Acknowledgements

Good Character, Good Stewards: Caring for the World Around Us is the result of a partnership project between Shenandoah National Park and the faculty and staff of McGaheysville Elementary School, Rockingham County Public Schools, Virginia. The activities in this guide meet the educational goals of the National Park Service and Shenandoah National Park, and correlate with character education requirements and the Standards of Learning for Virginia public schools.

National Park Service:

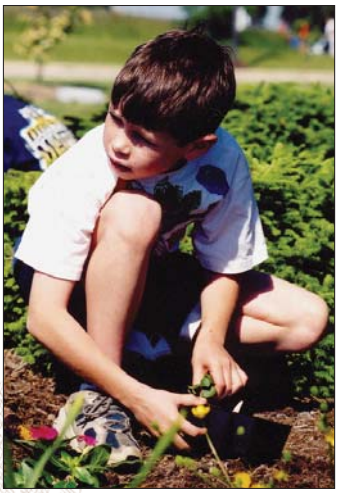
Timothy Taglauer, *Project Coordinator*
Linda Manka, *Education Specialist*
Neal Lewis, *Design and Layout*
Joanne Amberson, *Editing*

Primary Contributors, McGaheysville Elementary School:

Chevie Cale, *4th Grade*
Kathey Clanahan, *Kindergarten*
Marianne Cline, *5th Grade*
Janis Churchill, *2nd Grade*
Bonnie Downey, *1st Grade*
Judy Fields, *Guidance*
Etta Howard, *3rd Grade*
Sharon Martz, *5th Grade*
Barbara Palmer, *3rd grade*
Kim Phillips, *5th Grade*
Krista Shifflet, *1st Grade*
Debbie Sprouse, *5th Grade*
Bill Rauss, *Principal*
Tammy Dishner, *Assistant Principal*

Thanks to all the teachers at McGaheysville Elementary and other area schools who reviewed, piloted, and evaluated the activities in this curriculum.

This project was funded through an Environmental Leadership Education Grant from the National Park Service Fee Demonstration Program.



Parents' greatest hope is that their children grow up to be kind, caring adults. Teachers want to educate respectful and motivated students. Employers want to hire honest and productive workers. We all want to live in a society composed of people with good character.

Virginia Character Education Project

Introduction

Welcome to ***Good Character, Good Stewards: Caring for the World Around Us,*** an interdisciplinary curriculum supplement for grades K-6. ***Good Character, Good Stewards...*** is designed to augment existing curricula that meet Virginia Standards of Learning by integrating character education with science, math, language arts, and social science lessons. The activities focus on the concept of stewardship and the ideals of the National Park Service to provide relevant educational experiences that involve students and promote an understanding of their responsibility to care for the world and its resources.

A good steward exhibits positive character traits such as respect, caring, responsibility, and good citizenship toward the land, air, water, plants, animals, and people. Environmental stewardship is living responsibly as a caretaker of the environment for the benefit of present and future generations. A stewardship ethic is essential for the health and well-being of life on planet Earth.

"We are stewards of an irreplaceable environment. This is an awesome task as well as a precious gift."

President Jimmy Carter

The activities in this guide are designed to actively engage students in learning while relating good character lessons to a variety of other disciplines. We hope you find this material to be user-friendly, relevant to your classroom curriculum, adaptable to your time frame, and successful in achieving the learning objectives and Standards of Learning goals.

Virginia Standards of Learning

The Standards of Learning for Virginia Public Schools describe the commonwealth's expectations for student learning and achievement in grades K-12 in English, mathematics, science, history/social science, technology, the fine arts, foreign language, health and physical education, and driver education. These standards represent a broad consensus of what parents, classroom teachers, school administrators, academics, and business and community leaders believe schools should teach and students should learn.

Virginia Department of Education
www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml

Character Education

Legislation passed by the 1999 Virginia General Assembly (§22.1-208.01) requires each local school board to establish a character education program in its schools, the aim of which is to improve the learning environment, promote student achievement, reduce disciplinary problems and develop civic-minded students of high character.

Virginia Character Education Project
www.pen.k12.va.us/VDOE/Instruction/CEP/index.html

How to Use These Lessons

Good Character, Good Stewards is designed to supplement and support existing lesson plans that meet Virginia Standards of Learning curriculum requirements. The activities can be expanded, adapted, and modified to meet your individual teaching needs or applied to other subjects. Your input and creativity along with students' unique learning situations and abilities will determine how far you can go!

Each lesson begins by identifying the **Curriculum** subject and **Character traits** addressed in the lesson. The suggested **Grade level(s)** and the relevant **Virginia Standards of Learning** are listed followed by the approximate **Length/duration** and the **Materials** needed to complete the entire lesson. An **Overview** provides the basic theme and goal of the lesson followed by the **Objectives** for student learning. **Background** information on the subject matter is provided as well as the suggested **Vocabulary**.

