

RESOURCE LIBRARY
ACTIVITY : 1 HR

Hydrology of the New Orleans Region

Students learn about hydrology, explore the hydrological features of a landscape in National Geographic's FieldScope tool, and apply their knowledge during a role-playing activity about natural resource management.

GRADES

6 - 12+

SUBJECTS

Biology, Ecology, Earth Science, Experiential Learning, Geography, Geographic Information Systems (GIS), Human Geography, Physical Geography

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OVERVIEW

Students learn about hydrology, explore the hydrological features of a landscape in National Geographic's FieldScope tool, and apply their knowledge during a role-playing activity about natural resource management.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/hydrology-new-orleans-region/>

DIRECTIONS

1. Introduce hydrology and delta dynamics.

Explain to students that hydrology is the study of the movement, distribution, and functions of water in an area. One of the key drivers of hydrology is the water cycle. Have students read the encyclopedic entry for the water cycle. Ask: *What kinds of features are part of*

hydrology? (rivers, precipitation, lakes, water tables, sea level, currents) Then explain that for the New Orleans area specifically, delta dynamics are a central hydrological feature. Have students read the National Geographic encyclopedic entry for deltas. This time, give students a piece of paper and ask them to write at least three interesting facts they learned about deltas around the world. Then, have students watch two National Park Service videos on delta dynamics: “How Water Builds Land” and “How Have We Changed the Delta?” Have students write a brief description of how a delta works in their own words, using the same paper with their delta facts. Finally, explain the concept of a preserve. Explain how the Barataria Preserve, which students will investigate in this activity, is dedicated to the wetland ecosystems of New Orleans and is just one part of the six-part Jean Lafitte National Park. As a wetland, hydrology plays an important role in forming the habitats of this preserve.

2. Build understanding about water resource management.

Explain to students that hydrology impacts where people can live, and people often manage water resources to expand where they settle. An important example for the New Orleans region, as well as other delta ecosystems, is the creation of human-made levees to hold water back from human settlements. As students saw in the encyclopedic entry and video on deltas, these ecosystems are constantly changing. To deal with this change, people create levees to manage where water flows. But water is hard to keep in one place, making management very challenging. Have students read the National Geographic encyclopedic entry for levees to deepen their understanding of this hydrological management tool.

3. Explore the hydrology of the New Orleans region using FieldScope.

Access the FieldScope website for the Barataria Preserve and New Orleans area. Follow the short tutorial in FieldScope with students to explore how it works. Then, work alongside students and carry out the following instructions:

- In FieldScope, turn on the Boundaries and Places layer as well as the Coastal Land Loss layer. Examine this layer by looking at the legend to identify the different categories of land loss. Identify the number of years the land loss represents. Ask: *What types of areas seem to have the most land loss? What areas have land gain?* (Hint: they show up as green and you might have to zoom out to find them.) *Is there any land loss in the Barataria Preserve?*

- Zoom out so you can see all of New Orleans and some of the surrounding landscape. Identify on which side (east/west) of the Mississippi River most of the land loss occurs. Ask: *How might this relationship relate to the ocean?*
- Now turn on the Levees layer. Notice where levees are located. Turn on the Housing Density layer as well. Ask: *Are there any patterns between levees and where people live?* Now turn on the Land Cover layer. Ask: *Are there any patterns between levees and land cover types?*
- Keep all layers on and zoom into the Barataria Preserve. Ask: *What role do you think levees play in the Barataria Preserve—do they keep water out or let it into the preserve? How do you think this impacts the wetlands ecosystem in the preserve? (If there is not enough or is too much water in the preserve, the different plant and animal species might suffer, decreasing biodiversity or shifting ecosystem compositions.)*

As a class, discuss how exploring the hydrology of New Orleans relates back to the delta video students watched. Ask: *How do you think the hydrology of this area impacts the people who live here? What are its impacts on the ecosystem?*

4. Role-play natural resource management.

Explain to students how we, as people, all need water to function, but so do the ecosystems in which we live. Ask: *How might we balance the water needs of people with the water needs of the ecosystem?* As a class, brainstorm some ideas to get students thinking about the factors involved in natural resource management. Then, have students get into pairs and play the role of either New Orleans city manager or Barataria Preserve manager. Tell students to think about what it would be like to manage water for either a city or a nature preserve, focusing on the different values and uses of water in these areas. Give each pair a Two-Column Chart to organize their ideas, putting “Barataria Preserve” in one column and “New Orleans” in another and listing water values and uses under each. For example, under Barataria Preserve some water uses and values could be ecotourism, environmental health, wetland function, recreation, and habitats for animals/plants. For New Orleans, some water uses and values could be drinking water, recreation, human health, and agriculture. Finally, have each pair discuss how they would try to balance these two columns to make a decision about how to manage their water resources together. Some ideas include putting a limit on the amount of water used in each area, building more levees, tearing down levees, creating a water management group to make joint decisions, or asking the state government to come up with rules. Once finished, have each pair share their ideas with the class. Encourage students to

explore potential conflicts between their roles; city managers and preserve managers might see their water resources differently. Ask: *How might differences between the two types of managers influence hydrology in an area?*

5. Engage students in a wrap-up discussion.

To wrap-up the activity, discuss natural hazards such as hurricanes and the ways we try to control or reduce their impacts. Tie in students' ideas from the role-playing. Emphasize how decisions can impact both ecological features as well as human lives. You can also use this discussion to explore Hurricane Katrina as an example of the complex relationship between levees, human natural resource management, and the hydrology of this area.

