



Coastal Land Loss: Making Sense of it All

BTNEP/LSU AgCenter: Coastal Land Loss and Restoration

Focus/Overview

Students will understand the complex causes and effects of coastal land loss better if they conduct their own investigations and organize the information in a way that is personally meaningful. In the process of creating a concept map and then explaining the map to their classmates, the students will gain a deep understanding of coastal land loss and its affects on Louisiana.

Learning Objectives

The learner will...

- classify causes of coastal land loss into “natural” and “human”.
- organize the causes and effects of land loss in Barataria-Terrebonne into a concept map.
- decorate their concept maps, present them to their peers and display them in the school.

Louisiana Grade Level Expectations

3: GLE-58	Describe how humans have had negative and positive effects on organisms and their environments (SE-E-A5).
4: GLE-63	Demonstrate and explain how Earth’s surface is changed as a result of slow and rapid processes (ESS-E-A1, ESS-E-A5).
5: GLE-32	Demonstrate the results of constructive and destructive forces using models or illustrations (ESS-M-A7).
5: GLE-33	Identify processes that prevent or cause erosion (ESS-M-A7).
5: GLE-50	Describe the consequences of several types of human activities on local ecosystems (SE-M-A4).
8: GLE-53	Distinguish among several examples of erosion and describe common preventive measures (SE-M-A10).

Materials List

- Overhead transparency of **Causes of Coastal Land Loss in Barataria-Terrebonne (Blackline Master #1)**
- Overhead transparency of **Concept Map of BTNEP’s Seven Priority Problems (Blackline Master #2)**
- Copies of student worksheets: **Coastal Land Loss Connections (Blackline Master #3)**
- Copy of teacher information: **Causes and Effects: Making the Connections (Blackline Master #4)**
- BTNEP Priority Posters 1-4 (contact BTNEP for copies)
 - #1: Hydrologic Modification**
 - #2: Sediment Availability**
 - #3: Habitat Loss & Modification**
 - #4: Changes in Living Resources**
- **Thematic Map/Satellite image of the Barataria-Terrebonne Estuary** (contact BTNEP for copies)
- **Saving Our Good Earth: A Call to Action.** BTNEP Characterization Report (contact BTNEP for copies)

BTNEP Connection

Habitat

Grade Level

3-5, 8

Duration

40 minutes

Subject Area

science

Setting

classroom

Vocabulary

estuary, delta, distributary, abandoned delta, coastal land loss, coastal erosion, wetland loss

Original Source

“Coastal Erosion: Making Sense of It All” in BTNEP/LSU AgCenter: *Coastal Land Loss and Restoration*, Activity 1.



www.btnep.org



- **Land Loss in Lafourche Parish** brochure, Available from Lafourche Parish Council, 985/ 632-4666.
- Flip chart and easel (butcher paper taped on the wall will work)
- Poster board
- Markers and other materials for making attractive, colorful concept map
- **Vanishing Wetlands, Vanishing Future Video** (Contact BTNEP for copies)

Background

The Barataria-Terrebonne estuary was built over thousands of years as the Mississippi River changed its course through time. This geologically recent land mass is undergoing a great change. Wetland loss issues related to subsidence, hurricanes and storms, canals and navigation channels, introduced herbivores (nutria), flood control structures, development and urban sprawl, and sea level rise, all affect the ecosystem.