Step-by-step **Lesson** instructions begin with a **Motivational Activity** to use as a starting point and "hook" to engage the students. This is followed by a series of developmental **Activities** in which one or more curriculum subjects are incorporated. These activities may be done in developmental sequence as presented or rearranged as needed.

Assessment suggestions follow the lesson plan to verify and document achievement of the objectives. The **Going Further** and **Related Subject Activities** sections provide enrichment and expansion opportunities. **Resources and References** lists the sources of information used within the lesson. Finally, the **Glossary** provides applicable vocabulary definitions.


ACTIVITY: BRANCH OUT

Overview

Objectives

Background

Each lesson includes a section that uses national parks as examples of good stewardship ideals to help meet the learning objectives of the activities. Refer to the background on the history and mission of the National Park Service to help integrate the study of national parks with each lesson. If possible, take a field trip to one of Virginia's national park units to enhance the lessons with a hands-on experience.

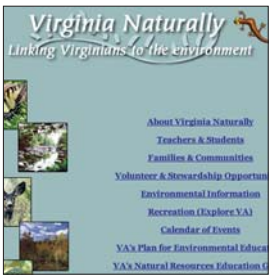
Preview the guide to determine the lessons that best suit your needs. Select an individual lesson or group several lessons together for extended learning. Grade levels and time frames are suggested for each activity, but they are flexible. The activity sequence can be rearranged, if desired.

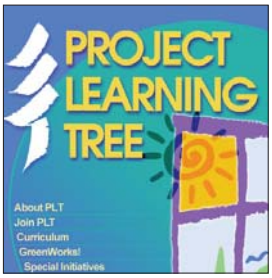
An **Evaluation Form** is included. Please make copies of the form and submit one evaluation form for each lesson you complete. Send completed forms to:

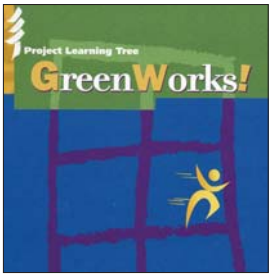
Education Office
Shenandoah National Park
3655 US Hwy 211 E
Luray, VA 22835

Your feedback is critical to help ensure that the activities are usable, relevant, and valuable as a teaching tool.

Additional Resources







Many of the lessons in ***Good Characters, Good Stewards*** *refer to activities that are easily found at the following resources.*

Exploring the Real Thing: A Guide to Educational Programs at National Park Sites in Virginia provides teachers with information on curriculum-based programs and materials offered by national park areas in Virginia. The guide includes descriptions of park education programs, as well as a list of resources recommended by teachers who use national parks as part of their curriculum. **http://www.nps.gov/ERT/**

Virginia Naturally is a gateway to statewide environmental education resources that strives to link Virginians to environmental information and promote lifelong learning about Virginia's environment and the stewardship of the Commonwealth's natural and historic resources. Website: **http://www.vanaturally.com**
Environmental Education Resource Directory:
http://www.deq.state.va.us/education/resources.html
Stewardship in Virginia: **http://www.vanaturally.com/volunteer.html**

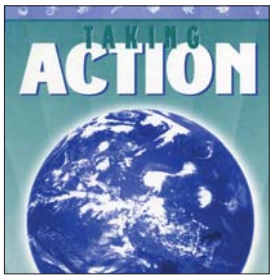
Virginia Department of Environmental Quality, Office of Environmental Education provides teachers with resources to deliver quality environmental education programs that meet state academic standards and engage citizens in conservation activities to promote environmental stewardship in Virginia.
http://www.deq.state.va.us/education

Project Learning Tree (PLT) is an international environmental education program that provides lesson plans and teacher training about forest communities. Activities are correlated to the Virginia Science Standards of Learning.
National PLT website: **http://www.plt.org**
Virginia PLT website: **http://www.cnr.vt.edu/plt**

GreenWorks! Connecting Community Action and Service-Learning is the service-learning component of *Project Learning Tree*. By combining the environmental knowledge and resources of PLT with community action initiatives, **GreenWorks!** action projects make a difference in how young people think, in their sense of responsibility toward their communities, and in their understanding of their relationship to the environment. **http://www.plt.org/greenworks/index.cfm**

Additional Resources

Project WILD is an international wildlife education curriculum with an emphasis on building an awareness and appreciation of wildlife that results in responsible actions towards the environment. Activities are correlated to the Virginia Science Standards of Learning.
National Project WILD website:
http://www.projectwild.org
Virginia Project WILD website: **http://www.dgif.virginia.gov/education-/project-wild/**



Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects
is a supplemental guide from Project WILD that inspires ideas and provides models for conducting effective environmental projects. This guide will help educators plan, implement and evaluate environmental action projects. **http://www.projectwild.org/TakingAction.htm**

Project WET: Water Education for Teachers is a water education program that facilitates and promotes awareness, appreciation, knowledge, and stewardship of water resources through the dissemination of classroom-ready teaching aids. The activities are correlated to the Virginia Science Standards of Learning.
National Project Wet website:
http://www.projectwet.org/index.html
Virginia Project Wet website:
http://www.deq.state.va.us/education/wet.html

National Park Service

The National Park Service is the premier steward and protector of our nation's diverse natural and cultural heritage. The primary mission of the National Park Service is to preserve the nation's natural and cultural resources and values for the enjoyment, education, and inspiration of this and future generations. ***Good Character, Good Stewards*** continues this legacy by striving to create knowledgeable, responsible citizens.

