

# MAKE THE GEORGIA CONNECTION



Make the Georgia Connection provides state-specific background information for some of your favorite Project WET lessons. In this issue we focus on water use and land activities upstream that affect coastal ecosystems in Georgia. The information below may be used with *A Drop in the Bucket*, *Color Me a Watershed*, *Common Water*, *Dilemma Derby*, *Hot Water*, *Pass the Jug* and *Water Works*.

## How do water use and land activities upstream affect coastal ecosystems?

By Lena Chambless, Environmental Outreach Assistant, Georgia Adopt-A-Stream and Georgia Project WET

The two major factors affecting Georgia coastal ecosystems are water quantity and water quality. As Georgia's freshwater flows from its' headwaters in the north Georgia mountains to the estuaries of the coast many communities along the way withdraw water, while daily activities from these communities create runoff that flows into the water and downstream.

Consider the Ocmulgee and Altamaha watersheds. The Upper Ocmulgee River begins in Metro Atlanta's DeKalb, Gwinnett and Rockdale counties at the Yellow River. It moves south past Macon and joins up with the Little Ocmulgee and Oconee rivers south of Vidalia. It flows into the Altamaha River, which flows to the marshes and then to the Atlantic Ocean. A rapidly growing population increases demand for tapwater, which increases the amount of water withdrawn from the river. Imagine the rate of water flow 500 hundred years ago. What about 100 years ago? Imagine all the people who now live along these waterways withdrawing freshwater that once flowed to Georgia's coast. The people who live in coastal counties also rely on fresh water from the rivers more today as their own supply from aquifers are diminishing.

The natural waterflow of Georgia's rivers is being disrupted by freshwater diversions such as damming of rivers, and withdrawals from cities and counties along these rivers. The amount of fresh water that mixes with saltwater in the estuaries is drastically changing. Saltwater levels are increasingly affecting the plants and animals that are able to live there. The amount of freshwater that flows to the coast is declining and is a leading suspect in marsh dieback. Plants and animals in the marsh have evolved life histories based on historic levels of freshwater flow and saltwater tidal patterns.

Other changes come in the form of the actual quality of the water that makes it to the coast. For example, fertilizers, animal feed, and waste in communities as far north as Clayton flow into streams that lead to the

Savannah River. The Savannah River picks up more pollutants in Augusta, Sylvania, and Savannah before it reaches the marshes and the Atlantic Ocean. The oil that leaks from cars and gasoline that drips from the pump nozzle stay on the concrete, an impervious surface. When it rains these pollutants wash over the streets, parking lots, and land, move into storm drains and flow directly to the river, without filtration from water treatment facilities.



Some of the pollutants, including fertilizer, animal feed and waste promote the growth of algae. When the algae dies, the bacteria that decomposes it reduces the dissolved oxygen content of the water and sometimes causes the extinction of other organisms.

You can help coastal ecosystems no matter where you live by conserving the water you use at home (and thereby reducing the withdrawals from the rivers), and lessening your contribution to nonpoint source pollution (oil, fertilizer, litter, etc.).

Activity	Grade Level	Concepts	Page #
<b>A Drop in the Bucket</b>	Middle School	freshwater as a limited resource	p.238
<b>Color Me a Watershed</b>	High School	impacts of development	p.223
<b>Common Water</b>	Middle School	water is a shared resource	p.232
<b>Dilemma Derby</b>	Middle & High School	water management	p.377
<b>Hot Water</b>	High School	debate water issues	p.388
<b>Pass the Jug</b>	Middle School	water rights	p.392
<b>Water Works</b>	Upper Elementary & Middle School	interdependence of water users	p.274

# The Georgia Performance Standards and Marine Education

By Liz Burkhardt, Environmental Outreach Assistant, Georgia Adopt-A-Stream and Georgia Project WET with thanks to Jo Adang, Deron Davis, Karen Greene, and Margaret Olsen

Teaching about marine ecosystems is one way to address the Georgia Performance Standards at all grade levels. Fortunately, considerable resources for teaching K-12 kids about the ocean are available in our own state of Georgia.

Studying marine science is particularly relevant to addressing the Earth and Life Science Content Standards. In addressing these Standards, the exploration of marine concepts will also allow teachers to meet the Characteristics of Science Performance Standards. Shown below are some examples of Content Standards and the co-requisite Characteristics of Science learning goals that can be addressed through the study of marine ecosystems. As is evident from this representation, ocean science can be a well-chosen topic for addressing Science Standards in the school curriculum.

## Examples of Georgia Performance Standards and Learning Goals that Apply to Marine Education

*For a complete listing of the GPS, see [www.georgiastandards.org](http://www.georgiastandards.org)*

Grade	Example of Content Standard in Earth Science, Life Science, and High School Sciences	Co-requisite Characteristic of Science Standard Learning Goal
K	Students will sort living organisms and non-living materials into groups by observable physical attributes.	Compare very different sizes, weights, ages, (baby/adult), and speeds (fast/slow) of both human made and natural things.
1	Students will investigate the characteristics and basic needs of plants and animals.	Raise questions about the world around you and be willing to seek answers to some of the questions by making careful observations.
2	Students will observe and record changes in their surroundings and infer the causes of the changes.	Describe changes in the size, weight, color, or movement of things, and note which of their other qualities remain the same during the specific change.
3	Students will investigate the habitats of different organisms and the dependence of organisms on their habitat.	Students will apply to their inquiry learning practices the fact that scientific investigations take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
4	Students will describe the role of organisms and the flow of energy within an ecosystem.	Support statements with facts found in books, articles, and databases, and identify the sources used.
5	Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.	Offer reasons for findings and consider reasons suggested by others.
6	Students will recognize the significant role of water in earth processes.	Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts. (For example: El Nino's effect on weather.)
7	Students will examine the dependence of organisms on one another and their environments.	Observe and explain how parts can be related to other parts in a system such as a predator/prey relationships in a community/ecosystem.
8	Students will be familiar with the forms and transformations of energy.	Apply to their inquiry learning processes the fact that scientists use technology and mathematics to enhance the process of scientific inquiry.
H.S. Physical Science	Students will investigate the properties of solutions.	Recognize that the universe is a vast single system in which the basic principles are the same everywhere.
H.S. Biology	Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.	Recognize that universal principles are discovered through observation and experimental verification.
H.S. Physics	Students will analyze the relationships between force, mass, gravity, and the motion of objects.	Decide what degree of precision is adequate and round off appropriately.
H.S. Environmental Science	Students will describe stability and change in ecosystems.	Suggest reasonable hypotheses for identified problems.
H.S. Earth Systems	Students will explain how life on Earth responds to and shapes Earth Systems.	Use data as evidence to support scientific articles and claims in written or oral presentations.

Numerous resources are available to help teachers educate their students about the ocean. A sampling of centers in Georgia that offer marine education is listed on the Georgia Project WET website. Go to [www.gaprojectWET.org](http://www.gaprojectWET.org) and see the Dragonfly Gazette section for the listing.