

Explore Coastal Louisiana

With Boudreaux



Teachers' Guide

By: Martha P. Hixon



A Teacher's Guide to
Explore Coastal Louisiana:
an educational CD-ROM

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In the Map Room, students can learn about the remote mapping systems used by scientists studying coastal Louisiana and can view various types of computerized maps of the coastal Louisiana region, while the Library contains links concerning wetlands restoration and wetlands loss both in Louisiana and in the rest of the United States. In the Kids' Room can be found quizzes, information on common and exotic animals found in Louisiana, and fun activities such as a computerized coloring book of wetlands scenes.

How can I use this CD in my classroom?

Explore Coastal Louisiana and/or the activities in this teacher's guide can be used by individual students, in small groups, or as a presentation to the entire classroom. Many teachers will probably use the material as a reference tool to supplement classroom discussions or as an independent learning center activity. However, check with your school's technology supervisor to see what equipment is available for incorporating a CD-ROM program into a classroom presentation.

Explore Coastal Louisiana was designed and written by a team of scientists, engineers, and classroom teachers. The many components to the material in this program can supplement your science and/or social studies curriculum by helping to satisfy the following Louisiana Department of Education Content Standards:

Science as Inquiry

- SI-E-A1 asking appropriate questions about organisms and events in the environment
- SI-E-A3 communicating that observations are made with one's senses
- SI-E-A5 using data, including numbers and graphs, to explain observations and experiments
- SI-E-B1 categorizing questions into what is known, what is not known, and what questions need to be explained
- SI-H-B1 communicating that scientists usually base their investigations on existing models, explanations, and theories
- SI-H-B2 communicating that scientists conduct investigations for a variety of reasons, such as exploration of new areas, discovery of new aspects of the natural world, confirmation of prior investigations, evaluation of current theories, and comparison of models and theories
- SI-H-B3 communicating that scientists rely on technology to enhance the gathering and manipulation of data
- SI-M-A6 comparing alternative explanations and predictions
- SI-M-A7 communicating scientific procedures, information, and explanations
- SI-M-B7 understanding that scientific development/technology is driven by societal needs and funding

Life Science

- LS-M-C2 modeling and interpreting food chains and food webs
- LS-M-C3 investigating major ecosystems and recognizing physical properties and organisms within each
- LS-M-C4 explaining the interaction and interdependence of nonliving and living components within ecosystems
- LS-M-D1 describing the importance of plant and animal adaptation, including local examples
- LS-E-A1 identifying the needs of plants and animals, based on age-appropriate recorded observations
- LS-E-A4 recognizing that there is great diversity among organisms
- LS-E-B1 observing and describing the life cycles of some plants and animals
- LS-E-B2 observing, comparing, and grouping plants and animals according to likenesses and/or differences
- LS-E-C1 examining the habitats of plants and animals and determining how basic needs are met within each habitat
- LS-E-C2 describing how the features of some plants and animals enable them to live in specific habitats
- LS-E-C3 observing animals and plants and describing interaction or interdependence
- LS-H-D4 exploring how humans have impacted ecosystems and the need for societies to plan for the future
- LS-H-F4 recognizing that behavior patterns have adaptive value
- LS-M-D2 explaining how some members of a species survive under changed environmental conditions

Science and the Environment

- SE-E-A2 understanding the components of a food chain
- SE-E-A3 identifying ways in which humans have altered their environment, both in positive and negative ways, either for themselves or for other living things
- SE-E-A4 understanding that the original sources of all material goods are natural resources and that the conserving and recycling of natural resources is a form of stewardship
- SE-E-A5 understanding that most plant and animal species are threatened or endangered today due to habitat loss or change
- SE-E-A6 distinguishing between renewable and nonrenewable resources and understanding that nonrenewable natural resources are not replenished through the natural cycles and thus are strictly limited in quantity
- SE-H-A2 investigating the flow of energy in ecological systems
- SE-H-A3 describing how habitat, carrying capacity, and limiting factors influence plant and animal populations (including humans)
- SE-H-A4 understanding that change is a fundamental characteristic of every

- ecosystem and that ecosystems have varying capacities for change and recovery
- SE-H-A5 describing the dynamic interactions between divisions of the biosphere
 - SE-H-A7 comparing and contrasting the dynamic interaction within the biosphere
 - SE-H-A8 analyzing evidence that plant and animal species have evolved physical, biochemical, and/or behavioral adaptations to their environments
 - SE-H-A9 demonstrating an understanding of influencing factors of biodiversity
 - SE-H-A10 explaining that all species represent a vital link in a complex web of interaction
 - SE-H-A11 understanding how pollutants can affect living systems
 - SE-H-B1 explaining the relationships between renewable and nonrenewable resources
 - SE-H-B2 comparing and contrasting conserving and preserving resources
 - SE-H-B4 comparing and contrasting long- and short-term consequences of resource management
 - SE-H-B5 analyzing resource management
 - SE-H-B6 recognizing that sustainable development is a process of change in which resource use, investment direction, technological development, and institutional change meet society's present as well as future needs
 - SE-H-C1 evaluating the dynamic interaction of land, water, and air and its relationship to living things in maintaining a healthy environment
 - SE-H-C2 evaluating the relationships between quality of life and environmental quality
 - SE-H-C3 investigating and communicating how environmental policy is formed by the interaction of social, economic, technological, and political considerations
 - SE-H-C4 demonstrating that environmental decisions include analyses that incorporate ecological, health, social, and economic factors
 - SE-H-C5 analyzing how public support affects the creation and enforcement of environmental laws and regulations
 - SE-H-D1 demonstrating the effects of personal choices and actions on the natural environment
 - SE-H-D2 analyzing how individuals are capable of reducing and reversing their impact on the environment through thinking, planning, education, collaboration, and action
 - SE-H-D3 demonstrating that the most important factor in prevention and control of pollution is education
 - SE-H-D4 demonstrating a knowledge that environmental issues should be a local and global concern
 - SE-H-D5 recognizing that the development of accountability toward the environment is essential for sustainability

