the Colorado River and the Gulf of California in northwestern Mexico. The left photo is from April 4, 1968 as photographed from the unmanned Apollo 6 courtesy of NASA. The right photo is from August 18, 2020 from Copernicus courtesy of Google Earth.

Altered Landscapes Worksheet

Compare and contrast the images below, ignore differences in colors. Using the Mississippi River Example as a guide, label examples of deposition and erosion. Research may be required. NOTE: The white on the right side is clouds not sand.



This view shows the west end of Lake Superior and Duluth, MN. The image on the left is from June 22,1973 taken by Nasa. The image on the right is from August 18,2020 from ESRI courtesy of USGS.