



Louisiana Teacher's Supplement

Introduction

Confronting Climate Change in the Gulf Region: Prospects for Sustaining Our Ecological Heritage describes likely climate changes and potential consequences for ecosystems spanning the region from the southern tip of Texas to the Florida Keys. Louisiana lies in the central subregion of the Gulf Coast Region and has a warm temperate and humid climate. Against a backdrop of significant variability over the past century, Louisiana has experienced a warming trend since the 1960s, and extreme rainfall events have increased during the 20th century. Projected changes in climate include an increase in maximum summer temperatures and winter minimum temperatures, a decrease in rainfall in coastal areas, and an acceleration of sea-level rise. Global sea-level rise combined with local land sinking give Louisiana the highest rate of relative sea-level rise in the United States. The encroaching sea threatens wetland ecosystems and coastal infrastructure, making global climate change one of the most significant challenges Louisiana will face in the coming decades.

The activities in the curriculum guide can easily be adapted to focus on specific ecosystems and places in Louisiana. The Mississippi Delta region figures predominantly in the Gulf report, and is featured as a case study on pages 43–44. Baton Rouge participates in the Clean Cities Program of the US Department of Energy, which supports and promotes the use of alternative fuel vehicles in order to reduce dependence on gasoline and diesel. And New Orleans participates in the international Cities for Climate Protection campaign.

Internet resources for Louisiana natural areas, state agencies, and environmental non-profit organizations provide additional background information for student research. The Louisiana Energy & Environmental Resource & Information Center (LEERIC) provides a gateway to other Louisiana environmental education resources at http://www.leeric.lsu.edu/ee_education/.

Louisiana Resource List and Teaching Hints by Activity

Activity 1 – Warming Up to Global Warming

In this activity students research newspaper articles to better understand how global warming is portrayed in the media. Recent articles on the topic can usually be accessed at a newspaper's web page by doing a keyword search for "global warming."

Web sites for newspapers of the Gulf Coast region can be accessed at <http://newslink.org>. For Louisiana, see <http://newslink.org/lanews.html>

The Baton Rouge Advocate recently did a series of articles about climate change (10/21/01– 10/23/01). These can be accessed at:

http://www.theadvocate.com/news/global_warming.asp

Web sites for two Louisiana newspapers

Baton Rouge Advocate: www.theadvocate.com

New Orleans Times-Picayune: www.nola.com/t-p

Activity 2 – Understanding Climate Change

The goal of the extension exercise (**Extension #2: Contribution from cars alone in the Gulf Coast region**) is to help students appreciate the magnitude of carbon dioxide emissions from motor vehicles. The calculations can be done at any scale, ranging from all the cars in the US to just those for a particular state or county.

Motor vehicle statistics for Louisiana are not available on the web; however, a Department of Public Safety official reports that the total number of vehicles registered in the State of Louisiana as of 06/30/01 is 6,519,569. (According to the official, this information was obtained from the MXR705 Report dated 06/30/01.)

Louisiana Energy Data – provides additional information on Louisiana energy consumption.

http://www.eia.doe.gov/emeu/states/main_la.html

Activity 3 – Gulf Coast Climate

In this activity students gain an appreciation for the physical and cultural characteristics that define the Gulf Coast region. Louisiana's place within the Gulf Coast region—physically, socially, and economically—can be explored through a US atlas, as well as maps available on the Internet. Two websites for Louisiana maps are

Louisiana State Maps

<http://www.state.la.us/maps.htm>

Louisiana Maps at University of Texas-Austin Map Library

<http://www.lib.utexas.edu/maps/louisiana.html>

Several examples of interconnections that may be less familiar to students can be found on “The Energy Market Map of Texas and Louisiana,” which shows electric transmission lines, gas pipelines, and ports.

http://www.eia.doe.gov/emeu/reps/states/maps/w_g_c.html

Similar maps for the other Gulf Coast states are also available.

<http://www.eia.doe.gov/emeu/reps/states/maps/>

Activity 4 – Know Thy Ecological Homes

In this activity students develop their knowledge of the plants and animals and physical processes characteristic of Gulf region ecosystems. Students will gain a better understanding of the biological diversity of the region if natural areas from several different Gulf States are studied. The Gulf Ecological Management Sites (GEMS) Program web site is the best resource for quick access to regional natural areas <http://www.epa.gov/gmpo/gem2.html>. If the teacher chooses to focus on Louisiana ecosystems, there are several web resources specific to Louisiana that are appropriate starting points, or are useful for more extensive student research.