- SE-H-D6 developing an awareness of personal responsibility as stewards of the local and global environment
- SE-M-A1 demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems
- SE-M-A2 demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations
- SE-M-A3 defining the concept of pollutant and describing the effects of various pollutants on ecosystems
- SE-M-A4 understanding that human actions can create risks and consequences in the environment
- SE-M-A5 tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem
- SE-M-A8 investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem

Geography: Physical and Cultural Systems

- G-1A-E1 identifying and describing the characteristics and uses of geographic representations, such as various types of maps, globes, graphs, diagrams, photographs, and satellite-produced images
- G-1A-E2 locating and interpreting geographic features and places on maps and globes
- G-1A-E3 constructing maps, graphs, charts, and diagrams to describe geographical information and to solve problems
- G-1A-H1 using geographic representations, tools, and technologies to explain, analyze, and solve geographic problems
- G-1A-H2 organizing geographic information and answering complex questions by formulating mental maps of places and regions
- G-1A-M1 identifying and describing the characteristics, functions, and applications of various types of maps and other geographic representations, tools, and technologies
- G-1A-M2 interpreting and developing maps, globes, graphs, charts, models, and databases to analyze spatial distributions and patterns
- G-1A-M3 organizing and displaying information about the location of geographic features and places by using mental mapping skills
- G-1B-E1 describing and comparing the physical characteristics of places, including land forms, bodies of water, soils, vegetation, and climate
- G-1B-E2 identifying and describing the human characteristics of places, including population distributions and culture
- G-1B-E3 describing how the physical and human characteristics of places change over time

- G-1B-E4 defining and differentiating regions by using physical characteristics, such as climate and land forms, and by using human characteristics, such as economic activity and language
- G-1B-H1 determining how location and social, cultural, and economic processes affect the features and significance of places
- G-1B-H2 analyzing the ways in which physical and human characteristics of places and regions have affected historic events
- G-1B-H3 Analyzing the various ways in which physical and human regions are structured and interconnected
- G-1B-H4 explaining and evaluating the importance of places and regions to cultural identity
- G-1B-M1 explaining and analyzing both the physical and human phenomena associated with specific places, including precipitation and settlement patterns
- G-1B-M2 identifying and describing significant physical features that have influenced historical events
- G-1B-M3 identifying criteria used to define regions and explaining how and why regions change
- G-1B-M4 describing and explaining how personal interests, culture, and technology affect people's perceptions and uses of places and regions
- G-1C-E1 describing how physical processes help to shape features and patterns on Earth's surface
- G-1C-E2 describing and comparing the types of settlement and patterns of land use in local communities, the United States, and world regions
- G-1C-E3 describing and explaining the characteristics, distribution, and migration of human populations
- G-1C-E4 identifying and comparing the cultural characteristics of different regions and people
- G-1C-E5 locating and explaining the spatial distribution of economic activities
- G-1C-H2 determining the economic, political, and social factors that contribute to human migration and settlement patterns and evaluating their impact on physical and human systems
- G-1C-H6 analyzing how cooperation, conflict, and self-interests impact social, political, and economic entities on Earth
- G-1C-M1 predicting and explaining how physical features help to shape patterns and arrangements in the physical environment
- G-1D-E1 identifying and explaining ways in which people depend upon and modify the physical environment
- G-1D-E2 describing how humans adapt to variations in the physical environment
- G-1D-E3 describing the locations, causes, and effects of natural disasters on the

- environment and society
- G-1D-E4 describing the use, distribution, and importance of natural resources
- G-1D-H1 describing and evaluating the ways in which technology has expanded the human capability to modify the physical environment
- G-1D-H2 examining the challenges placed on human systems by the physical environment and formulating strategies to deal with these challenges
- G-1D-H3 analyzing the relationship between natural resources and the exploration, colonization, settlement, and uses of land in different regions of the world
- G-1D-H4 evaluating policies and programs related to the use of natural resources
- G-1D-H5 developing plans to solve local and regional geographic problems related to contemporary issues
- G-1D-M1 analyzing and evaluating the effects of human actions upon the physical environment
- G-1D-M2 explaining and giving examples of how characteristics of different physical environments affect human activities
- G-1D-M4 identifying problems that relate to contemporary geographic issues and researching possible solutions

Supplemental Activities for Classroom Use

The following activities are suggestions for supplementing the information presented in the *Explore Coastal Louisiana* educational CD-ROM.

Introductory Activities: Explore Coastal Louisiana

1. Before introducing the CD-ROM to your classroom, have the class as a whole look at a parish map of Louisiana and identify the coastal parishes. Ask them what they know already about these parishes: what kind of habitats are found there? what cities? what types of employment or ways of earning a living does the class think (or know) are available in these parishes? what is the weather like? Exploring what kinds of knowledge and/or preconceived ideas the class members have about this area will help you adapt use of the CD to best meet their needs.

2. Find pictures of various habitat areas of coastal Louisiana (students could make collages, or mount individual pictures on posterboard or construction paper to hang up in the classroom). As a class, discuss how the ecology of this part of Louisiana differs from that of other parts of the state and of the nation: in what ways is this region unique? in what ways is it similar to the rest of Louisiana? to the states that border Louisiana on either side?

Extension of this activity: have students make Louisiana booklets throughout the year, focusing on habitat areas in different parts of the state.

3. Have students research the history of the coastal parishes: who was Jean Lafitte, for example? (he is mentioned in the introductory video). When did people begin settling this part of the state? How did they earn a living here, and what customs did they bring with them? How did this environment alter the lifestyles these immigrants were used to having?

4. In researching the history of this area, if possible visit a folklife museum or have a folklorist come visit your class to talk about the folkways and traditional lifestyles of the coastal Louisiana inhabitants.

5. Have students research the kinds of industries that lie along the coast and how these industries have impacted the region. In what ways do the rest of Louisiana's inhabitants depend on these industries and their products? How about the rest of the nation? the world? Brainstorm the types of occupations that depend on these industries.

6. Since much of the restoration effort underway in coastal Louisiana is the result of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA, or the "Breaux Act"), the class would

benefit from a discussion of what this act involves. If your class has Internet access, view the CWPPRA Website (<http://www.lacoast.gov>). Also see the appendix in this manual.

