5-8 Helping Watersheds Activity

South Carolina Aquarium

Overview

Focus Question
How can you help your watershed?

Activity Synopsis
Students will examine EPA and South Carolina DHEC websites to find out about the watersheds in their area and the issues affecting them. Students will use what they find to devise and implement a project to help watersheds in their local area.

Time Frame
Continuing project

Objectives
The learner will be able to:

- Use a computer to research information on watersheds
- Plan and implement a community project to help local watersheds

Student Key Terms

- non-point source pollution
- point source pollution
- riparian zone
- water quality
- watershed

Teacher Key Terms

- fecal coliform
- solvent

Standards

South Carolina College- and Career-Ready Science Standards 2021

5th Grade: 5-LS2-1, **5-ESS2-1**, **5-ESS3-1**
6th Grade: 6-ESS2-4
7th Grade: 7-PS1-3, 7-LS2-1, 7-LS2-2, **7-LS2-4, 7-ESS3-3**

***Bold standards are the main standards addressed in this activity**

2014 Academic Standards and Performance Indicators for Science

5th Grade: 5.S.1A.1, 5.S.1A.2, 5.S.1A.4, **5.S.1A.6, 5.S.1A.8, 5.S.1B.1, 5.E.3A.1, 5.E.3B.1, 5.E.3B.3**. **5.E.3B.4**
6th Grade: 6.S.1A.1, 6.S.1A.2, 6.S.1A.4, 6**.S.1A.6, 6.S.1A.8, 6.S.1B.1**
7th Grade: 7.S.1A.1, 7.S.1A.2, 7.S.1A.4, 7**.S.1A.6, 7.S.1A.8, 7.S.1B.1**
8th Grade: 8.S.1A.1, 8.S.1A.2, 8.S.1A.4, 8**.S.1A.6, 8.S.1A.8, 8.S.1B.1,** 8.E.5A.1

*** Bold standards are the main standards addressed in this activity**

South Carolina College- and Career-Ready Science Standards 2021

5th Grade Performance Expectations

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS3-1. Evaluate potential solutions to problems that individual communities face in protecting the Earth's resources and environment.

6th Grade Performance Expectations
6-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

7th Grade Performance Expectations
7-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
7-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
7-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
7-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
7-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

2014 Academic Standards and Performance Indicators for Science

Fifth Grade Performance Indicators
5.S.1A.1 Ask questions used to (1) generate hypotheses for scientific investigations or (2) refine models, explanations, or designs.
5.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
5.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
5.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
5.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.
5.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.
5.E.3A.1 Construct explanations of how different landforms and surface features result from the location and movement of water on Earth's surface through watersheds (drainage basins) and rivers.
5.E.3B.1 Analyze and interpret data to describe and predict how natural processes (such as weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, or storms) affect Earth's surface.
5.E.3B.3 Construct scientific arguments to support claims that human activities (such as conservation efforts or pollution) affect the land and oceans of Earth.
5.E.3B.4 Define problems caused by natural processes or human activities and test possible solutions to reduce the impact on landforms and the ocean shore zone.

Sixth Grade Performance Indicators
6.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.
6.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

6.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
6.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
6.S.1A.8 Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
6.S.1B.1 Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.

Seventh Grade Performance Indicators
7.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.
7.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
7.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
7.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
7.S.1A.8 Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
7.S.1B.1 Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.

Eighth Grade Performance Indicators
8.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.
8.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
8.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
8.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
8.S.1A.8 Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
8.E.5A.1 Develop and use models to explain how the processes of weathering, erosion, and deposition change surface features in the environment.