Modification

To explore the impact of hurricanes on the area, have students explore the **Hurricane layer**.

Ask: *Where have the most hurricanes made landfall? What relationships do you see with Coastal Land Loss and Land Cover layers?* Discuss how the both the levees and natural features greatly impact how hurricanes affect the area.

Informal Assessment

To assess student learning, evaluate their products based on the following criteria:

- Understanding hydrology—Each student should be able to identify at least three features of hydrology, list three facts about deltas, and write an accurate explanation of how a delta works.
- Use of FieldScope—Students follow instructions, identify patterns in hydrological features such as where land loss occurs and the role of levees, and answer posed questions.
- Role-playing activity—Each group must have a list of at least four factors and three water users along with a completed Decision Matrix for their water management decision.
- Discussions—Look for participation. Each student should communicate at least one idea during the course of discussions.

Extending the Learning

Ask students to write a short story or poem or create a drawing, painting, or other visual featuring how water impacts their lives. This will give students the opportunity to creatively explore their understanding about water and hydrology in a reflective capacity, which can help them connect classroom learning with their everyday lives.

To deepen engagement, set up a debate during the natural resource manager role-playing activity. Break the class in two groups: Barataria Preserve managers and New Orleans city managers. Create a scenario where the two groups must make a case for authority over water resource management in the area. Moderate a debate between the two groups where they must argue for why their area—Barataria or the city—deserves to make decisions about the city's water use and management.

OBJECTIVES

Subjects & Disciplines

Biology

- [Ecology](#)

Earth Science

- Experiential Learning

Geography

- [Geographic Information Systems \(GIS\)](#)
- [Human Geography](#)
- [Physical Geography](#)

Learning Objectives

Students will:

- identify elements involved in a hydrologic system
- describe how a delta system works
- use GIS to explore the hydrology of an area
- analyze patterns in land loss and relate them to hydrology
- role-play a natural resource manager and make decisions about water management

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Hands-on learning
- Multimedia instruction
- Reading
- Role playing

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Learning and Innovation Skills
 - Communication and Collaboration
 - Creativity and Innovation
 - Critical Thinking and Problem Solving
 - Life and Career Skills
 - Social and Cross-Cultural Skills
- Critical Thinking Skills
 - Analyzing
 - Applying
 - Remembering
 - Understanding
- Geographic Skills
 - Analyzing Geographic Information
 - Answering Geographic Questions
 - Asking Geographic Questions

National Standards, Principles, and Practices

IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 12:**

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

NATIONAL GEOGRAPHY STANDARDS

- **Standard 1:**

How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

- **Standard 14:**

How human actions modify the physical environment

- **Standard 15:**

How physical systems affect human systems

- **Standard 4:**

The physical and human characteristics of places

NATIONAL SCIENCE EDUCATION STANDARDS

- **(5-8) Standard E-1:**

Abilities of technological design

- **(5-8) Standard F-3:**

Natural hazards

- **(9-12) Standard E-1:**

Abilities of technological design

- **(9-12) Standard F-5:**

Natural and human-induced hazards

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Paper
- Pencils
- Pens

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, 1 computer per small group

PHYSICAL SPACE

- Classroom
- Computer lab

GROUPING

- Large-group instruction

BACKGROUND & VOCABULARY

Background Information

A preserve is a space set aside to protect certain biological and/or geological features, such as individual species of plants and animals or an entire ecosystem. These spaces are then managed to conserve these features, often allowing public access for education, research, or appreciation. A preserve is different from a park because of this specific focus on ecological conservation and protection. The Barataria Preserve is just one part of the six-part Jean Lafitte National Historical Park and Preserve.

Hurricane Katrina struck the Gulf Coast as a category four storm in the fall of 2005, with some of the most severe impacts felt in the area of New Orleans, Louisiana. Historically, the wetlands of this area, like the Barataria Preserve, have protected it from hurricanes by absorbing storm surge and deflecting winds. Unfortunately, years of levee-induced wetland loss made the city more vulnerable to the impacts of Hurricane Katrina. In addition, the levee system failed during this hurricane, flooding much of the city and forcing tens of thousands of people to flee their homes. Hurricane Katrina was the most expensive natural disaster in U.S. history as well as one of the deadliest hurricanes. The impacts of Hurricane Katrina on the human lives, ecosystems, hydrology, and infrastructure of the Gulf Coast are still felt to this day.

Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
delta	<i>noun</i>	the flat, low-lying plain that sometimes forms at the mouth of a river from deposits of sediments.
ecosystem	<i>noun</i>	community and interactions of living and nonliving things in an area.
geographic information system (GIS)	<i>noun</i>	any system for capturing, storing, checking, and displaying data related to positions on the Earth's surface.
habitat	<i>noun</i>	environment where an organism lives throughout the year or for shorter periods of time.
hydrology	<i>noun</i>	the study of water.
levee	<i>noun</i>	bank of a river, raised either naturally or constructed by people.
preserve	<i>noun</i>	an area restricted for the protection and preservation of natural resources
region	<i>noun</i>	any area on Earth with one or more common characteristics. Regions are the basic units of geography.
water cycle	<i>noun</i>	movement of water between atmosphere, land, and ocean.
wetland	<i>noun</i>	area of land covered by shallow water or saturated by water.

For Further Exploration

Websites

- [National Geographic Education: BioBlitz](#)

- [National Geographic: BioBlitz](#)



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