Congress set aside Yellowstone National Park in 1872 as the first national "public park or pleasuring-ground." However, it wasn't until 1916 that a federal bureau, the National Park Service, was created to manage the growing number of national parks then assigned to the U.S. Department of the Interior.

On August 25, 1916, President Woodrow Wilson signed the act creating the National Park Service. This act states that

> *the Service thus established shall promote and regulate the use of Federal areas known as national parks, monuments and reservations … which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.*

Today, the National Park Service manages more than 390 park areas, including more than 18 in Virginia. These parks hold a special place in the hearts of all Americans, to whom the parks belong. Each park tells a story and represents a special characteristic important to our country through its history, location, or amazing natural features. These stories are just waiting to be discovered and valued by students who will realize that national parks are part of their history, their future, their pleasure, and their responsibility.

Good Character, Good Stewards will help guide your students to model responsible behaviors and make informed decisions. As lifelong stewards, they can positively impact their world by caring for plants, wildlife, people, and the environment. As responsible citizens, students can ensure that the treasures of our National Park System will be here for generations to come. Our children are the future!

Education Mission

Interpretation and education is a primary organizational purpose of the National Park Service, essential to achieving our mission of protecting and preserving our nation's natural and cultural resources. We envision a national park system that is recognized as a significant resource for learning, where people and organizations collaborate on teaching and learning about the interconnection of human culture and nature, natural systems, and the values of America's diverse heritage, and the principles of democracy. Parks are an integral part of the nation's educational system, providing unique and powerful individual learning experiences that help shape understanding and inspire personal values.

For more information on national parks, visit the National Park Service website at **www.nps.gov**

For an on-line guide to educational programs at National Park Service sites in Virginia, visit the *Exploring the Real Thing* website at **http://www.nps.gov/ERT/**

ACTIVITY: BRANCH OUT

Overview

Trees are important resources that provide oxygen, homes for animals, scenic beauty, building materials, and paper. People can exhibit good citizenship and responsible, caring behavior by conserving resources, recycling paper, and planting trees to protect and improve their environment.

Objectives

Students will be able to

1. observe trees through the seasons and describe the changes over time;
2. graph and chart progress towards a funding goal and establish a recycling project for the school;
3. celebrate Earth Day or Arbor Day by planting a tree in the school yard or community;
4. exhibit the character traits of responsibility and good citizenship by caring for their tree as a way to improve the environment;
5. understand the importance of stewardship and how national parks protect trees and other resources.

Background

The average American uses seven trees a year. It takes an entire tree to make a stack of newspapers just three feet high. Approximately 36 acres of trees are cut each week just to make the Sunday *New York Times*! A tree will reduce carbon dioxide in the air, produce oxygen, provide protection and homes for animals, and serve as a source of products used by people. Trees also provide shade and beauty for recreational enjoyment. By respecting our environment through reducing waste, reusing items, refusing what we don't need, and recycling, every person can make a difference!

SCIENCE: Life Processes – Resource Conservation

CHARACTER: Citizenship, Responsibility, Caring

GRADE LEVEL
Kindergarten – 1st Grade

VIRGINIA STANDARDS OF LEARNING
Math: K.13, K.15,1.18,1.19
Science: K.1, K.2, K.6, K.8, K.9, K.10, 1.1,1.4
English: K.1, K.2, K.11, 1.2, 1.3, 1.11, 1.12

LENGTH/DURATION
This unit should be started in the autumn of the year and continued periodically until late spring.

MATERIALS
construction paper shapes, clipboards, 8 1/2 x 11 paper, file folder for each student, crayons or paint, paper for posters, books: *Brother Eagle, Sister Sky* and *The Shape of Things* (see Resources and References), newspapers, parent volunteers, funds to purchase tree(s), representative from a plant nursery

VOCABULARY
environment, conservation, deciduous, recycle, observation, graph, respect, citizenship, responsibility, caring, stewardship

ACTIVITY: BRANCH OUT

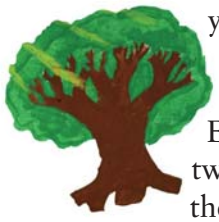
LESSON

Motivational Activity

Introduce or review the concept of shapes in our natural world by reading and discussing the book *The Shape of Things*. Have students observe shapes in the classroom, then draw pictures of simple objects using circles, squares, triangles, and rectangles. Encourage students to share their pictures and compare them with familiar objects at school or in the neighborhood to identify similarities in patterns and shapes.