Procedure

1. The Barataria-Terrebonne **estuary** is a unique place. (Show students a satellite image of the Barataria-Terrebonne estuary.) Many people visit the estuary because of what it has to offer. What are some reasons people like to visit our estuary? (Students list the reasons why people visit Barataria-Terrebonne estuary, like seafood, wildlife (alligators, waterfowl), fishing, boating, scenery, swamps, music, etc.)
2. Our estuary is unique for another reason. Do you know how the land of estuary was made? It was made by the accumulation of thousands of years' worth of mud from the Mississippi River. For more than 7,000 years, the river has been building a huge **delta** out into the Gulf of Mexico. Before it began building the delta, the land of our estuary was not here. This area was actually under the waters of the Gulf of Mexico! Each time the river flooded, muddy water spread out over the land. When the water went down, the mud and sediment was left behind. That is how most of Louisiana was built. (This would be a good time to show a segment of a BTNEP video focused on how the Mississippi built its delta lobes over the last 7,000 years. Video clips are available for streaming over a computer. Vanishing Wetlands Video Clip 2: Mississippi Delta or video can be obtained from the BTNEP office.)
3. Bayou Lafourche once branched off from the Mississippi River. It is a **distributary** of the larger river, since it carried waters out of the main channel of the Mississippi River. It brought sediment down this way from the river, and every time the river flooded, so did Bayou Lafourche. Scientists estimate that it began to do this about 2,000 years ago. (Display the BTNEP Priority Issues Posters 1-4 in the classroom and discuss each one with the class. Leave the posters displayed for the students to use as they work.)
4. The Lafourche Delta is an **abandoned delta**. Land building is no longer occurring there due to human creation of the levee system. This means the Lafourche delta is actually shrinking now. This shrinking is referred to as **coastal land loss** or **coastal erosion** and sometimes as **wetland loss**. They all mean the same thing. Coastal land loss is a serious problem for everyone in Louisiana and even in other states. (Review what the functions and values are of coastal wetlands so students will understand why losing the coastal wetlands is a very serious issue.) Some of the causes of coastal land loss are natural and some are human. Some we can change to slow the rate of land loss and some we cannot change.
5. Here is a list of the factors causing coastal land loss in the Barataria-Terrebonne estuary. (Show the transparency **Causes of Coastal Land Loss in Barataria-Terrebonne Estuary – Blackline Master #1**)
6. Tell me what you have learned from the video about each of these factors. We'll record this information in a chart. We need to include the cause (the factor causing land loss), whether it is natural or human, the effect the factor has on the coastal wetlands and a possible solution to the problem if there is one. (Record what the students tell you on a flip chart or chalk board. Use four columns: cause, natural/human, effect, solution. Use one sheet for each of the causes of land loss.)
7. Let's start with sediment reduction. Tell me whether it is a natural cause or a human cause, and explain what it is. What effect does sediment reduction have on our wetlands? Give me possible solutions to this problem.
8. What about subsidence? (Go through each of the causes in the same manner.)

9. Now we have six sheets of paper representing important causes of coastal land loss. (Pass out **Coastal Land Loss Connections (Blackline Master #2)**. Before we go on, I want you to solve a puzzle. Wetland loss is a puzzle many people are trying to solve. Understanding the causes and effects is the first step to solving the problem. Draw lines between the columns to link the causes and effects of coastal erosion. (Students link components of coastal erosion on their worksheet.)
11. Our next task is to create a concept map that shows the relationships between the causes and the effects of coastal land loss. A concept map is useful explaining complex information and showing how one thing relates to another. Coastal erosion has several causes, and those causes have several effects. They don't all happen separately in different areas. They happen together and can affect each other, which makes it more complex, especially when you are trying to find solutions. (Have students construct their concept maps. This can be an individual assignment or a small group assignment.) First sketch your concept map on a piece of notebook paper. After I've approved your work, you can transfer your map to a larger sheet of paper and add illustrations to enhance your concept map's information.
12. When concept maps are finished, have students present them and then display the in the classroom or school.

Blackline Masters

1. **Causes of Coastal Land Loss in Barataria-Terrebonne Estuary**
2. **Coastal Land Loss Connections** (teacher answer key provided)
3. **Coastal Land Loss in the Barataria-Terrebonne Basin** (information sheet)

Assessment

- Use the concept maps produced by students at the end of the lesson as a means of assessing their understanding of coastal land loss.

Resources

BTNEP Resources:

- BTNEP Priority Posters 1-4 (contact BTNEP for copies)
- Satellite image of the Barataria-Terrebonne Estuary (contact BTNEP for copies)
- **Saving Our Good Earth: A Call to Action.** BTNEP Characterization Report (contact BTNEP for copies)

Tradebooks:

Billot, Wendy. 2005. **Before the Saltwater Came.** 32pp.

LaLoutre, the grandmotherly otter, gently tells the story of her life in the Louisiana marsh. Readers will learn about the beauty and charm of the wetland and how its gradual disappearance affects the wildlife and plants.
<http://www.wetlandbooks.com/> Ages: 3+

Garrett, Ann. 1999. **Keeper of the Swamp.** Turtle Books. 40 pp. ISBN: 1890515124

A boy's heritage from his dying grandfather, who protects the alligators of their Louisiana swamp from poachers, is the knowledge of the ways of the swamp and how it should be kept undamaged. Includes informational pages on alligators and swamps. Age Range: 6 to 9.

