

# *On the Gulf: Coastlines in Danger*

## Teacher's Guide

Grade Level: 6–8

Curriculum Focus: Physical Science

Lesson Duration: Two class periods

### Program Description

In the aftermath of Hurricane Katrina, this program takes a look at the challenges that scientists, environmentalists, and engineers face with Gulf Coast weather phenomena.

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### Onscreen Questions

Part 1, "Tracking Hurricanes" and "The Disappearing Delta"

- How does hurricane activity affect the dwindling delta?
- How does a quickly changing coastline affect wildlife?

Part 2, "Rebuilding the Buffer"

- How can people live in the Mississippi Delta without destroying its ecosystem?
  - What can be done to replenish the delta? Will these steps work in the long run?
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### Lesson Plan

#### *Student Objectives*

- Describe how the environment of the Mississippi Delta has changed over time, from its relationship to the Mississippi River to the long-term effects of the levees.
- Explain how the loss of Mississippi Delta wetlands affected cities along Louisiana's coastline during Hurricane Katrina.
- Research and summarize information about the wetlands, including their significance, the organisms that make up the ecosystem, and the ways that humans have modified the ecosystem.
- Use information from the program and other resources to develop a book that utilizes best practices in writing about science concepts and demonstrates an understanding of the importance and use of wetlands on the Gulf Coast.

## Materials

- On the Gulf: Coastlines in Danger video
- Computer with Internet access
- Print resources about the wetlands
- Samples of children's science books, both nonfiction and fiction
- Publishing program

## Procedures

1. After watching the video, discuss how the Mississippi Delta has changed over time. What is the relationship between the Mississippi River and the Mississippi Delta? How did the river form the delta? (*Heavy seasonal rains cause the Mississippi River to flood and temporarily cover surrounding land. The Mississippi Delta formed from sediment, plant matter, and clay left behind when the water subsides.*) What put an end to this natural land-building process in 1928? (*After a catastrophic flood in 1927, the Army Corp of Engineers built a series of levees along the Mississippi River.*) How did the levees affect the wetlands of the Mississippi Delta? (*The river was separated from the delta. The river could no longer flood and build the wetlands, so the wetlands began to slowly disappear.*)
2. Next, ask students to describe how wetlands affect coastal areas during a hurricane. (*They protect the coast by providing a buffer against the storm surge, a dome of water that approaches the coast during a hurricane.*) Why is the city of New Orleans particularly vulnerable to the storm surge from a hurricane? (*The city is built below sea level, between Lake Pontchartrain and the Mississippi River, and is protected by a series of natural and manmade levees.*) What impact did the disappearing wetlands of the Mississippi Delta have on the city of New Orleans during Hurricane Katrina? (*The wetlands could not act as a buffer against the storm surge. The floodwater breached the levees and the city flooded.*) For more information, the following site provides maps of the storm's path, satellite photos showing the damage in New Orleans, and diagrams of how the levees are being repaired.
  - Hurricane Katrina: Mapping the Destruction  
<http://news.bbc.co.uk/1/shared/spl/hi/americas/05/katrina/html/default.stm>
3. As a class, discuss why it's important to learn about the wetlands. Explain that students' assignment is to write a book about the wetlands for elementary students. Their book can be either nonfiction or fiction, and can be organized in any way they'd like, but it should answer the following questions:
  - What are wetlands? What are some common names for types of wetlands?
  - What are the physical characteristics of wetlands?
  - How do wetlands form?

- What are some examples of wetlands around the United States?
  - What plants and animals live in wetlands?
  - Why are wetlands important?
  - What is happening to the wetlands?
  - What are some effects of the disappearing wetlands?
  - What are at least three human activities that threaten the wetlands?
  - What is being done (or can be done) to stop the destruction of the wetlands?
4. Before you begin, pass around some examples of science-themed children's books, both fiction and nonfiction. (An example might be a book from the *Magic School Bus* series.) Ask students what they think makes a successful children's science book. Encourage them to consider the overall concepts, the writing, and the design. Some ideas might include
- Simple concepts (or complex concepts explained in simple terms)
  - Clear, short sentences
  - Lively, engaging copy
  - Colorful, well-labeled pictures that support the text
  - Simple charts, graphs, or maps
  - Examples or connections with children's own lives
  - Large, easy-to-read text
  - Not too much text on one page
5. Have students work in small groups of three or four to create their books. They should all participate in the research and the development of a book outline, but they may want to divide specific tasks, such as writing, editing, illustrating, and photo and image research. The following websites provide information for their research:
- EPA: Wetlands  
<http://www.epa.gov/owow/wetlands/>
  - Wetland Information  
[http://www.wetland.org/educ\\_wetlandinfo2.htm](http://www.wetland.org/educ_wetlandinfo2.htm)
  - Wetlands in the National Parks  
<http://www.nature.nps.gov/water/wetlbro.htm>
  - National Wetlands Inventory  
<http://wetlands.fws.gov/>

