



## Florida 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 and the goods and services they provide to society, spanning the region from the southern tip of Texas to the Florida Keys. Florida lies in the eastern subregion of the Gulf Coast Region and experiences a warm-temperate to subtropical climate with a distinct summer wet-season and a winter dry-season. Against a backdrop of some variability over the past century, Florida's average annual temperature has been increasing since the late 1960s. Average winter rainfall has increased while summer rainfall has decreased. Projected changes in climate include an increase in maximum summer temperatures, an increase in ocean temperatures, a northward shift in the freeze line, and changes in precipitation, with the possibility of less rainfall over the northern part of the state. Tourism generates billions of dollars for the state, and is highly dependent on the condition and ecological integrity of Gulf coast beaches, coastal wetlands, and coral reefs. Coastal erosion induced by sea-level rise already threatens hundreds of miles of Florida beaches. An acceleration of sea-level rise due to climate change will increase the rate of erosion and the height of storm surges. In combination with human pressures due to an increasing population, climate change and improper land use management pose a serious threat to Florida's natural resources and economy.

The activities in the curriculum guide can easily be adapted to focus on specific ecosystems and places in Florida. Florida's natural habitats are diverse, and harbor many threatened or endangered species. The Everglades, the coral reefs off the coast of South Florida, and the Apalachicola basin of the Florida Panhandle are featured specifically in the Gulf Report. They could be used as case studies for several of the activities in the guide. Florida has many other unique natural areas threatened by human pressures and climate change.

Internet resources for Florida natural areas, state agencies, and environmental non-profit organizations provide excellent background information for student research. Some important general resources include:

- The Florida Department of Education maintains a search engine for Florida educators looking for learning resources in environmental education. <http://www.firn.edu/doe/bin00001/environ/eep.html>
- The FICUS Network is a digital library of information relevant to the environmental and educational communities. <http://www.ficus.usf.edu/>

- Florida Wildlife Extension provides links to many environmental education resources for Florida.  
[http://www.wec.ufl.edu/extension/educational\\_resources.htm](http://www.wec.ufl.edu/extension/educational_resources.htm)
- South Florida Virtual Tour is a great site with pictures and information on Florida ecosystems and specific natural areas. [http://sofia.usgs.gov/virtual\\_tour/](http://sofia.usgs.gov/virtual_tour/)

## Florida 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 Florida, see <http://newslink.org/flnews.html> Louisiana's 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](http://www.theadvocate.com/news/global_warming.asp)

Web sites for some key Florida newspapers:

Miami Herald: [www.miami.com/herald](http://www.miami.com/herald)

Orlando Sentinel: [www.orlandosentinel.com](http://www.orlandosentinel.com)

St. Petersburg Times: [www.sptimes.com](http://www.sptimes.com)

Tampa Tribune: [www.tampatrib.com](http://www.tampatrib.com)

### 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.

Statistics on motor vehicle registrations in Florida are listed at [http://www.hsmv.state.fl.us/reports/facts\\_mv.html](http://www.hsmv.state.fl.us/reports/facts_mv.html). As of November 2001, the number of registered vehicles for the state estimated for 2000-2001 is 13,995,245 total vehicles (11,242,773 passenger cars and trucks).

Florida retail gasoline prices for the current week are available.

<http://www.fueleconomy.gov/feg/gasprices/states/FL.shtml>

Florida Energy data – provides information on energy consumption in Florida.

[http://www.eia.doe.gov/emeu/states/main\\_fl.html](http://www.eia.doe.gov/emeu/states/main_fl.html)

### Activity 3 – Gulf Coast Climate Future

In this activity students gain an appreciation for the physical and cultural characteristics that define the Gulf Coast region. Florida'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. A good starting point is the University of Texas's map library:

Florida Maps

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

Florida Historical Maps

<http://alabamamaps.ua.edu/historicalmaps/florida/index.html>

Several examples of interconnections that may be less familiar to students can be found on "The Energy Market Map of the South Atlantic," which shows electric transmission lines, gas pipelines, and ports.

[http://www.eia.doe.gov/emeu/reps/states/maps/so\\_atl.html](http://www.eia.doe.gov/emeu/reps/states/maps/so_atl.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 teachers choose to focus on Florida ecosystems, there are several web resources specific to Florida that serve as appropriate starting points, or are useful for more extensive student research.

Florida Ecosystems

Detailed descriptions of the physical and biological characteristics of Florida upland, freshwater, and marine ecosystems.

[http://www.ficus.usf.edu/docs/fl\\_ecosystem/florida.htm](http://www.ficus.usf.edu/docs/fl_ecosystem/florida.htm)

Common Florida Natural Areas – an electronic brochure describing natural areas such as mangroves, hammocks, and flatwoods. Developed by Florida Conservation Foundation.

<http://www.ficus.usf.edu/>

A map of the ecoregions of Florida can be downloaded from the US Environmental Protection Agency (EPA).

[http://www.epa.gov/wed/pages/ecoregions/level\\_iv.htm](http://www.epa.gov/wed/pages/ecoregions/level_iv.htm)

Everglades Virtual Field Trip – describes the biology, hydrology, and geology of the Everglades through text and photos.

<http://taxodium.env.duke.edu/wetland/ftbegin.htm>

Everglades National Park Virtual Tour – panoramic pictures and information on South Florida habitats.