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Cross Curricular Standards

South Carolina Social Studies Standards
6.5.CX, 7.5.1.PR

South Carolina College and Career Standards for ELA
Inquiry (I) – 6-1.1, 6-3.4, 6-4.1, 6-4.2, 6-4.3, 6-5.1, 7-1.1, 7-3.4, 7-4.1, 7-4.2, 7-4.3, 7-5.1, 8-1.1, 8-3.4, 8-4.1, 8-4.2, 8-4.3, 8-5.1
Writing (W) – 6-1.1, 6-2.1, 6-4.1, 6-5.2, 6-6.1, 7-1.1, 7-2.1, 7-4.1, 7-5.2, 7-6.1, 8-1.1, 8-2.1, 8-4.1, 8-5.2, 8-6.1

Common Core Math Standards
6.NS.5

Common Core ELA Standards
Reading for Literature – 6.1, 6.7, 6.9, 7.1, 7.7, 7.9, 8.1, 8.7, 8.9
Reading for Informational Text – 6.1, 6.2, 6.3, 6.4, 6.7, 6.9, 7.1, 7.2, 7.3, 7.4, 7.7, 8.1, 8.2, 8.3, 8.4, 8.7
Writing – 6.4, 6.6, 6.7, 6.8, 6.9, 7.4, 7.6, 7.7, 7.8, 7.9, 8.4, 8.6, 8.7, 8.8, 8.9
Speaking/Listening – 6.1a, 6.2, 6.6, 7.1a, 7.2, 7.6, 8.1a, 8.2, 8.6
Language – 6.1, 6.2, 6.3, 6.6, 7.1, 7.2, 7.3, 7.6, 8.1, 8.2, 8.3, 8.6
Reading for Literacy – 6-8.1, 6-8.2, 6-8.7, 6-7.8
Writing for Literacy – 6-8.1a, 6-8.1b, 6-8.1c, 6-8.1d, 6-8.1e

Background

Key Points
Key Points will give you the main information you should know to teach the activity.

- **Watersheds** connect a variety of habitats and ecosystems over a large area of land. Many species are dependent on healthy watersheds to survive.
- Watersheds become unhealthy when they become contaminated. Contamination comes both from wastes given off by large industries and farms and from the wastes given off by regular people in their day-to-day activities. Half of the contamination in watersheds comes from the wastes of regular people like you and me.
- Individuals have the ability to help watersheds by being conscientious of the behaviors they engage in on a day-to-day basis. (For a list of things to do to help, scroll down to the bottom of this page)

Detailed Information
Detailed Information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions.

All living things depend on water for survival. For this reason, all living things are dependent on healthy **watersheds**. Water travels through watersheds across a variety of habitats and ecosystems and eventually will empty into the ocean (with the exception of the watersheds of the Great Salt Lake and the Dead Sea). Because watersheds affect all of the ecosystems in the world, they also affect all of the living things in the world. A contaminated watershed can be devastating to a large number of species in a variety of communities.

Water is easily contaminated because of its property as a universal **solvent**. This property is also one of the things that make water so important to living things. Many substances dissolve in water. Because some substances have electrical charges that are attracted to the electrical charges of water molecules, the molecules of these substances will bond with the molecules of the water. This is what happens when salt or sugar is poured into a glass of water. The salt or sugar molecules will bond with the water molecules and, to the eye, seem to disappear. Because of this solvent property, water is necessary for digestion and for transporting substances around an organism's body. In animals, water helps to break down food into its usable nutrients, and then the water in the blood helps to carry the nutrients to the various cells of the body as well as carry the wastes out of the body.

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This property that allows water to break down and transport nutrients in living things also breaks down and transports contaminants in watersheds. Chemicals or other impurities that are dropped into watersheds will be dissolved in the water and transported through the watershed, potentially across large areas of land. Anything that drinks this contaminated water will also be drinking the dissolved contaminants, with potentially unhealthy results for the organism.

Because a watershed can be as large as half a continent, contamination is never completely localized within a watershed. Contaminants released in a watershed near Greenville will travel across South Carolina to the coast through the Santee Watershed. Contamination on the Yellowstone River in Montana will eventually travel across the states to Louisiana and the Gulf of Mexico through the Mississippi River Watershed. For this reason, when thinking about how to improve the health of a watershed, the entire breadth of the watershed has to be considered.