Somervill, Barbara A. 2004. **Animal Survivors of the Wetlands.** Scholastic Library Publishing. 64pp.
 ISBN: 0531165914

The American alligator, the brown pelican, and the whooping crane are some of the animals that make the wetlands their home and have faced extinction. Over the years, the existence of these animals has been threatened by hunting, pollution, pesticides, and habitat destruction. This book explores the efforts being made to help these animals survive and thrive. Age Range: 10 to 12.

Causes of Coastal Land Loss in Barataria-Terrebonne Estuary

- Subsidence
- Sea level rise
- Flood control structures on the Mississippi & Atchafalaya rivers
- Canals and navigation channels
- Storms and wave action
- Herbivory
- Development



Coastal Land Loss Connections

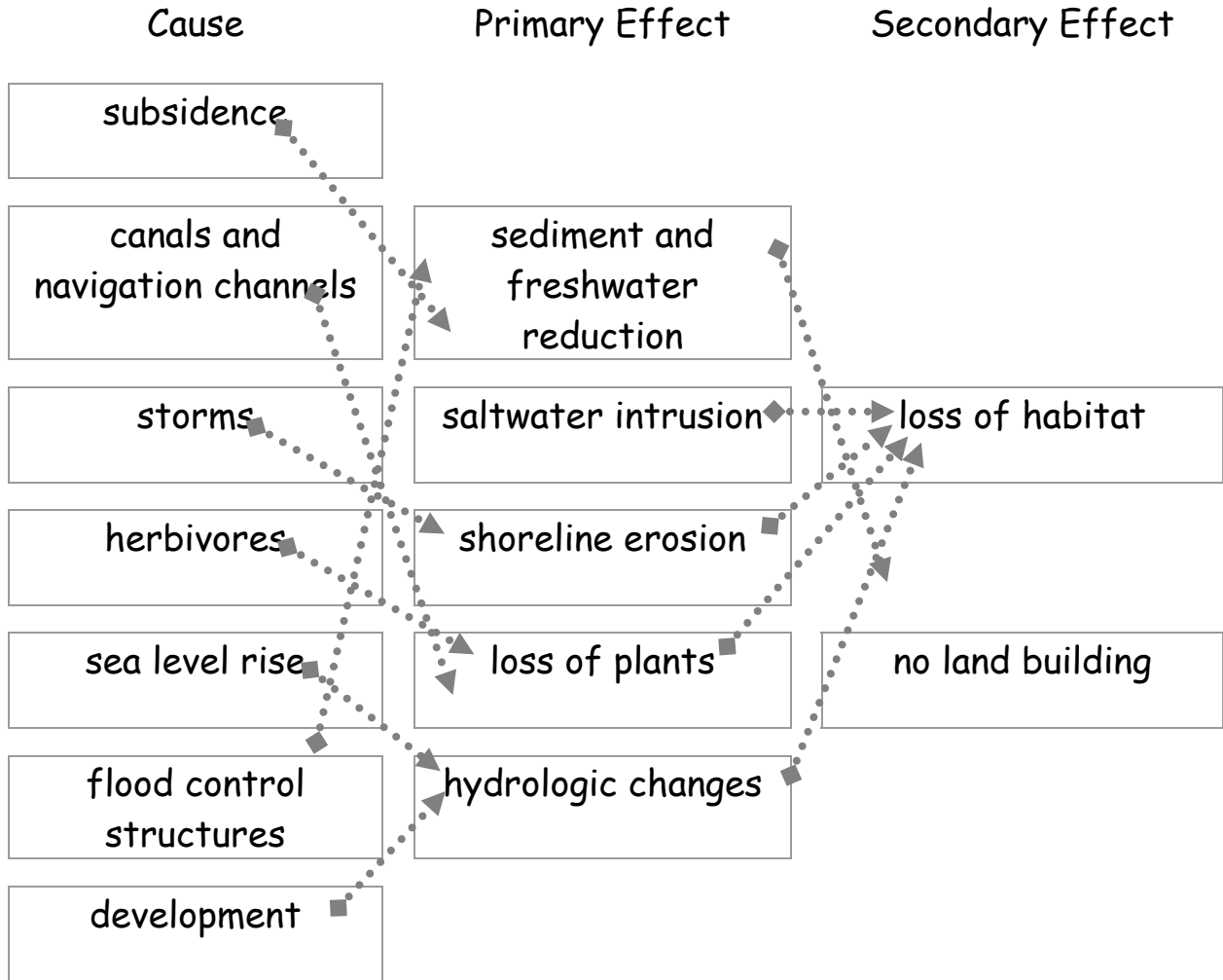
Connect the cause of coastal erosion with its primary and secondary effect(s) with labeled arrows. Write "cause(s)" and "lead(s) to" on the arrow shafts.