7. Invite a guest speaker to your classroom to talk about the restoration efforts currently underway. See the Contacts information listed at the CWPPRA website, or contact:

Jay Gamble, CWPPRA Outreach Coordinator, U.S. Army Corps of Engineers. Phone: (504) 862-2786. Email: jay.gamble@mvn02.usace.army.mil.

8. Have the class write letters to Senator Breaux's office either asking for further information on how and why he lobbied for the Breaux Act or else thanking him for his efforts in this regard.

9. Have students pick a place name from one of the coastal parishes (it can be a town, a parish, or some sort of landmark) and research the origins of the name.

Maps and Mapping Systems :

1. Brainstorm the kinds of maps one may use and what each is used for (road maps, political maps, topographical maps, and so forth). Have students bring types of maps to class (and you provide some as well); display these along the walls of the classroom. Or, collect several different kinds of maps of Louisiana and talk about what kinds of information each one contains. Choose one or two items (such as your town) and compare how the same item is represented differently on different types of maps.

2. If you have Internet access, look at the Earthshots website (<http://www.usgs.gov/earthshots/slow/tableofcontents>). Earthshots is a collection of Landsat (satellite) images and text, designed to show environmental changes and to introduce remote sensing. Images from other satellites, maps, and photographs are also included. Earthshots comes from the U.S. Geological Survey's EROS Data Center, the world's largest archive of earth science data.

3. Have students collect geographic, economic, and population information about their parish or town. As a small-group activity, brainstorm the kinds of maps that could be devised using this information.

4. Have each student trace his or her route from home to school (or vice versa). Then, brainstorm some "what if" scenarios that would cause the driver to alter his or her path while in route (closed streets due to construction or flooding, an accident, etc.). As a class, discuss how these on-the-spot changes in route compare to what a GIS does. (For further activities of this type and/or discussion of GIS systems, see the ArcView teaching guide [Explore Your World with a Geographic Information System](#), listed in the Bibliography section of this teacher's guide.)

5. Using maps and pictures, look at various parts of Louisiana and have students do a personal inventory on where they would like to live and why. Have them compare the other parts of Louisiana with their own hometown and parish.

6. Look at all the factors that create the weather patterns in coastal Louisiana. Use television and radio weather reports, satellite images, historical records, and so forth to investigate such things as clouds and weather patterns. Since hurricanes are a big factor in coastal erosion, a mini-unit on hurricanes would be an appropriate tie-in. Discuss such points as how a hurricane begins, how to track a hurricane, and the aftereffects of a hurricane coming ashore. For more information on hurricanes, see the National Hurricane Center's website at <http://www.nhc.noaa.gov/> and the USGS Fact Sheet: Hurricane Impacts on the Coastal Environment at <http://marine.usgs.gov/fact-sheets/hurricane/hurricane-txt.html>.

7. The following activity demonstrates how distance affects what a person sees in a landscape: Find a large poster containing a scene that has lots of detail (a map of an amusement park works well, if you can get one about poster size). Tape the map to the wall and mark a series of spots on the floor with masking tape, beginning about 3 feet away and at intervals of 2 yards or so further back. Have children begin at the farthest spot and describe what they see on the poster (this activity works best if they cannot tell ahead of time what is in the picture). Have the class brainstorm specific situations that would call for different perspectives (such as wanting to know the surrounding landmarks of the amusement park, directions for getting from one section of the park to another, or locating a bathroom or specific ride).

8. On a globe, ask students to find the latitude lines marking coastal Louisiana and then to follow those latitude lines all the way around the globe. As they "travel," do they see any similarities or differences in region? What would account for these similarities and/or differences?

9. (For older or advanced students): If you have Internet access in the classroom (or if you wish to assign this as an extra project for those students having access at home), the following website offers an interactive project in which the student can make his or her own GIS: <http://globe.gsfc.nasa.gov/cgi-bin/map.cgi?l=en&b=g&rg=n>

Values of Wetlands

1. Discuss with the class how coastal wetlands serve as nurseries for juvenile organisms and as temporary stopping place for migrating birds.
2. Produce food webs for organisms living in coastal areas.
3. Demonstrate the filtering capacity of soil layers: fill a flower pot with soil but do not plug the drainage holes in the bottom of the pot. Holding the pot up for the class to see, pour a mixture of water and other ingredients over the soil and see what the water looks like that drips out of the drainage hole. (The water draining out of the pot should not contain much of the same ingredients that it held before being poured over the soil).

Wetlands Habitats and Inhabitants

1. Discuss the meaning of the word “habitat” (it means “home”). Ask students to describe their own homes (inside and out); focus on how humans acquire and store the basic necessities such as food and water. Explain that wildlife habitat includes those elements that animals need to survive (shelter, water, food, a safe place to have and rear young and to gather food). Have students look at the common and endangered animals data banks in the Library section of this CD (give them a few days to do this on their own during free time or while the rest of the class is finishing other work). Then, have each child choose an animal from the list and design a home and habitat that contains the essential items that animals need to survive. Have students share their findings and product with the class. As a group, discuss which animals might share the same needs and/or habitats and why (some as predators, some because their needs are similar). Explore with the class how their animals would be affected if this habitat were altered in any way or if one of the co-habiting animals were to disappear or lessen in numbers.

2. Discuss how the local physical environment has affected the way people live in your community (such as the choice of building materials, housing styles, types of flowers and vegetables grown, occupations, recreation, and winter activities and clothing). Focus as much as possible on aspects of the environment that dictate the lifestyle being discussed. If any child in the class has lived in another part of the country, encourage him or her to share experiences that are similar or different to those being discussed in class.

Extension: If possible, visit a recreated folklife settlement (or look at pictures in magazines or tourist guides) illustrating how Native Americans and early settlers used indigeneous plants as building materials and how they adapted their cooking techniques to suit the food sources found along the coast. Discuss with the class how much of these practices are still necessary today.