Contaminants enter watersheds through a variety of means. One type is categorized as point source pollution. **Point source pollution** enters the environment from an identifiable source, such as from a discharge pipe of a factory. Industries that have identifiable discharges include livestock farms, landfills and water treatment plants. These industries discharge many different kinds of pollution, ranging from livestock manure to industrial chemicals.

Half of the pollution in our nation's waters comes from non-point sources. Non-point sources of pollution include you, me and everyone else that you know. **Non-point source pollution** is pollution that comes from sources that cannot be directly pointed out. An example of non-point pollution is the fertilizer that people put on their lawns. When excess fertilizer washes off of the lawn during a rainstorm it can enter the watershed as runoff. Runoff is water that flows on the surface across lawns, roads and other landscape features. Pollution can be carried or dissolved in runoff and enter the watershed. Once in a body of water, the pollution can be sensed with the proper equipment, but it cannot be directly linked to any particular lawn in the community. Nonpoint pollution originates from urban areas, agriculture land, construction sites, lawns, and some industries, such as mining. The main elements of polluted runoff are heavy metals, salts, sediment, nutrients, and bacteria.

Sediment can also be a contaminant in watersheds. Runoff picks up soil as it travels over land. When vegetation is removed from land for farms, the roots that held the soil in place are no longer there, and the rainwater will easily erode it away. This sediment is eventually carried in to the watersheds and can make major changes in the quality and appearance of the water. For example the reddish-brown water we associate with the rivers of the Piedmont of South Carolina is not their natural appearance. These rivers were clear until poor farming practices were introduced into the Piedmont, and all of the exposed red clay soil in the fields began washing into the rivers and streams of the area.

Excess nutrients are considered contaminants in watersheds. Nutrients in watersheds are important because they support food chains in the aquatic communities. Too many nutrients can cause major problems, though. Excess nutrients can lead to algal blooms in which the fast-multiplying algae explode in population because of the sudden influx of nutrients. The new algae will use up all of the oxygen in the ecosystem which in turn will lead to fish kills in which all of the animals in the aquatic ecosystem die because of lack of oxygen. Excess nutrients get into watersheds often through fertilizers that are put on farms and lawns. Fertilizers are artificial nutrients that are laid on fields and then brought into watersheds through surface runoff. These are then carried to coastal areas where they can cause algal blooms.

Most contamination in watersheds occurs on a steady continuing basis, but at times the contamination can be sudden and devastating. An example of this was when Hurricane Floyd hit the Coastal Plain of North Carolina in 1999. The deluge of water brought into this area by the heavy rains of the hurricane flooded the large pig farms and other farms of the area as well as the septic tanks of many rural homes. All the wastes from these farms and septic tanks began being carried by surface runoff into the PeeDee River Watershed. Along with the wastes came an abundance of bacteria known as **fecal coliforms** (the most famous one is E. coli) into the watershed. Because fecal coliforms are dangerous to animals, those who lived downstream of these farms and septic tanks in the Pee Dee Watershed around Myrtle Beach and Georgetown, could not drink untreated tap water for months because they would become seriously sick. These bacteria also affected wildlife, particularly filter feeders such as oysters. Many oyster beds have to be closed because the oysters have an abundance of fecal coliforms in their bodies.