Activities

1. Have students use cutout patterns of circles and rectangles to create pictures of trees. Take the pictures outside and observe the shapes of trees in the schoolyard. Do the pictures look like the live trees? Why or why not? Did the children create "lollipop trees"? Explore a tree – the trunk, branches, twigs, and leaves or needles – using the senses of looking, smelling, listening, and touching. Use dramatic play to create the shape of a variety of trees.

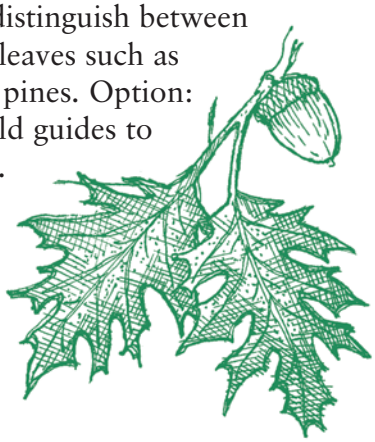


   In the autumn, have the class choose one large deciduous tree in the schoolyard to observe. Discuss the natural changes that take place in autumn. Have students use crayons or paints to illustrate the tree. Save these pictures to include in a student-made book about seasons. The students will draw a picture of this same tree in winter and again in spring and compare the differences. They can dictate sentences to go with the pictures. Read the sentences aloud to initiate discussion and determine understanding.

2. Read aloud *Brother Eagle, Sister Sky*. Ask, "What can we do to make a difference? How will we achieve this?"

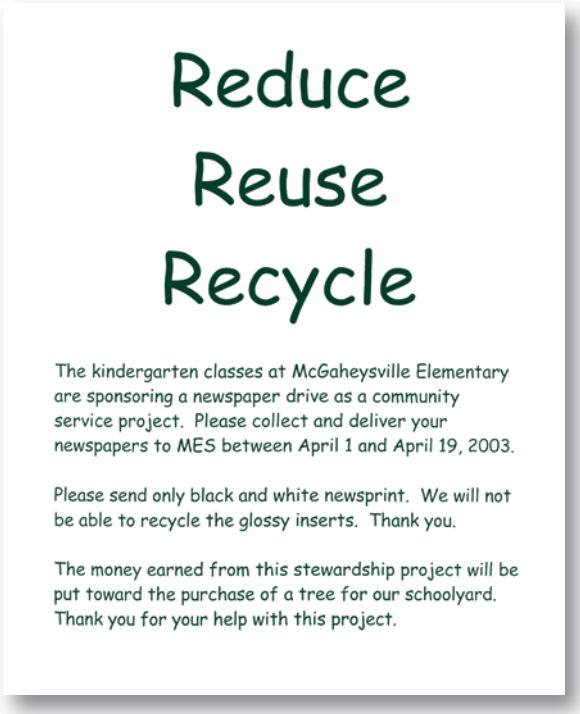
3. Identify the parts of plants and discuss why plants and trees are important in our world. Develop a plan to plant a tree (or other seedling) in the schoolyard or community. Obtain permission for the planting first. Determine which native trees are recommended for your school's geographic region (refer to *Common Forest Trees of Virginia* listed in the resources). Determine what kind of tree will be planted and where to plant it. Ask, "Where will we get the tree? Will the tree cost money and how much? How will we pay for it? Who will care for the tree once it is planted?"

4. Investigate and begin to identify various types of trees. Take a walk to a park or around the school neighborhood. Help students learn to distinguish between common types of leaves such as maples, oaks, and pines. Option: use simple tree field guides to help identify trees. Have students press and mount a variety of identified leaves for colorful autumn collages.



5. Take a field trip to a plant nursery. Working with a salesperson, have the students select the appropriate native tree (or trees) to plant at the school. Determine the total funds needed to make the purchase. Suggest that the class

start a newspaper drive to raise the money for the trees (obtain the school's approval beforehand). Students would collect old newspapers and take them to a local recycling center.



Reduce
Reuse
Recycle

The kindergarten classes at McGaheysville Elementary are sponsoring a newspaper drive as a community service project. Please collect and deliver your newspapers to MES between April 1 and April 19, 2003.

Please send only black and white newsprint. We will not be able to recycle the glossy inserts. Thank you.

The money earned from this stewardship project will be put toward the purchase of a tree for our schoolyard. Thank you for your help with this project.

Contact a recycling center and determine the amount paid for each pound of newspaper. **Note**: Recycling centers often pay one cent per pound of newspaper. Some recycling centers do not accept less than 200 pounds. Calculate the total amount of newspapers to collect in order to earn the needed funds. Share the amount goal with the students.