3. Since coastal Louisiana is a birder’s paradise, students would benefit from an in-depth activity on bird-watching. If possible, take a field trip to a rural area away from the city (if this is not possible, you can still do this activity on the school grounds outside). The students are to collect data on various birds sighted in the area in a 30-minute period, such as the number of different species, varieties of birdsongs, and basic behavior of the observed birds (you may wish to make and reproduce simple charts for the students to record this information on). As a group, discuss the following questions: why were certain birds present in this area? what behavior did they exhibit, and why? do they live here year-round, or are they overwintering? After completing this activity, have students compare their observations with the Bird Bank data located in the Library of Camp Wetlands.

4. Produce a classroom newsletter on the endangered and/or common species found in coastal Louisiana. Assign individuals or pairs of students a particular animal or plant to research and write up an article for the newsletter. The article should contain the following information:

1. Scientific name of the species
2. Physical description of the species and its particular habits (such as eating and nesting)
3. Description of habitat and region in Louisiana occupied by the species
4. Description of human development within the species's current habitat
5. Reasons (if any) the species is endangered, and if so, what is being done about the endangerment
6. A creative activity concerning the species (a poem, drawing, word game, or comic strip, for example. Simple poems such as haiku, cinquains, and limericks are easy and fun for this age group.)

Type up the articles (or ask an aide or class mom to do so) and hand out your class newsletter to the rest of the school. (If the art cannot be inserted into the newsletter, include a notice as to where interested persons may come to view the art).

5. Encourage students to look at the Animals Data Banks in the Library section of the CD by having them fill out "Creature of the Week" sheets to turn in. On these sheets, have students complete questions asking for basic information such as habitat, diet, and physical description of the animal. Or, have students complete a "Louisiana Life" booklet made up of these sheets plus any artwork the students wish to do.

6. As a class activity, research what kinds of birds use the Louisiana coast as a stopover or overwintering site during migrations. Then have the students imagine themselves as one of these birds and write a story telling where they have traveled from and where they are going, what they have eaten along the way, the dangers they have encountered on their flight, and why they use the Louisiana coast as a stopping point. The stories should be based on the factual information gained in class.

Extension: This activity is a good follow-up to a field trip to marshes where migrating birds actually do stop over for a period. If you take the field trip, encourage the students to observe carefully in order to gather information they can use in their stories, such as sights, sounds, textures, smells, how things look from a bird's perspective, and so on.

Wetland Restoration

Have students investigate problems that some recreational activities can pose for wildlife and/or their habitats (such as boating, birdwatching, scuba diving, sport fishing, camping, wildlife photography, and, of course, hunting). Then develop a code of ethics for these activities that suggest ways to lessen the potential injury or harassment to wildlife for those who engage in such activities.

Environmental Impact and Human Habitats

1. In the following small-group activity for older students or advanced classes, the goal is to see firsthand the decisions and complications that must be dealt with when considering the growth of human habitation areas:

Each group is assigned some development project (a hospital, for example, or a new housing development; picking out a current project in your hometown is an ideal assignment). Their goal is to determine where and how to locate this project within the community while inflicting the least impact upon the existing habitat (they should narrow their choices of location down to three, and then one). After they have made their decision, each group is to present their project and decision to the rest of the class in the form of a “town meeting,” and the rest of the class will vote on whether to accept their proposal or not. (NOTE: this project works best if the group can periodically conference with the teacher for guidance in how to proceed and how to interpret the various forms of data they will be using, such as land use maps). Points that will need to be considered:

1. Current land use and land cover of the area in question. Make sure students study the current land cover and consider how changes will affect the plants and animals in that area and surrounding areas. What human developments already exist? How have those developments impacted the area already?
2. Current inhabitants of the area (both human and animal) and the habitats necessary for continued survival of these species.
3. Parking lots, roads, and other buildings that will also be necessary for the accessibility and success of the development in question.

In their presentation to the class, the group could do a “presentation board”:

- a. Enlarge the original land cover/land use map so that the areas can be seen easily by the rest of the class.
- b. Mark off the proposed location of the project (including roads, buildings, parking lots, and other adjacent buildings or constructions) in terms of actual size compared to the map.

Extension: Classmates could role-play specific citizens and voice their concerns regarding the project.

2. Have students write a mini-biography of a local conservationist or other individual (living or dead) who has made a contribution to environmental issues in Louisiana. Questions that the students can seek to answer are: What motivated this person to pursue environmental issues or otherwise to take action? What difficulties (if any) did the person encounter? What exactly did the person accomplish, and how? If possible, try to arrange some person-to-person interviews with local people engaged in conservation.
3. In consultation with the school librarian, set up a learning center with books set in Louisiana (picture books are especially good for this purpose, even for older middle-school students). Then, have students

write a story or a play about endangered species or habitats in coastal Louisiana, or a story set in this area.

Barrier Islands

1. As a small-group activity, have students research and demonstrate why waves break as they reach the shore.
2. Discuss what kinds of plants might live on a sand dune. Why are dunes with plants larger than those without?
3. Have students research the formation of barrier islands--how did sand get there to begin with, and why do they "move"?

For more information on barrier islands, see the USGS Fact Sheet: Louisiana's Barrier Islands: A Vanishing Resource at <http://marine.usgs.gov/fact-sheets/Barrier/barrier.html>.

The Mississippi River

1. Look at a map of the United States that illustrates the Mississippi River Delta and the river systems that flow into the Mississippi. Have students identify the major rivers that feed into the Mississippi and what states these rivers are found in. Discuss with the class the process by which deltas form in the Mississippi River and how the runoff from other states contributes to this process.
2. As a class or in small groups, build a model of the Mississippi River drainage system using salt dough or modeling clay and paints. Have them refer to an actual map as much as possible for accuracy.

Extension: When making the model, make sure the rivers are slightly indented. While the salt dough or modeling clay is drying, cover the model with a light layer of potting soil. (You could also add "pollutants" such as styrofoam particles.) After the model has completely dried, use a watering can to reproduce rainfall upon the model and have the class observe the process of runoff. Have the class notice where much of the soil and pollutants end up--in the coastal parishes of Louisiana.

Extension: For older students, this is a good introduction to a discussion of dams, levees, and flooding. Have pairs or small groups of students research the development of the current levee system in Louisiana and how it has changed the environmental dynamics of the coast. A focal point of this project could be the "Great Flood" of 1927.