Louisiana Natural Areas

The US Fish and Wildlife Service manages several wildlife refuges in Louisiana. <http://southeastlouisiana.fws.gov/>

The Nature Conservancy's website profiles Louisiana's six ecoregions, including their historic land use, current conditions, and biodiversity significance. There are brief descriptions of 15 separate nature preserves. <http://www.louisiananature.org/preserve/explore.cfm>

The Louisiana GEMS website links to information about coastal management areas. <http://www.dnr.state.la.us/crm/coastmgt/gems/lagems.ssi>

Barataria-Terrebonne National Estuary Program – a US Environmental Protection Agency (EPA)/State of Louisiana partnership to address environmental concerns in the estuary system. www.btnep.org

A teaching guide on coastal wetlands, with special focus on the Mississippi River delta is available from the US Geological Survey (USGS). <http://www.nwrc.nbs.gov/fringe/draining.html>

Louisiana Climate

Louisiana Office of State Climatology – provides state maps of average annual temperature, precipitation, and freeze dates. <http://www.losc.lsu.edu/>

Louisiana Annual Precipitation Map <http://www.ocs.orst.edu/pub/maps/Precipitation/Total/States/LA/la.gif>

Other

EPA Louisiana state atlas <http://www.epa.gov/ceisweb1/ceishome/atlas/stateatlas/louisiana.html>

Louisiana Department of Natural Resources
<http://www.dnr.state.la.us/quicktourteach.ssi>

The most recent population figures can be obtained from the Census Bureau.
<http://quickfacts.census.gov/qfd/states/22000.html>

Activity 5 – Nature's Bounty

This activity introduces to students the concept of “ecosystem goods and services,” the societal benefits received from the natural environment.

The Louisiana GEMS website provides descriptions of the ecological functions of the 16 GEMS sites.

<http://www.dnr.state.la.us/crm/coastmgt/gems/lagems.ssi>

This website about Louisiana wetlands has an overview of wetland functions and values.
<http://www.lacoast.gov/wetlands/index.htm>

Activity 6 – What Could Happen Here?

In this activity students explore how climate change might affect plants and animals of the Gulf Coast region. Teachers can choose a local ecosystem—such as a lake, wetland, or forest near their school—or a specific natural area of significance, such as a wildlife refuge, or state or national park. If possible, the activity should be accompanied by a field trip, so that students have a better understanding of the ecological characteristics of the study area. As an alternative, a visit to a managed ecosystem such as managed forest, aquaculture facility, or farm is an opportunity for students to consider the vulnerability of economic activities to climate and land use changes.

Several Louisiana sites would serve as good case studies for detailed analysis of climate change impacts.

- Breton National Wildlife Refuge – barrier islands that serve as sanctuary for nesting and wintering seabirds. <http://southeastlouisiana.fws.gov/breton.html>
- Big Branch Marsh National Wildlife Refuge
<http://southeastlouisiana.fws.gov/bigbranch.html>
- Isles Dernieres – a barrier island and nesting area for Kemps Ridley sea turtles.
<http://www.dnr.state.la.us/crm/coastmgt/gems/islesder.htm>
- Atchafalaya Delta and Swamp Basin – an area including bottomland hardwood and cypress-tupelo swamps. <http://www.dnr.state.la.us/crm/coastmgt/gems/atchafal.htm>

Additional resources for important plant and animal species:

US Fish and Wildlife Service Region 4 includes Louisiana.

<http://southeast.fws.gov/>

Endangered species lists by county for Louisiana can be accessed from

http://ecos.fws.gov/webpage/webpage_usa_lists.html?state=LA

Activity 9 – Reducing Our Impact on the Global Environment

For this activity students research possible solutions to reduce the amount of greenhouse gases emitted into the atmosphere and thus slow global warming. The emphasis is that global problems need local solutions and activities, and that individual actions do matter.

In 1999, the Coalition to Restore Coastal Louisiana produced the report *Danger and Opportunity: Implications of Climate Change for Louisiana – A Report to the Louisiana State Legislature*. The report details specific opportunities for improved energy conservation and efficiency in Louisiana.

<http://www.crcl.org/pubs/hcr74/hcr74.htm>

A number of other organizations promote energy conservation and pollution reduction in Louisiana.

Energy Efficiency Resource Gateway – provides practical tips on energy efficiency specific to Louisiana

<http://www.leeric.lsu.edu/energy/>

Louisiana's Alliance for Affordable Energy

<http://www.gnofn.org/~all4nrg/>

Louisiana Environmental Action Network (LEAN)

<http://www.leanweb.org>

LSU Center for Energy Studies Home Page

<http://www.enrg.lsu.edu/>

Louisiana Energy Policy – provides an overview of energy issues and policies important to Louisiana.