[http://sofia.usgs.gov/virtual\\_tour/enp/index.html](http://sofia.usgs.gov/virtual_tour/enp/index.html)

Habitats of Everglades National Park

<http://www.nps.gov/ever/eco/habitats.htm>

Tampa Bay Estuary Program – descriptions of the habitats, plants, animals, and birds of the Tampa Bay Estuary.

<http://www.tbep.org/tbep.html>

Other Florida state parks representing many of Florida's ecosystems in a relatively protected state can be accessed.

<http://www.dep.state.fl.us/parks>

Florida's beaches and coastal areas

<http://www.dca.state.fl.us/ffcm/>

### Florida Climate

Southeast Regional Climate Center provides a wealth of information on Florida climate, including maps of annual average temperature and precipitation.

<http://water.dnr.state.sc.us/climate/sercc/>

Florida Annual Precipitation Map (Oregon State University)

<http://www.ocs.orst.edu/pub/maps/Precipitation/Total/States/FL/fl.gif>

Florida Climate Center

[http://www.coaps.fsu.edu/climate\\_center/](http://www.coaps.fsu.edu/climate_center/)

### Other

EPA Florida state atlas

<http://www.epa.gov/ceisweb1/ceishome/atlas/stateatlas/florida.html>

General information about Florida's economy

<http://www.state.fl.us/>

General access to environmental information in Florida  
<http://www8.myflorida.com/myflorida/environment.htm>  
<http://www.dep.state.fl.us/>

### **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 (e.g., one of the case studies highlighted in the report). 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.

Florida sites that would serve as good case studies for detailed analysis of climate change impacts include:

- Everglades National Park: [http://sofia.usgs.gov/virtual\\_tour/enp/index.html](http://sofia.usgs.gov/virtual_tour/enp/index.html) or <http://www.nps.gov/ever/>
- Apalachicola Bay: <http://inlet.geol.sc.edu/APA/>
- Coral reef areas off the Florida Keys: [http://sofia.usgs.gov/virtual\\_tour/flbay/index.html](http://sofia.usgs.gov/virtual_tour/flbay/index.html)

Additional resources for important plant and animal species:

Online Guide to Rare Plant and Animal Species of Florida – database searchable by organism type or name, or by county.  
<http://www.fnai.org/fieldguide/>

Florida Panther Net – web site explores the natural history and conservation of the Florida panther.  
<http://www.panther.state.fl.us/>

Save the Manatee Club – manatee facts, including habitats, range, and behavior.  
<http://www.savethemanatee.org/>

Florida Fish and Wildlife Commission, Bureau of Protected Species Management  
<http://www.floridaconservation.org/psm/>

### **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.

Florida Climate Alliance is an organization working to reduce Florida's emissions of greenhouse gases.

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

The Florida Solar Energy Center of the University of Central Florida web site includes an educator's page with links to solar energy and alternative energy curriculum units

<http://www.fsec.ucf.edu/>

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

[http://www.eren.doe.gov/state\\_energy/mystate.cfm?state=fl](http://www.eren.doe.gov/state_energy/mystate.cfm?state=fl)

### **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.

Some Florida organizations focusing on environmental issues:

Council for a Sustainable Florida

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

Florida Department of Environmental Protection

<http://www.dep.state.fl.us/>

The Florida Water Story Project is developing curriculum units on Florida freshwater, estuarine, and marine environments.

<http://www.flh2o.com/>

South Florida Water Management District web site includes information on water conservation strategies and technical information on the status of Florida ground water and surface water levels.

<http://www.sfwmd.gov/curre/watshort/index2.html>

Florida Chapter of the Audubon Society

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

Florida Marine Research Institute

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

Conservancy of Southwest Florida

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

Florida Wildlife Federation

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

Tampa Baywatch

<http://www.webcoast.com/tpbaywatch/>

Florida Defenders of the Environment

<http://www.fladefenders.org>

Nature Conservancy of Florida

<http://www.tncflorida.org>

One Thousand Friends of Florida

<http://www.1000friendsofflorida.org>

Reef Relief

<http://www.reefrelief.org>

Sierra Club of Florida

<http://florida.sierraclub.org>

## Ties to Florida Learning Standards

Activity	SCIENCE						SOCIAL STUDIES	
	D.1.4	D.2.4	G.1.4	G.2.4	H.1.4	H.3.4	B.1.4	B.2.4
1		√			√	√		
2	√	√				√		√
3	√	√		√		√	√	√
4		√	√				√	√
5		√	√	√			√	√
6		√	√	√			√	√
7		√			√		√	
8		√		√				
9		√		√		√		√
10		√		√	√			√

### SCIENCE

#### Processes that Shape the Earth

SC.D.1.4 The student recognizes that processes in the lithosphere, atmosphere, hydrosphere, and biosphere interact to shape the Earth (#1,3)

SC.D.2.4 The student understands the need for protection of the natural systems on Earth

#### How Living Things Interact with the Environment

SC.G.1.4 The student understands the competitive, interdependent, cyclic nature of living things in the environment (#1)

SC.G.2.4 The student understands the consequences of using limited natural resources (#2,5,6)

#### The Nature of Science

SC.H.1.4 The student uses the scientific processes and habits of mind to solve problems (#1,2,7)

SC.H.3.4 The student understands that science, technology, and society are interwoven and interdependent (#3)

### SOCIAL STUDIES - Geography

SS.B.1.4 The student understands the world in spatial terms (#1,4).

SS.B.2.4 The student understands the interactions of people and the physical environment (#1,4,7)