3. Have students research past floods and their effects on the fishing, shrimp, and oyster industries in the Gulf.

Oil and Gas Industry/Offshore Drilling

Many of the manmade canals now found in coastal Louisiana were built so that barges could maneuver easily. Following a discussion of canal-building, have the students build their own barges:

Using ONLY aluminum foil, toothpicks, and tape, construct a barge that will actually float in the bathtub. Test its capacity by seeing how many pennies you can load onto it before it sinks.

Bibliography and Useful Additional Resources

Bibliography of Professional Resources:

Banbury, Mary M., et al. *Wetland Blues, a Video Guidebook for Teachers*. Project CEED, 1993, University of New Orleans College of Education. Supported by a grant from Urban Waste Management and Research Center, UNO and the EPA. A 20-minute video aimed at conveying the importance of wetlands to middle-school/high school students, plus teacher's guide with supplemental activities.

**Black Bears and Songbirds of the Lower Mississippi River Valley*. 1999. U.S. Geological Survey and U.S. Fish and Wildlife Service. Interactive CD-ROM and teacher's guide .

Explore Your World with a Geographic Information System; a Teaching Supplement for Grades 5-12 Introducing Basic GIS Concepts and Components. ArcView for Schools and Libraries. A teachers' packet of information (booklet, poster, and tutorial diskette for the ArcView GIS software).

*Guntenspergen, Glenn R., and Beth A. Vairin. *Willful Winds: Hurricane Andrew and Louisiana's Coast*. 1996. Louisiana Sea Grant College Program and U.S. Department of Interior.

**Louisiana Wetlands Functions and Values*. U.S. Geological Survey, National Wetlands Research Center; Louisiana State University Agricultural Center, Louisiana Cooperative Extension Service; and Louisiana Department of Natural Resources. This CD-ROM is intended to provide a general overview of the importance of wetlands within Louisiana. It contains four videoclips covering wetlands functions and values, coastal wetlands land loss and restoration, the Wetlands Reserve Program (WRP), and wetlands conservation opportunities statewide, plus a wetlands quiz that can be used for testing students' knowledge in an interactive setting.

Pitre, Glen. *Haunted Waters, Fragile Lands: Oh, What Tales to Tell!* Barataria-Terrebonne National Estuary Program. An award-winning documentary on the cultural, geologic, and environmental history of the Barataria-Terrebonne National Estuary System. Videotape (1 hour) and teacher's guide available from BTNEP, P.O. Box 2663, Thibodaux, LA 70310, or 1-800-259-0869, or the BTNEP website at <http://www.btnep.org/pages/educational.html#video>.

---. *Rescuing the Treasure*. Barataria-Terrebonne National Estuary Program. Sequel to *Haunted Waters* (30 minutes) focusing on the contemporary ecological struggle of the region. Videotape available from BTNEP, P.O. Box 2663, Thibodaux, LA 70310, or 1-800-259-0869, or the BTNEP website at <http://www.btnep.org/pages/educational.html#video>.

Slatterly, Britt Eckhardt. *WOW! The Wonders of Wetlands*. Environmental Concern, Inc. 1991.

A teacher's guide of wetlands activities suitable for grades K-12, funded by The Chesapeake Bay Trust, Asea Brown Boveri, Inc., and the National Fish and Wildlife Foundation (plus others). Contact: Environmental Concern, P.O. Box P, St. Michaels, MD 21663.

Vanishing Wetlands, Vanishing Future. Barataria-Terrebonne National Estuary Program and Nicholls State University. This zany video on the BTNEP seven priority problems is in the style of Bill Nye the Science Guy and is aimed at a middle school audience. It comes in a two-part series, each 30 minutes long. The videotape available from BTNEP, P.O. Box 2663, Thibodaux, LA 70310, or 1-800-259-0869, or the BTNEP website at <http://www.btnep.org/pages/educational.html#video>. A teacher's guide is under construction and will be available online at the BTNEP website.

*Watzin, Mary C., and James G. Gosselink. *The Fragile Fringe: Coastal Wetlands of the Continental United States*. 1992. Louisiana Sea Grant Program, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. Booklet and teacher's guide focusing on the wetland ecological systems of Louisiana and other Gulf coastal states. Also available online at <http://www.lacoast.gov/Overview/Hurricanes/index.htm>.

*Wells, John T., and Charles H. Peterson. *Restless Ribbons of Sand: Atlantic and Gulf Coastal Barriers*. 1986. U. S. Fish and Wildlife Service and Louisiana Sea Grant College Program, Baton Rouge, LA.

*These educational tools can be obtained from the U.S. Geological Survey's National Wetlands Research Center, 700 Cajundome Blvd, Lafayette, LA 70506, or see <http://www.lacoast.gov/>.

Useful Websites:

Animal Tracks®, a classroom education program of the National Wildlife Federation, provides ready-to-download classroom activities focused on air, habitat, wildlife and endangered species, people and the environment, and water. <http://www.nwf.org/nwf/atracks/activity.html>

Association for the Promotion and Advancement of Science Education website:

<http://www.apase.bc.ca/>

Barataria-Terrebonne National Estuary Program invites you to browse their site to learn more about the continuing effort to protect Louisiana's environment. The Educational Materials link to this site lists videos, posters, CD-ROMs, and other publications available from BTNEP and also provides some lesson plans and activities and an online field trip. <http://www.btnep.org/>

Bay Link is an educational site centered on the Chesapeake Bay estuary, the people living on its drainage area, and the effect the various natural and human forces have on the Bay. **Marsh March** (Gr. 4-12) investigates the natural organization of a wetland and the interrelationships between the wetlands and the surrounding environment. With **Habitat Hunt** (Gr. 6-12), students will investigate variation among aquatic habitats. Bay Link can be found at http://www.whro.org/bl/2fr_baylink.html

Earth Scan Laboratory Coastal Studies Institute Louisiana State University

<http://antares.csi.lsu.edu/>

Earth Science Links; Teacher Resources is a general earth science resource site especially for teachers. <http://www.ems.psu.edu/RelatedSites/teacher.html>

EPA Office of Water; Wetlands Science, Education, & Information Resources page

<http://www.epa.gov/OWOW/wetlands/scinfo.html#Kids>

Explore a Wetland (Gr. K-8). Take a walk in a wetland and then make a wetland picture story or fill in a wetland worksheet. <http://www.nwf.org/nwf/atracks/habitat/wetlands/wetl0007.html>

The EXPLORES! Teacher's Resource Guide <http://www.met.fsu.edu/explores/resources.html>

Gator Hole Graphics (Gr. 6-8). Interpret graphs that tell how some swamp animals survive drought. <http://www.nwf.org/nwf/atracks/habitat/wetlands/wetl0008.html>

Helping Your Child Learn Geography, with activities for children from 5 to 10 years of age
U.S. Department of Education, Office of Educational Research and Improvement.