6. After students have completed their books, pass them around for the rest of the class to read. Which ones were most effective in teaching about the wetlands? Which ones would children enjoy reading most? You may want to choose two or three from the class to share with an elementary class in your school.
7. Conclude the lesson by reviewing what students learned. How did their understanding of the wetlands change? What were some of the most surprising facts about the wetlands? What were some of the most innovative or promising approaches to saving the wetlands?

### *Assessment*

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students shared several observations about how rivers form deltas, the purpose of levees and their effects on wetlands, or the importance of wetlands in hurricane-prone areas; clearly described the wetlands and the organisms that make up the ecosystem; thoroughly explained the significance of the wetlands and identified at least three ways that humans have modified this ecosystem; used this information to create an engaging, age-appropriate children's book that utilizes at least five of the best practices in science writing as agreed upon by the class.
- 2 points: Students shared a few observations about how rivers form deltas, the purpose of levees and their effects on wetlands, or the importance of wetlands in hurricane-prone areas; adequately described the wetlands and the organisms that make up the ecosystem; provided a satisfactory explanation for the significance of the wetlands and identified at least two ways that humans have modified this ecosystem; used this information to create a complete, accurate, age-appropriate children's book that utilizes at least two of the best practices in science writing as agreed upon by the class.
- 1 point: Students shared one or no observations about how rivers form deltas, the purpose of levees and their effects on wetlands, or the importance of wetlands in hurricane-prone areas; provided an incomplete description of the wetlands and the organisms that make up the ecosystem; provided an unclear or inaccurate explanation for the significance of the wetlands; identified one or no ways that humans have modified this ecosystem; children's book did not answer the required questions and did not utilize at least two of the best practices in science writing as agreed upon by the class.

### *Vocabulary*

#### **delta**

Definition: A large, triangular shape of land where sand and soil is deposited at the mouth of a river

Context: For years scientists have been warning about the dangers of Louisiana's receding delta.

**hypoxic**

Definition: Having a reduced concentration of dissolved oxygen; in a water body, hypoxia leads to stress or even death in aquatic organisms

Context: Hypoxic conditions in a river can cause fish to suffocate.

**levee**

Definition: An embankment designed to prevent flooding

Context: The levees surrounding New Orleans were designed to withstand category-3 hurricanes.

**sediment**

Definition: The solid matter that settles to the bottom of liquid

Context: The benefits of the river are the fresh water and the sediments that they provide.

**storm surge**

Definition: The dome of water produced by the action of cyclonic winds during a hurricane, in which the sea level can be up to five meters higher than normal

Context: When a hurricane comes ashore, the storm surge comes with it, destroying beaches and almost everything else in its path.

**wetlands**

Definition: A lowland area, such as a marsh or swamp, where the soil is saturated with moisture; an area of land where much of the soil is covered with water

Context: Louisiana wetlands are disappearing at the alarming rate of 25 square miles every year.

*Academic Standards*

**Mid-continent Research for Education and Learning (McREL)**

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following national standards:

- Science – Earth and Space Sciences: Understands atmospheric processes and the water cycle; Understands Earth's composition and structure
- Science – Nature of Science: Understands the scientific enterprise

### **National Academy of Sciences**

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following science standards:

- Science in Personal and Social Perspectives
- Earth and Space Science

### **The National Council of Teachers of English (NCTE) and the International Reading Association (IRA)**

The National Council of Teachers of English (NCTE) and the International Reading Association (IRA) have developed national standards to provide guidelines for teaching the English language arts. To view the standards online, go to <http://www.ncte.org/about/over/standards/110846.htm>.

This lesson plan addresses the following national standards:

- Students apply knowledge of language structure, language conventions, media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts.
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### **Support Materials**

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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### ***Credit***

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