Plan for the collection, storage, and delivery of the newspapers and begin the project! Enlist the help of interested parents. Remind the students of the additional benefits of recycling newspapers – the fact that each tree saved is a beautiful "gift" to our world.

6. Create a chart to advertise and illustrate the class's fund-raising goal. This could be in the form of a thermometer that will "blow its top" when the goal is reached! Students could also create a graph to chart the date and number of pounds as newspapers are collected. Allow the children to sign their names on the chart to show that they will work hard to accomplish their goals.

7. Have the children create posters to advertise their plan and to generate support for their newspaper drive. They might dictate/write and illustrate friendly letters to their parents and school administrators to share their enthusiasm for the project.

8. Schedule a field trip around Earth Day or Arbor Day (both in April) to a recycling center. Enlist parents or adult volunteers to help deliver the collected newspapers for recycling. Use the money to purchase the selected native tree (or trees) from the plant nursery. Large trees can be delivered. Ask the nursery staff to demonstrate how to properly plant the tree. Have the students assist, if possible.

9. Students should contribute to the continuing care of the new planting(s). If this is done each year, the students will observe, through time, the creation of a small park-like area in the schoolyard or community. They will see the results of their responsible, caring, citizenship and environmental stewardship.

10. Visit or study a nearby national park or other natural area that preserves and protects trees and forest habitats. Have the students determine who is responsible for taking care of the trees and plants in the park. Ask the students what their role and responsibility is to help take care of the park.

Assessments

1. Evaluate the students' abilities to represent, through creative dramatics with self-made props, the changes a healthy, deciduous tree makes during each season. Example: 1 = student is able to pose like a tree, 2 = student is able to pose like a tree and demonstrate that seasonal changes occur, 3 = student is able to pose like a tree, demonstrate that seasonal changes occur, and show what healthy trees need to survive.
2. Students will demonstrate knowledge of the skills necessary to create and read a graph.
3. Students will be able to demonstrate gained knowledge of trees through leaf identification. Suggested inclusions: maple, oak, and pine.
4. Students will be able to verbalize several reasons for planting and protecting trees and explain how recycling newspaper helps to preserve natural resources. They should understand the value of good citizenship, responsibility, and a caring attitude.

Going Further

1. Create a "Word Tree." Outline a large shape of a tree on the blackboard or on bulletin board paper. Have students list parts of a tree or adjectives describing trees and use them to fill in the shape. They might also draw small pictures.
2. Contact the Virginia Department of Forestry, your local Soil and Water Conservation District, or The National Arbor Day Foundation to obtain tree seedlings for each student to plant at home. Ideally this would occur on the day the tree is planted at school so the students will know how to properly plant and care for a tree.
3. Establish a school-wide plan to recycle aluminum cans or other reusable materials.

Related Subject Activities

1. Reading - Read a book about Helen Keller and use a blindfold while exploring a tree. Discuss the way a tree feels, smells, and "sounds." (Could it be an animal habitat in which various animals make their sounds of communication?) Can the students find and identify their favorite tree within a small area by using senses other than sight?

2. Language Arts - Write a letter to:

   The National Arbor Day Foundation
   Arbor Lodge 100
   Nebraska City, NE 68410

   Request age-appropriate information about trees and suggested activities students might do to protect and preserve trees.

3. Phonics - Create a list of words that rhyme with "tree."

4. Art - Take pictures of a tree in the schoolyard and post them by the corresponding month.

Resources and References

Common Forest Trees of Virginia: How to Know Them. Virginia Department of Forestry, 2001.

Jeffers, Susan J. *Brother Eagle, Sister Sky*. Penguin Putnam, 1991.

Dodds, Dayle Ann. illus: Julie Lacome. *The Shape of Things*. U.S.A.: Scott Foresman, 1996.

Javna, John. *50 Simple Things Kids Can Do to Save the Earth*. New York: The Earth Works Group. Andrews and McMeel, 1990.

Kricher, John C., and Gordon Morrison. *Ecology of Eastern Forests: Peterson Field Guide*. New York: Houghton Mifflin Co., 1988.

Project Learning Tree. American Forest Foundation, 2002.

Waste Away. Vermont Institute of Natural Science, 1989.

Virginia Department of Forestry website: **www.dof.state.va.us**

Virginia Department of Conservation and Recreation website: **www.dcr.state.va.us**

For information on Native Plants for Conservation, Restoration, & Landscaping: **www.dcr.virginia.gov/natural_heritage/nativeplants.shtml**

The National Arbor Day Foundation website: **www.arborday.org**

To Pollute or Not To Pollute? *That* is the Question!

Overview

Waste, litter, and pollution negatively affect life on Earth. Responsible actions leading to pollution reduction could save money, protect resources, improve health, and lead to an overall higher quality of life. Strong values and good character traits are needed – now – for EVERYONE'S sake! Students can learn to help their environment by understanding the problems and solutions of pollution and exhibiting the character traits of respect, caring, trustworthiness, responsibility, and stewardship.