<http://www.ed.gov/pubs/parents/Geography/title.html>

The Learning Web of the U.S. Geological Survey is dedicated to K-12 education, exploration, and life-long learning. Visit often and explore things on, in, around, and about the Earth such as plants and animals, land, water, and maps. Excellent educational activities and lesson plans.

<http://www.usgs.gov/education/>

The **Louisiana Coastal Restoration Web Site** contains information and links relating to coastal restoration projects in Louisiana and is the web site for the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). In addition to general information on restoration projects, the site has several interactive links suitable for students, an Outreach/Education link that provides educational materials and information, and a link to *Water Marks*, the quarterly CWPPRA newsletter.

<http://www.lacoast.gov/>

Louisiana Wetlands Education is a website maintained by the Educational Technology Review Center at the University of Southwestern Louisiana. Links provide information on various types of wetlands, including lesson plans. <http://www.challenge.state.la.us/wetlands/index.html>

Salty Discoveries (Gr. K-8). Hatch brine shrimp eggs and observe their development. <http://www.nwf.org/nwf/atracks/habitat/wetlands/wetl0009.html>

Surveys and Slogans (Gr. 4-5). Take a wetland survey and design a wetland stamp, poster, T-shirt, or bumper sticker. <http://www.nwf.org/nwf/atracks/habitat/wetlands/wetl0010.html>

U.S. Geological Survey's Water Science for Schools Website: <http://wwwga.usgs.gov/edu/>

The US Global Change Research Information Office; It's Elementary!

<http://gcrio.ciesin.org/edu/elementary/itselem.html>

Remote sensing. <http://gcrio.ciesin.org/edu/elementary/remote.html>

The Virtual Field Trips Web site <http://www.field-guides.com/>

Wetlands Reading List; Pre-Kindergarten through Grade 12

<http://www.epa.gov/OWOW/wetlands/science/readlist.html>

WWW.Birder.com <http://www.birder.com/>

Books for the Classroom:

Along the Coasts, Renato Massa. Raintree/Steck Vaughn, 1997.

America's Wetlands: A Carolrhoda Earth Watch Book, Frank A. Staub. Carolroda, 1995.

Animal Habitats, Cecilia Fitzsimons. Illus. Adam Hook. Nature's Hidden Worlds Series. Raintree/Steck-Vaughn, 1996.

Betting on Forever, Billy Aronson. Illus. John Quinn. McGraw-Hill, 1996.

Children's Atlas of the Environment. Rand McNally, 1991.

The Living Ocean, Elizabeth Collins. The Earth at Risk Series. Chelsea House, 1994.

The Missing 'Gator of Gumbo Limbo: An Ecological Mystery, Jean Craighead George. HarperTrophy, 1993.

Pond Life, George K. Reid. A Golden Book Field Guide. 1967.

Save Our Wetlands; One Earth, Ron Hirschi. Photographs by Peggy Bauer and Erwin Bauer. Delacorte, 1994.

Swamps, Sheila Gore. Illus. Robert Burns. Our Planet Series. Troll Assoc, 1993.

Taking Care of the Earth: Kids in Action, Laurence Pringle. Illus. Bobbie Moore. Boyds Mills Press, 1995.

Threatened Oceans, Jenny E. Tesar. Our Fragile Planet Series. Facts on File, 1991.

The Vanishing Wetlands, Trent Duffy. Franklin Watts, 1994.

Wading into Wetlands, National Wildlife Federation. Ranger Rick's Naturescope. Chelsea House, 1998.

Wetlands, Ian McLeish. Thomson Learning, 1995.

Coastal Wetlands Test 1

1. When we speak of the functions of a wetland, we mean the ____.
 - a. quantity of food and timber that can be harvested from the wetland for human consumption
 - b. quantity of food produced for the animals that live in the wetland
 - c. natural processes that occur within the wetland
 - d. quality of life for the inhabitants

2. When we speak of a wetland's value, we are referring to ____.
 - a. the benefits to the people in and around the wetlands
 - b. the benefits to both the environment of the wetlands and to the people in and around the wetlands
 - c. the costs of maintaining the wetlands
 - d. how much the land is worth in the real estate market

3. Coastal wetlands serve as a ____ for many adult marine species that inhabit offshore waters.
 - a. nursery
 - b. supplier of nutrients
 - c. supplier of fresh water that dilutes the offshore waters
 - d. cemetery

4. Flood control is a natural function of the marsh whereby marsh soils and vegetation act as ____ to absorb and detain floodwater.
 - a. lubricants
 - b. digesters
 - c. catalysts
 - d. sponges

5. The conversion of marsh to open water exceeds ____ square mile(s) per year in some areas of coastal Louisiana.
 - a. two-tenths of a
 - b. one
 - c. thirty-five
 - d. one hundred

6. Louisiana currently ranks ____ in the nation in its rate of loss of wetlands.
 - a. first
 - b. second after Alaska
 - c. second after Florida
 - d. third after Florida and Ohio

7. About ___ % of wetlands in coastal Louisiana are privately owned.
- 10
 - 40
 - 75
 - 95
8. The federal government became actively involved in coastal restoration when Congress enacted the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in ___.
- 1980
 - 1985
 - 1990
 - 1995
9. Since Colonial times, the United States has lost more than ___ % of its wetlands.
- 25
 - 50
 - 75
 - 95
10. Exotic means ___.
- non-native
 - indigenous
 - extraordinarily beautiful
 - rare or endangered
11. The greatest problem created by introduced species is that ___.
- they are usually less attractive than native species
 - the niche that the introduced species occupies interferes with the niche of an established species
 - they increase the populations of resident species
 - all of the above
12. Subsidence, the sinking of the land, is ___.
- only caused by human activity
 - a natural process only
 - a natural process that is sometimes accelerated by human activity
 - not an important issue in coastal wetlands
13. ___ has more wetlands than all states combined.
- Louisiana