Cause	Primary Effect	Secondary Effect
subsidence		
canals and navigation channels	sediment and freshwater reduction	
storms	saltwater intrusion	loss of habitat
herbivores	shoreline erosion	
sea level rise	loss of plants	no land building
flood control structures	hydrologic changes	
development		



Coastal Land Loss Connections

Connect the cause of coastal erosion with its primary and secondary effect(s) with labeled arrows. Write "cause(s)" and "lead(s) to" on the arrow shafts.



Coastal Land Loss in Barataria-Terrebonne Basin

- Will there be any barrier islands by the year 2030?
- Will the towns south of the Houma-Thibodaux area survive?
- What will happen to our seafood industry?
- How will we protect our properties from hurricanes when the natural protection is gone?
- How can today's residents of Barataria-Terrebonne plan for their children's future?
- What can the people of Barataria-Terrebonne do to help themselves?



When you were a middle school student, did you have to try to answer questions like these? Today the students of Barataria-Terrebonne and other parts of Louisiana need to think about these weighty questions. They face a future full of change and uncertainty, and a large issue is the loss of our coastal wetlands, the backbone of much of the economy and the culture of Barataria-Terrebonne, and protection from devastating hurricanes. Today's students need the knowledge and the critical thinking skills necessary for making informed decisions and practicing good stewardship of the rich resources of our coastal wetlands.

Barataria-Terrebonne is disappearing at a faster rate than any place else in the world. In coastal Louisiana as a whole, 25-35 square miles of marsh become open water every year (that's about one football field every 30 minutes!). The average land loss rate in Barataria-Terrebonne is estimated at more than 18 square miles a year, but there are many hot-spots where the loss is much more severe than the average.

If the causes of coastal land loss in Barataria-Terrebonne were simple, there might be a simple solution. But the causes are complex. Many factors contribute to the loss of our coastal habitats. Some are natural geologic processes, and others are caused by human activities. Natural geologic processes that result in coastal land loss include subsidence, sea level rise, storms and wave action, and herbivory. Human activities that result in coastal land loss include flood control structures on the Mississippi and Atchafalaya rivers (e.g. levees, dams), canals and navigation channels, and development.

Barataria-Terrebonne is part of the Lafourche delta lobe, which is part of the huge Mississippi River Delta. The young sediments that make up the land of the

Lafourche delta lobe were deposited by the floodwaters of the Mississippi River and Bayou Lafourche beginning about 2,000 years ago. Bayou Lafourche was then a major tributary of the Mississippi River, directing a large portion of the river's flow south to the Gulf of Mexico. Today, even if people had not discovered the bountiful resources of Barataria-Terrebonne and settled there in large numbers, the Lafourche delta would be deteriorating. It is in the erosional phase of its delta-building and degradation cycle, the Gulf of Mexico erodes the barrier islands and headlands of the shoreline.

We have no control over the geologic processes that govern this cycle. But people have made changes that have greatly increased the rate at which the delta is eroding, and these changes are affecting the lives of the people in Barataria-Terrebonne in many negative ways. The human changes include construction of the levees on the Mississippi River and Atchafalaya River, which prevent fresh water and sediments from flowing through the network of waterways that make their way across Barataria-Terrebonne. In addition, canals cut for navigation and oil and gas access have altered the hydrology, or water flow.

These effects were unintentional, but they have had disastrous results, teaching us how fragile the marshes and swamps of Barataria-Terrebonne are. Today, we face a huge challenge. With a strong commitment, careful planning and a large amount of money, the rapid land loss can be slowed. But it will take the involvement of not only government agencies, scientists and decision-makers, but the residents of the Barataria-Terrebonne basins, whose culture and economy depend on the survival of the coastal wetlands.