Objectives

Students will be able to

1. describe what pollution is, what causes it, and its effects upon the Earth;
2. name 3 ways that litter can harm wildlife, plants, and humans;
3. sort trash into man-made or natural materials;
4. propose ways to help eliminate and/or clean up pollution, litter, and waste;
5 develop and express an appreciation of and responsibility for stewardship of the Earth.

Background

A pollutant is a harmful chemical or waste material discharged into the land, water, or atmosphere leading to a state of dirtiness, impurity, or unhealthiness. Pollution affects everyone! It can be very dangerous for plants, animals, and humans. Much of the waste that is thrown away can be reduced, reused, recycled, or refused (example: simply don't take a bag at the grocery store if not needed). There are many methods to help eliminate or reduce pollution and its potential danger to living things.

Everything that is living produces waste. Decomposers and microorganisms recycle nature's waste to enrich the earth and to provide essential nutrients for the growth of plants.

SCIENCE: Life Processes – Resources, Pollution

CHARACTER: Respect, Caring, Trustworthiness, Responsibility, and Stewardship

GRADE LEVEL
1st Grade

VIRGINIA STANDARDS OF LEARNING
Mathematics: 1.12, 1.18
Science: 1.1, 1.8
English: 1.2, 1.12

LENGTH/DURATION
6 weeks or 1-2 hours per day during Earth Week

MATERIALS
paper, pencils, washed and clean white t-shirts, fabric paint, various sponges or stencils, cardboard pieces, single subject notebook or several blank pages bound together, bulletin board display area, natural and man-made trash, writing paper

VOCABULARY
reduce, reuse, recycle, refuse (see Background), litter, pollution, natural resource, stewardship

Activity: **Save Our Earth**

Human waste, however, is threatening our environment! Hazardous chemicals, disposable diapers, plastics, aluminum cans, styrofoam packaging, and manufacturing pollutants are clogging our air, water supplies, and landfills and are destroying important plant communities and wildlife habitats. Collection and disposal of waste consumes tremendous energy and resources.

The first Earth Day was celebrated in 1970 to raise awareness about the environment and encourage people to take action against pollution. Today, many communities celebrate Earth Day and Earth Week in April with special programs, clean-up projects, and festivals focusing on how people can be environmental stewards.

ACTIVITY: **SAVE OUR EARTH**

LESSON

Motivational Activity

Begin the celebration of Earth Week by reading and discussing *The Lorax* or *Lester and Clyde* (see Resources and References). What are the consequences of abuse and pollution on our natural resources? What is the value of keeping a clean and healthy Earth?

Have students draw and color their bedrooms, placing furniture and decorations as they visualize them. Each student might add a small stuffed animal from home to enhance the scene. After each student has displayed and shared this personal world, have him/her (or others) throw trash on it. How do the students feel about their "world" being "trashed"? Discuss their reactions as you list them on the board.

Compare this trashing of a personal environment to the littering and pollution seen happening to our Earth. How can this harm our future and what impact does it have on all the living creatures – present and future? Why should people care and what steps can we take to prevent this from happening?

Activities

1. Create a special "Gratitude Journal" to keep a record of all of the things students are grateful for. They can make entries throughout the year, focusing on "saving the Earth" and how to be a good steward to keep our Earth green, clean, healthy, and beautiful. Students can begin with labeled illustrations and by the end of the year advance to expressing their thoughts in complete sentences.
2. In the spring, discuss Earth Day and have students make special Earth Day T-shirts. Each student should bring in one clean, white T-shirt. Place cardboard pieces inside the shirts to keep the paint from soaking through to the other side. With clothes protected, dip each child's hand and arm into brown fabric paint and press it onto the shirt for the "tree trunk." Once the paint dries, have the students sponge-paint leaves on the tree with green paint. They may add more details to their shirt, e.g., birds, flowers, insects, sun, clouds. Finally, have an adult write "Save Our Earth," the child's name, and the date on the shirt in fabric paint. Have the students wear their shirts on Earth Day to demonstrate pride for the environment.

3. Develop an experiment to demonstrate the effect of pollutants on plants. Using two labeled, reusable containers filled with dirt, have each child plant alfalfa or lima bean seeds (or any fast-growing plant). One container should be watered with pure, clean water and the other with polluted water (such as with vinegar, lemon juice, soap suds, oil). All other factors should remain constant. Have the students record daily observations and conclusions in their journals.

4. Help students learn about the negative effects of litter and pollutants on animals. Examples might include sea turtles mistakenly ingesting plastic bags instead of jellyfish, birds' eggs weakened by pesticides, small animals trapped helplessly in bottles or cans, starving sea birds caught in broken fishing line, and fish swimming through plastic packaging loops from 6-packs of drinks. A bulletin board representing the various scenarios could be created and displayed in an area visible to all. Add a creative title, such as "CLEAN UP TRASH - SAVE A FRIEND!"