<http://www.dnr.state.la.us/sec/execdiv/techasmt/lep/index.htm>

Clean Cities Program Home Page – <http://www.ccities.doe.gov/>

The US Department of Energy provides information on current renewable energy projects in Louisiana and links to additional resources.

http://www.eren.doe.gov/state_energy/mystate.cfm?state=la

Activity 10 – Reducing Our Impact on the Local Environment

This activity and its extensions emphasize that climate change will amplify our present use of land, water, and air resources. Students should be aware of the complexity of environmental issues—a result of the complex interactions within ecosystems, and between nature and humanity.

Several Louisiana organizations focus on issues of coastal land loss and preservation of ecosystem services.

Coast 2050 is a major Louisiana coastal restoration project to address the coastal land loss threatening ecosystems and the services they provide.

<http://www.coast2050.gov/>

Coalition to Restore Coastal Louisiana advocates for preservation and restoration of the Mississippi River Delta ecosystem.

<http://www.crcl.org/>

LA coast web site offers information on coastal wetland restoration in Louisiana and brown marsh phenomenon.

<http://www.lacoast.gov>

Save Louisiana's Wetlands (Louisiana Dept of Natural Resources/Office of Coastal Restoration and Management)

<http://www.savelawetlands.org/>

Louisiana Environmental Action Network – a citizen group devoted to environmental issues in Louisiana, including air quality and emission reductions.

<http://www.leanweb.org/>

Louisiana Environmental Data Warehouse – environmental information on air, water, land, health, and other issues for the Mississippi River industrial corridor in Louisiana.

<http://www.riversentinel.net/>

Mississippi River Basin Alliance – a coalition that unites environmental justice organizations and traditional conservation groups around issues impacting the Mississippi River.

<http://www.mrba.org>

Ties to Louisiana Learning Standards

SCIENCE

Activity	Science as Inquiry		Life	Earth and Space		Science and the Environment											
	A6	B1	D4	A1	A6	A1	A4	A9	A11	C1	C2	C4	C5	D1	D2	D4	D6
1	√	√										√	√	√	√	√	√
2		√		√	√	√				√				√	√	√	√
3									√	√						√	
4			√			√	√	√		√							
5			√			√	√					√					
6			√				√	√	√	√						√	
7	√		√				√									√	
8			√								√					√	√
9											√	√	√	√	√	√	√
10	√		√				√		√		√	√	√	√	√	√	√

Science as Inquiry

SI-H-A6 communicating and defending a scientific argument

SI-H-B1 communicating that scientists usually base their investigations on existing models, explanations, and theories

Life Science

LS-H-D4 exploring how humans have impacted ecosystems and the need for societies to plan for the future

Earth and Space Science

ESS-H-A1 investigating the methods of energy transfer and identifying the sun as the major source of energy for most of the Earth's systems

ESS-H-A6 describing the energy transfer from the sun to the Earth and its atmosphere as it relates to the development of weather and climate patterns

Science and the Environment

SE-H-A1 demonstrating an understanding of the functions of Earth's major ecological systems

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-A9 demonstrating an understanding of influencing factors of biodiversity

SE-H-A11 understanding how pollutants can affect living systems

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-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-D4 demonstrating a knowledge that environmental issues should be a local and global concern

SE-H-D6 developing an awareness of personal responsibility as stewards of the local and global environment

Reference: Louisiana State Department of Education, 1997. Louisiana Science Content Standards. Available at:

<http://www.doe.state.la.us/doe/publications/contents/scframe.htm>

Louisiana Learning Standards (continued)

SOCIAL STUDIES

Activity	Geography								Civics
	World in Spatial Terms		Places and Regions		Physical and Human Systems	Environment and Society			
	1A-H1	1A-H2	1B-H3	1B-H4	1C-H6	1D-H1	1D-H4	1D-H5	1D-H2
1					√	√	√		√
2						√			
3	√	√	√	√		√			
4	√	√							
5		√							
6		√				√			
7									
8									
9					√	√	√	√	√
10		√					√	√	√

GEOGRAPHY: Physical and Cultural Systems

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-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-1C-H6 Analyzing how cooperation, conflict, and self interests impact social, political, and economic entities

G-1D-H1 Describing and evaluating the ways in which technology has expanded the human capability to modify the physical environment

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

CIVICS: Citizenship and Government

C-1D-H2 Evaluating and defending positions on issues regarding the personal and civic responsibilities of citizens in American constitutional democracy

Reference: Louisiana State Department of Education, 1997. Louisiana Social Studies Content Standards.

Available at: <http://www.doe.state.la.us/doe/publications/contents/ssframe.htm>