Since over 50% of contamination in watersheds comes from non-point pollution, students can do a great deal to help reduce contamination in local watersheds. Below are some examples of things the students or their parents can do to help local watersheds:

- *Conserve the amount of water they use on a day-to-day basis.* The less water used will reduce the amount of wastewater that will eventually enter the watershed.
- *Recycle and compost.* The less waste that enters landfills, the less contaminants that the landfills will be giving off.
- *Pick up litter.* Contaminants leach off of litter and enter watersheds or the litter itself will enter watersheds.
- *Bury or flush pet wastes.* Pet wastes left on lawns can become home to fecal bacteria that can be picked up by runoff and carried into watersheds.
- *Only purchase and use environmentally friendly cleaners, pesticides, herbicides and fertilizers.* The chemicals in many of these products can be very detrimental to living things and can be easily picked up by runoff and carried into local watersheds.
- *Properly dispose of any chemical products.* Never dump products such as oil, antifreeze, paint remover, cleaners and paint onto the ground or into storm drains. Contact local waste management professionals to find safe receptacles for these products.
- *Plant native plants around the school and home.* Because native plants are adapted to the local environment, they require less watering and fertilizer than exotic plants, and so reduce wastewater and runoff amounts.
- *Educate others.* The more people who understand the problems and solutions involved in watersheds and become involved in helping, the less non-point pollution will be produced.
- *Become involved in watershed conservation projects.* Projects such as the EPA's "Adopt a Watershed" allow students to become involved in an organized collective effort to continually improve the health of watersheds.
- *Write public officials about issues related to watershed conservation.* There are many ways to help watersheds that can be fostered with government support.
- *Preserve and create wetlands.* Wetlands are very important for the health of watersheds. Wetlands slow the speed of runoff and reduce the amount of erosion that brings sediment into rivers and lakes. The vegetation and mud in wetlands also act as filters that hold impurities and so help clean watersheds.
- *Preserve and create riparian zones.* **Riparian zones** are areas of vegetation around rivers, lakes, wetlands and other bodies of water that act as buffer zones for watersheds. Like wetlands, riparian zones slow runoff and erosion as well as filter out impurities, helping to keep watersheds clean. Maintaining riparian zones helps to keep watersheds healthy.
- *Slow development that increases impermeable surfaces.* Construction of roads and buildings creates impermeable surfaces on which water cannot soak through. This increases the amount of runoff entering watersheds, much of it containing contaminants such as oil that collect on these impermeable surfaces. By reducing development, the contaminants entering watersheds will also be reduced.
- *Raise controls on the pollution emissions of industry.* Waste given off by industry contaminates watersheds. By carefully controlling how industries dispose of their waste, less contamination will enter watersheds.
- *Increase wastewater treatment facilities.* The water leaving our homes and businesses though our sinks, bathtubs and toilets are often full of contaminants. Sending this wastewater to a treatment plant helps to remove these impurities before they enter a watershed.
- *Conserve entire watersheds instead of just isolated habitats*

This last idea is probably the most important. Watersheds connect habitats and ecosystems across a large area of land. For this reason, a section of a river cannot be conserved and expected to have healthy **water quality** unless the areas of rivers and streams upstream in the watershed are also conserved. Because watersheds are such large areas and inhabited by so many different species, maintaining the health of any watershed is of great importance. Because people often inhabit all areas of a watershed as well, it takes a collaborative effort on the part of everyone living on the watershed to help keep the watershed healthy. By being conscientious and by spreading the word to others, everybody has the opportunity to make a difference in improving the health of watersheds.

Procedures

Materials

- Computers with internet access
- Journals/paper
- The rest to be determined by the students and the teacher

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Procedure

1. Have the students examine the websites: the Environmental Protection Agency *Surf Your Watershed* site for South Carolina (http://www.epa.gov/surf3/states/SC/) and the South Carolina DHEC Bureau of Water site, *South Carolina Watershed Management Program* (http://www.scdhec.net/water/). Have students use the maps on these sites to find the watersheds where their towns are located.

2. Have students use the "Water Quality Assessment for Watersheds" meter on the EPA site to determine how water quality is around their community. How does this compare with other areas in the state? What is the water quality of areas upstream of their community? What is the water quality of areas downstream? What areas of South Carolina had the best water quality? What areas had the worst water quality? Students should write their findings in their journals.

3. Have students use the DHEC site to learn more about the watershed where they live. Have them research some of the characteristics of their watersheds and list some of the factors that might be affecting the water quality of their local watershed. Have the students write what they find in their journals.