5. Have a big Spring Cleanup at your school or on a trip to a local park. Remind students to wear plastic gloves to avoid germs. Discuss the difference between "man-made" and "natural" trash. Which items will eventually return to the soil if allowed to naturally decompose? How long will it take? Students can proudly wear their Earth Day shirts on the day of the "cleanup."

   Set a perimeter and have students work in pairs to collect the trash. As it is gathered, it can be sorted into piles of "human-made" or "natural trash." Each pile can be compared, in size, with a known object (e.g., a car, bush, child, basketball, marble) and then weighed. Discuss how many pounds of trash were collected and how the students have helped the Earth. Ask the students how collecting trash demonstrates good character (being a good citizen) and discuss how this action represents being good stewards for the Earth.

6. Create a "*To Pollute or Not To Pollute*" bulletin board. Divide a bulletin board into two defined sections. On one side, have a beautiful, green Earth (sun shining, etc.). On the other side, have an Earth that is polluted, dirty, and "gross" (sad sun, brown clouds). Have children collect trash from their home, both natural and man-made. Cover the polluted side with

   lots of garbage. On the beautiful side, have students draw or cut out pictures of animals, streams, happy people, recycled items, etc. Use things that make the Earth and environment beautiful and enjoyable. Have students explain and discuss the difference we, as trustworthy good stewards, can make in our world.

7. Make a "Trash Man." Draw an outline of a life-size person on white poster-board. Have students bring human-made trash items to school and glue them onto the silhouette with a hot glue gun. Use some of the trash to resemble facial features, eyes, nose, hair, etc. Display the "Trash Man" to remind students and visitors to "Reduce, Reuse, Recycle, & Refuse." Add students' comments or slogans to encourage litter prevention. On chart paper or in a journal, have students write about the variety of trash they collected and their feelings about recycling. How would it help if people simply refused to use an unnecessary item? Example: extra napkins, straws, and ketchup packets at a fast food restaurant.

8. Plan a field trip to a national park. In preparation, have students write in their gratitude journals: What natural and historic resources (plants, animals, views, artifacts) will the students see? Why are they thankful for these? How can they help protect the park and the resources? What does the national park do to protect and preserve these resources?

   After the park visit, have students write about their experience. What did they see, feel, and enjoy? In what ways are they thankful for the park? Do they hope the park is there for their future and for future generations? How can they help and why should they care? Can they be trusted to care for our environment?

9. Have the students discuss what they can do to help "save our Earth." In their journals, ask them to illustrate at least three good citizenship behaviors that would help to eliminate pollution and protect resources.

ACTIVITY: SAVE OUR EARTH

Assessments

1. Observe and document behaviors, participation, and understandings exhibited in discussions, activities, and conversations in the classroom.
2. Use anecdotal records during the hands-on activities to verify students' understanding of the concept of pollution and its effect on the Earth.
3. Journal entries, writings, and drawings should show the students' understanding of the concept of pollution, its effect on the earth, and an appreciation for the role of national parks as environmental stewards. Students should be able to express several ways to reduce pollution. Drawings should illustrate at least 3 ways to help the earth and 3 things that hurt the earth.
4. Self-assessment should include an understanding of concepts and intended change in behavior as a result of these activities.

Going Further

1. Create Pollution Posters. Divide the class into 3 groups identified as "land pollution," "air pollution," or "water pollution." Have each group title their poster, then draw a scene that depicts that type of pollution.
2. Teach the students how to make an at-home compost container to dispose of and recycle organic matter. (Remind them not to compost meat or cheese, as these will attract animals.)
3. Set up a recycling center in the classroom for your grade level. With staff and parent support, this could expand to a school-wide recycling center.
4. Create "Treasures from Trash." Make creative art displays from trash and discuss the impact of trash on Earth.

Related Subject Activities

1. Math – Separate, graph, and weigh the trash collected.
2. Art – Create pictures, dioramas, bumper stickers, posters, and journal entries with "Save our Earth" slogans.
3. Drama – Write and prepare a class play or puppet show about the effects of pollution on our Earth. Present it to other classes, the school body, and parents.
4. Music – Create a "Trash Rap" or sing various earth songs, e.g., "*Don't Throw Your Trash in My Backyard!*"

Resources and References

Geisel, Theodor Seuss [Dr. Seuss]. *The Lorax.* New York: Random House, Inc. 1971.

Reece, James H. *Lester and Clyde*. U.S.A.: Scholastic Paperbacks, 1994.

Grove, S. & Dr. Judi Hechtman. *Reduce, Reuse, and Recycle*. California: Creative Teaching Press, 1996.

Javna, John. *50 Simple Things Kids Can Do to Save the Earth*. Missouri: The Earth Works Group, Andrews and McMeel, 1990.