- b. Texas
 - c. Florida
 - d. Alaska
14. One of the ways that alligator farming benefits the wetlands is that ____.
- a. alligators create nesting sites that are used by many other species
 - b. property owners who receive positive economic incentives from wetlands will be encouraged to become better stewards of the land
 - c. it will increase the demand for alligator products
 - d. alligators are a key species and are essential to the survival of many other species within the wetland
15. The Louisiana black bear has suffered the most from ____.
- a. overhunting
 - b. pollution in the food chain
 - c. loss of habitat
 - d. diseases spread by humans
16. Developers abandoned the Bayou Sauvage area after impoundment because ____.
- a. property values in the New Orleans area were falling
 - b. taxes were too high because it was part of New Orleans
 - c. the area was still too wet for building homes
 - d. the City of New Orleans forced them to stop development
17. The first phase of restoration of the Bayou Sauvage area was to ____.
- a. bulldoze the impoundment levees
 - b. pump out the excess water from the impounded area
 - c. seed and fertilize the area so marsh plants would grow
 - d. dredge out the areas with open water to make it deep enough for water skiing and fishing boats
18. Senators ____ and J. Bennett Johnson are mostly responsible for the passing of the Coastal Wetland Planning, Protection, and Restoration Act.
- a. Edwin Edwards
 - b. Edward Kennedy
 - c. John Breaux
 - d. Jimmy Hayes
19. To protect their land from spring flooding, early sugarcane farmers ____.
- a. built huge pumps powered by teams of horses to pump the water away from their fields
 - b. surrounded their land with artificial levees
 - c. increased the height of the natural river levees

d. both choices (a) & (b) above

20. Between ____ % of Louisiana's population lives within 50 miles of the coast?

- a. 10 and 15 b. 20 and 25
c. 35 and 40 d. 60 and 70

Coastal Louisiana Test 1 Answer Key

- | | | | |
|------|-------|-------|-------|
| 1. C | 6. A | 11. B | 16. C |
| 2. B | 7. C | 12. C | 17. B |
| 3. A | 8. C | 13. D | 18. C |
| 4. D | 9. B | 14. B | 19. C |
| 5. C | 10. A | 15. C | 20. D |

Appendix 1: Summary of the Coastal Wetlands Planning, Protection and Restoration Act (the “Breux Act”) and current CWPPRA projects.

The Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), also known as the Breux Act after its major author, Louisiana Senator John Breux, was signed into law in 1990. It insures that state and federal monies are available for coastal restoration and conservation efforts. As a federal public law, it funds wetland enhancement projects nationwide, but it also designates approximately \$35 million annually (70 percent of the authorized funds) for wetland restoration work specifically in Louisiana. This stipulation exists in recognition of the fact that Louisiana’s wetlands are a national treasure, a significant asset to the United States as a whole. Approximately 40 percent of the coastal wetlands of the lower 48 states is located here. In addition, Louisiana provides wintering habitat for 20 percent of the nation’s waterfowl and supports the largest fishery in the lower 48 states. This fragile environment is disappearing at an alarming rate: Louisiana has lost up to 40 square miles of marsh a year for several decades-- that's 80 percent of the nation's annual coastal wetland loss.

CWPPRA is administered through a designated task force made up of the state of Louisiana (represented by the governor) and five federal agencies (the Department of Agriculture, Department of Commerce, Department of the Army, Department of the Interior, and the Environmental Protection Agency). This group was initially charged with developing a comprehensive restoration plan for addressing coastal Louisiana’s severe wetland loss. The task force developed a plan that identified basin restoration strategies and the projects necessary to implement those strategies, plus overall objectives for any projects developed under the auspices of the Breux Act. In fulfilling this overall plan, the CWPPRA Task Force annually develops a list of high-priority restoration projects to be constructed. As of 1998, seven such priority lists have been formulated, resulting in over 80 projects that address wetland loss in the nine hydrological basins identified along Louisiana’s coastline: Pontchartrain, Breton Sound, Mississippi River Delta, Barataria, Terrebonne, Atchafalaya, Teche/Vermilion, Mermentau, and Calcasieu/Sabine. The projects funded by CWPPRA all focus on marsh creation, restoration, protection or enhancement.

*For more on the establishment and implementation of the Breux Act., see B. A. Vairin, **Caring for Coastal Wetlands**, a government document produced in 1997 by the U.S. Geological Survey, National Wetlands Research Center, Lafayette, LA. 318-266-8551. Also see the CWPPRA website at <http://www.lacoast.gov/>*

Appendix 2: Bayou Sauvage National Wildlife Refuge

The Bayou Sauvage National Wildlife Refuge, located in Orleans parish 16 miles east of New Orleans, was established in 1986 to provide habitat in an urban setting for wintering waterfowl, shore birds, and wading birds. Located entirely within the corporate limits of the city of New Orleans, it is the nation's largest urban refuge, with a total of 18,000 acres of fertile wetlands. The refuge is easily accessible via U.S. Highway 90, U.S. Highway 11, and Interstate 10. Public use opportunities include fishing, hiking, biking, bird watching, and various types of guided tours and environmental education programs.

Bayou Sauvage National Wildlife Refuge is home to several endangered and threatened species. One of these is the brown pelican, which is a year-round resident in the area. The number of nesting brown pelicans has substantially increased despite loss of nesting habitat. Another endangered bird is the peregrine falcon, a winter resident of the refuge each year whose numbers have also been increasing in the refuge. Several American bald eagles continue to nest on the refuge each year; their population numbers are increasing, as well. Other raptors are present in the refuge, along with waterfowl, wading birds, shorebirds, swamp rabbits, alligators, game and small mammals, reptiles, and amphibians.