4. Based on what the students learned from viewing the websites, from their pre-visit activities and from their visit to the Aquarium, have students discuss and list some of the factors they think may be affecting the water quality of the local watershed or some of the other watersheds in the state. What can be done about it? Have students discuss things that they can do to help watersheds.

5. Based on what students have discussed, have them decide upon a project that they can do to help local watersheds. Have them plan and implement this project. If students have trouble coming up with ideas, suggest some of the ideas below.

Project Ideas

- Start a recycling program in the school.
- Start a composting program with cafeteria leftovers.
- Do a litter pick-up somewhere in the community or participate in or organize a River sweep in the area.
- Write letters to politicians about conservation issues related to water quality and watersheds.
- Start an education campaign in school to educate others about conservation issues related to water quality and watersheds (create posters, website, t-shirts, etc.).
- Plant plants next to a local body of water to create a riparian buffer zone.
- Find out what chemicals are being used on the school property (herbicides, pesticides, etc.). Determine how healthy they are to local environment. Devise a plan to reduce their use on the school property.
- Participate in a conservation agency student involvement program:
    - South Carolina DHEC Bureau of Water South Carolina Water Watch Program http://www.scdhec.net/water/
    - United States Environmental Protection Agency Adopt Your Watershed Program http://www.epa.gov/adopt/

Follow-up Questions

- Is there anyone in your area that would be resistant to hearing ways to protect watersheds?
- What can be done to convince them the importance of protecting watersheds?
- What types of jobs are out there for people who would like to protect watersheds and the environment?
- What does the term “green” mean to you? The community around you? The world?

Assessment

Students will create a poster, website or press release explaining the project they conducted to help local watersheds. In the poster, website or press release, students will use text, pictures and photographs to identify a problem affecting local watersheds and show

what the students did to help these local watersheds. Students will hang the poster somewhere where other students can see it, publish the website on the internet or send the press release to the local newspaper.

Scoring rubric out of 100 points

Create a poster, website	**20 points**
Identify a problem in the local area affecting watersheds	**20 points**
Use text and pictures to show what they did to help local watersheds	**40 points**
Publicly present the poster, website or press release	**20 points**

Cross-Curricular Extension

STEM Extension
This activity is already a great STEM activity, but to extend it have students create a presentation to deliver to the school's administration. Presentation should include their project design as well as the budget and manpower to complete it. Have them make modifications after they get feedback.

Resources

Teacher Reference Books

Audubon magazine, published by the National Audubon Society.
This bi-monthly magazine has articles on wildlife all over the world and the conservation issues affecting them.

Carson, Rachel. *Silent Spring*, Houghton Mifflin Co., 1993.
This book, first published in 1962, was a powerful look at how pesticides have affected the natural world. It led to the banning of DDT and helped start the environmental movement.

Duany, Andres, Elizabeth Plater-Zyberk and Jeff Speck. *Suburban Nation: The Rise of Sprawl and the Decline of the American Dream,* North Point Press, New York, 2000.
A look at the issues around and consequences of America's current system of urban development.

Leopold, Aldo. *A Sand County Almanac,* Oxford University Press, New York, 1949.
This classic of nature writing was one of the first texts to examine the ethical reasons of why humans need to preserve wild places.

Ricklefs, Robert E. and Gary L. Miller. *Ecology*, W.H. Freeman Company, 1999.
This college textbook is a great resource for finding out how wildlife communities interact with each other as well as the abiotic factors of their environment, and what human influences can be on these communities.

Teacher Reference Websites

Chesapeake Bay Foundation Environmental Education
www.cbf.org/
The Chesapeake Bay Foundation has put together an exemplary watershed protection program that encompasses many states. This site includes information on what they have done in this program as well as curricula and other education related items.

South Carolina Department of Health and Environmental Control (DHEC): Bureau of Water
www.scdhec.net/water
This site offers information on drinking water, water pollution control, watersheds plus much more.

