

**RESOURCE LIBRARY**

ACTIVITY : 1 HR

## Exploring Ecosystems Using GIS

Using the National Geographic FieldScope tool, students explore the human and biological features of the Barataria Preserve and its surrounding landscape. Then they investigate map layers of this landscape and analyze human-environment relationships within it.

**GRADES**

6 - 12+

**SUBJECTS**

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

**CONTENTS**

4 PDFs, 1 Link

## OVERVIEW

Using the National Geographic FieldScope tool, students explore the human and biological features of the Barataria Preserve and its surrounding landscape. Then they investigate map layers of this landscape and analyze human-environment relationships within it.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/exploring-ecosystems-using-gis/>

## DIRECTIONS

### 1. Build background about the concepts of nature and preserves.

Engage students in a brainstorming session. Ask them to define the terms *human* and *nature*—first on their own and then in groups. Have individual students use the Two-Column Chart to organize their ideas by listing characteristics they think of when they hear *human* and *nature*.

Then, have students get into groups and share these ideas to come up with group definitions. As a class, discuss these definitions and come up with a list of common ideas and themes. List these ideas on a white board or anywhere that the class can see them. You will come back to these ideas at the end of the activity. Next, explain the concept of a preserve and how the features preserves protect often fall under the definition of nature. Explain how the Barataria Preserve, which students will investigate in this activity, is a preserve dedicated to the wetlands ecosystems of New Orleans and is just one part of the six-part Jean Lafitte National Park.

## 2. Introduce and explore FieldScope.

Show students the basic features of FieldScope by following the tutorial with them. Then, as a class, complete the following steps in FieldScope:

- Turn on the Boundaries and Places layer.
- Locate your school by putting the address in the Search Bar. You can also zoom into these locations if you know cross streets or other landmarks to help guide you.
- Turn on the Land Cover layer and identify what your school is classified as by using the Query Tool and clicking on the location you want to identify.
- Turn off the Land Cover layer and turn on the Housing Density layer. Read the legend of the map to identify the density of housing around your school in both 1970 and 2010. Note whether or not it has changed. Turn off the Housing Density layer.
- Zoom out a little bit and locate the nearest green space or park. Ask: *Have you ever been to this place? Why or why not? What's it like if you have? How is it similar to or different from a preserve?*

## 3. Explore the Barataria Preserve and the surrounding landscape with FieldScope.

Still in FieldScope, help students find the Barataria Preserve and zoom in to where they can see both the city of New Orleans and the preserve. You can use the Search Bar to locate the preserve if needed. Then, give students the Exploring Ecosystems worksheet. Have students carry out the instructions in Part 1. Walk around the classroom as students work, helping them as needed. Once they have finished Part 1, discuss what they found. Ask: *What was the most interesting observation you made during this part of the activity?*

#### **4. Analyze ecosystem relationships with FieldScope.**

Now that students are familiar with the types of information available in FieldScope, it is time for them to explore on their own, ask questions, and develop answers. Distribute a copy of the Problem-and-Solution Diagram to each student. Have students carry out the instructions in the Exploring Ecosystems worksheet, Part 2. During this part of the activity, students will also use the Problem-and-Solution Diagram to describe their analysis. Continue observing students as they work, providing guidance as needed. Once they have finished this part of the activity, have students save and print their maps.

#### **5. Have students conduct peer evaluations.**

After students produce their maps and answers, ask them to work in pairs. Have them exchange their maps and analysis diagrams with each other and discuss and critique them. Tell students to look for the following criteria in each other's work:

- the map has two or more layers clearly displayed
- the student can use their worksheet to explain their analysis and resulting answer

#### **6. Engage the whole class in a wrap-up discussion.**

As a class, discuss how students' analyses of the Barataria Preserve and its surrounding landscape involved multiple factors, both human- and nature-related. Ask students to share their ideas about how they think the Barataria Preserve is impacted by these factors and their interactions. During the discussion, refer back to the class-created list of human and nature characteristics. Have students revisit their individual two-column charts of human and nature characteristics as well. Ask: *Do you agree with your initial definitions and ideas about humans and nature? Why or why not?* Discuss how these ideas are complex and difficult to describe because, as students saw from this activity, humans and nature are constantly interacting.