The refuge contains a variety of different habitats, including freshwater and brackish marshes, bottomland hardwood forests, lagoons, canals, borrow pits, chenieres (former beach fronts), and natural bayous. The marshes along Lake Pontchartrain and Lake Borgne serve as estuarine nurseries for various fish species, crabs, and shrimp. Freshwater lagoons, bayous, and ponds serve as production areas for largemouth bass, crappie, bluegill, and catfish. Such diverse habitat meets the needs of 340 bird species during various seasons of the year; peak waterfowl populations of 50,000 use the wetland areas during the fall, winter, and early spring months.

Bayou Sauvage National Wildlife Refuge is an impounded area ringed with levees, a consequence of plans in the 1950s to turn the freshwater marsh between New Orleans and Slidell into a subdivision, New Orleans East. When developers realized that this area was still too wet to build houses on, plans for the subdivision were abandoned, but the levees and highways remained, trapping rainwater into the encircled marshes. Gradually the water level of the impounded area rose, the marshes were flooded, and vegetation died off, including willows that were once an important rookery for egrets in the area. In 1956 this area was only 6% open water; by 1988 the area had converted to 30% open water. Some of these open-water ponds are over 1 mile wide and about 1 foot deep.

Within the refuge's boundaries are two hydrologic restoration project areas, which are regularly drained so that the marshes can revert back to the former vegetation. This drainage is accomplished by using two 48-inch pumps located on the east levee. These pumps draw the water levels down to about 1 to 1.5 feet in the spring and summer. Due to these pumps more and more mudflats have been exposed, where new vegetation has begun growing, filling in what used to be open water areas.

To get to the refuge office:

From Slidell: take I-10 west; take Irish Bayou exit #254; turn left onto U.S. Highway 11; go 6 miles to U.S. Highway 90; turn right and go approximately 2 miles.

From New Orleans: take I-10 east to exit #246A (Chalmette, I-510); go about 2 miles on I-510 to U.S. Highway 90 east exit; turn left and go approximately 4 miles.

For more information, contact: Southeast Louisiana Refuges
1010 Gause Blvd. #936
Slidell, LA 70458
phone: (504) 646-7555
e-mail address: r4rw_la.sel@mail.fws.gov

Appendix 3: The Barataria-Terrebonne National Estuary Program

The Barataria and Terrebonne basins, sandwiched between the Mississippi River on the east and the Atchafalaya Basin on the west and the towns of Morganza in the north and Grand Isle in the south, span over 4.1 million acres. Bayou Lafourche separates the two basins; Barataria Basin lies to the east of Bayou Lafourche, and Terrebonne Basin is the west side. More than three-quarters of the Barataria-Terrebonne area, approximately 3.2 million acres, is classified as open water or wetlands, leaving approximately one million acres for urban and agricultural uses. Elevations throughout this estuarine complex are just a few feet above sea level; the land elevations on natural ridges, in the northern portion of the estuary, are the only points reaching 30 feet. Throughout much of the system, levees are the most prominent land features. The southern half of the system contains estuaries, which exchange water with the Gulf of Mexico, while the northern end contains freshwater wetlands and backswamps. The northern end is also referred to as the "upper watershed" because it collects the rainwater and feeds the bayous that drain into the estuarine system.

Because the Barataria-Terrebonne system is an estuary, a coastal area where saltwater from the ocean mixes with freshwater from rivers, rainfall, and upland runoff, salt- and freshwater proportions within the estuary differ daily depending on the season, weather, and tides. Vital coastal ecosystems exist in these dynamic conditions. The mixing of saltwater and freshwater begins offshore, where water, sediment, nutrients, and pollutants from the Mississippi River mix with the saltwater of the Gulf of Mexico. Wind and tides drive this mixture, along with fish and shellfish, into these estuaries. Changes at the coast affect water levels and habitats throughout the entire system from Fourchon to Donaldsonville.

The Barataria-Terrebonne estuarine system contains some of the most diverse and fertile habitats in the world, yet no other place on earth is disappearing as quickly. The Barataria-Terrebonne estuary is important to the entire nation as well as to Louisiana. Nearly 20% of the nation's commercial estuarine seafood spend all or part of their life cycle in this estuarine complex. This area provides important habitats for furbearers, shellfish, finfish, waterfowl, and other migratory birds as well as endangered species such as the bald eagle and brown pelican. Additionally, oil and gas enterprises operating within this complex have contributed billions of dollars to the nation's economy. Furthermore, the estuary marsh protects south Louisiana from extensive hurricane damages.

Natural processes and human activities have changed the physical landscape and the long-term future of these basins. As a result, no other place on earth is disappearing as quickly as the Barataria-Terrebonne estuarine system. The Barataria-Terrebonne National Estuary Program's challenge is to move forward as good stewards of the natural resources that remain within the estuary complex.

On September 13, 1990, the EPA and the State of Louisiana entered a cooperative agreement under the National Estuary Program to form the Barataria-Terrebonne National Estuary Program (BTNEP). The purpose of the program was to develop a coalition of government, private, and

commercial interests to identify problems, assess trends, design pollution control, develop resource management strategies, recommend corrective actions, and seek implementation commitments for the preservation of Louisiana's Barataria and Terrebonne basins.

By 1990, the Management Conference identified seven priority issues affecting the Barataria-Terrebonne estuarine system. Each of the priority problems affects the others, compounding the difficulty of finding a solution to each problem. These problems are: hydrologic modifications (changes in water flow), sediment reduction (fewer deposits available to the natural system), habitat loss (land loss and habitat change), eutrophication (over-abundance of nutrients in the water), pathogen contamination (bacteria and viruses in the water), toxic substances (toxic chemicals in the water), and changes in living resources (birds, fish, and other animals).

Visit the BTNEP website for more information: <http://www.btnep.org/>

Sponsoring Agencies for the Educational CD *Explore Coastal Louisiana*

U.S. Geological Survey
Biological Resources Division
National Wetlands Research Center
700 Cajundome Blvd.
Lafayette, LA 70506
<http://www.nwrc.nbs.gov/>

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Coastal Wetlands Planning, Protection and Restoration Act
<http://www.lacoast.gov/>