Southern Appalachian Watershed Conservation Clearinghouse
http://sunsite.utk.edu/samab/proj/watershed.html
This site offers links to a number of websites related to watershed conservation in the Southeastern United States.

Surf Your Watershed: A Service to Help You Locate, Use, and Share Environmental Information about your Place
www.epa.gov/surf
This site allows you to learn specific information related to the watershed your town is located in.

Student Reference Books

Bruning, Nancy. *Cities Against Nature,* Childrens Press, Chicago, 1992.
A student's look at how urban development affects wildlife communities.

Cone, Molly. *Come Back, Salmon,* Sierra Club Books for Children, San Francisco, 1992.
Learn how the students of Jackson Elementary School in Everett, Washington, cleaned a nearby stream, stocked it with salmon and protected it from pollution.

Herda, D.J. *Environmental America: The Southeastern States,* The Millbrook Press, Brookfield, CT, 1991.
A student's look at the environmental issues affecting the Southeastern United States.

Liptak, Karen. *Saving Our Wetlands and Their Wildlife,* Franklin Watts, New York, 1991.
This book describes the different types of wetlands and the wildlife found there. It also includes ideas for protecting the wetland habitats.

Mattson, Mark. *Scholastic Environmental Atlas of the United States*, Scholastic Inc., 1993.
This excellent reference book is filled with maps and charts that help kids to understand different aspects of environmental issues such as overpopulation and waste disposal.

McVey, Vicki. *The Sierra Club Kid's Guide to Planet Care & Repair,* Sierra Club Books for Children, San Francisco, 1993.
Learn how activities we do every day affect the environment. Includes tips for improving our environment as well as classroom activities for students.

Student Fiction Books
These books may be too elementary for middle school students, but they are beautiful books that can be appreciated by everybody

Cherry, Lynne. *The Great Kapok Tree,* Harcourt Brace Jovanovich, Publishers, New York, 1990.
A man getting ready to chop down a tree in the Amazon rainforest falls asleep and is visited by many different members of the rainforest wildlife community who tell him why they do not want the tree to be cut down.

Cherry, Lynne. *A River Ran Wild,* Harcourt Brace Jovanovich, Publishers, New York, 1992.
A beautifully illustrated story of how a river in New England has changed during the last 400 years as more people moved to live on its banks.

Jeffers, Susan. *Brother Eagle, Sister Sky: A Message From Chief Seattle*, Dial Books, New York, 1991.
A beautifully illustrated book of the ecological message of Chief Seattle, an Indian chief who lived in the Pacific Northwest from 1790 to 1866.

Curricula

Aquatic Project WILD
Aquatic Project WILD is an interdisciplinary curriculum for K-12 teachers on aquatic wildlife and ecosystems. The activities cover a broad range of environmental and conservation topics.
For more information click on http://www.projectwild.org/ProjectWILDK-12AquaticcurriculumandActivityGuide.htm

The GLOBE Program
Global Learning and Observations to Benefit the Environment (GLOBE) is a hands-on international environmental science and education program. GLOBE links students, teachers, and the scientific research community in an effort to learn more about the environment through student data collection and observation. To learn more about the GLOBE program visit their website at www.globe.gov.

Project WILD
Project WILD is an interdisciplinary curriculum for K-12 teachers on a broad range of environmental and conservation topics.
For more information click on: http://www.projectwild.org/

Project WET
Project WET is an interdisciplinary curriculum for K-12 teachers on water. The activities cover a wide range of water-related topics.
For more information visit the website at http://www.projectwet.org/

SC MAPS
SC MAPS is a standards-based interdisciplinary curriculum for middle school teachers that focus on the geology of the regions of South Carolina using aerial photographs, images and topographic maps. Great source for good maps!
For more information visit the website at http://www.cas.sc.edu/cege/resources/scmaps/scmaps.html