## Tip

Encourage students to engage in systems thinking by keeping in mind how scale (e.g., local, municipal, state) and relationships (e.g., human-environment interactions) are involved in their exploration of the Barataria Preserve.

## Modification

If there is no access to a printer, have students switch computers with a partner for the peer evaluation activity.

## Informal Assessment

Have students evaluate each other's maps and analysis worksheets based on the following criteria:

- the map has two or more layers clearly displayed
- analysis worksheets are filled out
- the student can explain what he or she did for the analysis and resulting answer

Throughout the activity, observe how students are carrying out the FieldScope instructions, including taking notes about what they find as they go through FieldScope explorations. Assess students based on level of engagement and competence development—whether they understand the tasks and apply their understanding to their performance.

In addition, informally assess students' products: brainstorming charts, maps, analysis worksheets, and discussions. Brainstorming charts should contain lists of ideas for both human and nature concepts. Maps must contain at least two layers. Analysis worksheets must contain the question, layers used, analysis process, and answer. For the discussion, look for participation. Every student should communicate at least one idea during discussion time. By the end of the activity, students should be able to identify different factors that influence an ecosystem and explain how they interact and influence each other as evidenced by the various student products.

## Extending the Learning

For additional exploration, have students repeat the FieldScope analysis of data layers from the Exploring Ecosystems Worksheet, Part 2, in a different ecosystem such as their hometown or a different national park. Have them compare their results to what they found in the Barataria Preserve landscape. Analyses may need to be based on just the housing density and land cover layers, however, since these are the only layers available nationwide.

## OBJECTIVES

# Subjects & Disciplines

### **Biology**

- [Ecology](#)
- Experiential Learning

### **Geography**

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

# Learning Objectives

Students will:

- analyze relationships between social, ecological, and spatial data
- use GIS data and maps to explore an ecosystem
- identify spatial and physical characteristics of an ecosystem
- compare and contrast a nature preserve and surrounding areas geographically, ecologically, and socially

# Teaching Approach

- Learning-for-use

# Teaching Methods

- Brainstorming
- Discussions
- Hands-on learning

- Inquiry

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Critical Thinking and Problem Solving
  - Life and Career Skills
    - Initiative and Self-Direction
- Critical Thinking Skills
  - Analyzing
  - Applying
  - Understanding

## National Standards, Principles, and Practices

### IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- Standard 7:

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

### NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

- Theme 3:

People, Places, and Environments

### NATIONAL SCIENCE EDUCATION STANDARDS

- **(5-8) Standard F-2:**

Populations, resources, and environments

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

Science and technology in society

- **(9-12) Standard E-2:**

Understandings about science and technology

- **(9-12) Standard F-3:**

Natural resources

## **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, Printer, Projector

### **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 Park.

This activity encourages systems thinking, which emphasizes understanding how multiple scales and factors—human and natural—influence each other. Understanding the connections and interactions between these components is important for understanding the complexity of a landscape as a whole. Systems thinking is a key component of geo-literacy.

## Prior Knowledge

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## Recommended Prior Activities

- None

## Vocabulary

<b>Term</b>	<b>Part of Speech</b>	<b>Definition</b>
<b>density</b>	<i>noun</i>	number of things of one kind in a given area.
<b>ecology</b>	<i>noun</i>	branch of biology that studies the relationship between living organisms and their environment.
<b>ecosystem</b>	<i>noun</i>	community and interactions of living and nonliving things in an area.
<b>elevation</b>	<i>noun</i>	height above or below sea level.
<b>geographic information system (GIS)</b>	<i>noun</i>	any system for capturing, storing, checking, and displaying data related to positions on the Earth's surface.
<b>land cover</b>	<i>noun</i>	physical material at the very top surface of the Earth, such as grass.
<b>levee</b>	<i>noun</i>	bank of a river, raised either naturally or constructed by people.
<b>preserve</b>	<i>verb</i>	to maintain and keep safe from damage.



<b>Term</b>	<b>Part of Speech</b>	<b>Definition</b>
wetland	<i>noun</i>	area of land covered by shallow water or saturated by water.

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## For Further Exploration

### Websites

- [Jean Lafitte National Historical Park and Preserve](#)
- [Encyclopedia of Life: Invasive species collection](#)
- [National Geographic Education: BioBlitz](#)
- [National Geographic: BioBlitz](#)



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