Waste Away. Vermont: Vermont Institute of Natural Science, 1989.
"Waste–What Is It?" 1-3.
"Don't Throw Your Trash in My Backyard!" 23.
"Roots Of Our Waste Problem." 37-46.

The Study of Respect and Care for Nature's Small Creatures.

SCIENCE: Life Processes – Adaptations, Living Systems

CHARACTER: Caring, Respect

GRADE LEVEL
1st Grade - 4th Grade

VIRGINIA STANDARDS OF LEARNING
Science: 1.1, 1.5, 2.1, 3.1, 3.4, 4.1, 4.5
English: 1.1, 1.2, 1.12, 2.2, 2.3, 2.9, 2.10, 3.1, 3.8, 4.

LENGTH/DURATION
3 one-hour sessions

MATERIALS
hard hat or helmet, cardboard, duct tape, roly-polys (or other small creatures such as worms or mealworms), magnifying glass or bug boxes, soil, shoebox, construction paper, parent volunteers, ruler, rubber gloves

VOCABULARY
adaptation, habitat, behavioral adaptation, physical adaptation, crustacean, isopod, pillbug, roly-poly, scat, decomposer, ecosystem, caring, respect, stewardship

Overview

Even small creatures have adaptations that allow them to survive in nature. "Roly-polyology 101" allows students to study these adaptations while learning the importance of respecting little creatures and why people should care about them.

Objectives

Students will be able to

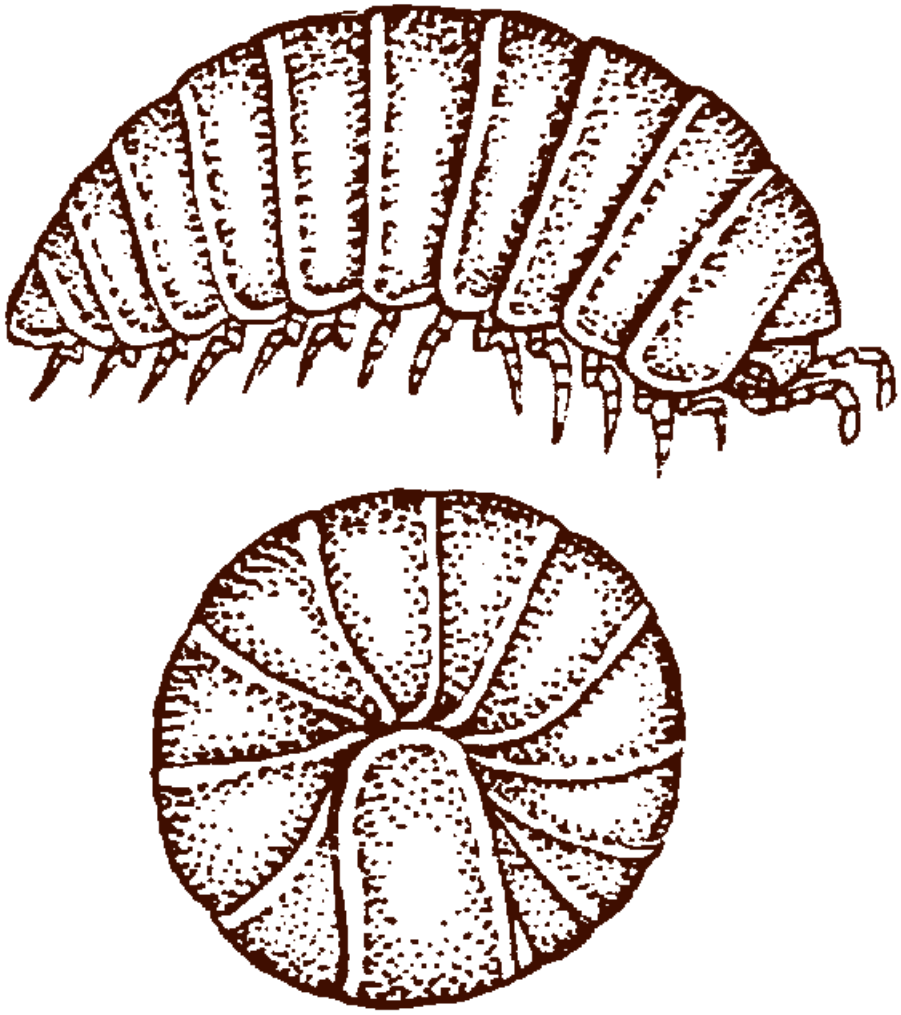
1. observe, describe, and illustrate the natural habitat of a small creature;
2. describe the important role small creatures play within their ecosystem;
3. demonstrate a caring attitude by gently and patiently handling small creatures;
4. propose ways to help eliminate and/or clean up pollution, litter, and waste;
5 demonstrate respect for a habitat by leaving the habitat as it is found.

Background

An adaptation is a structure, function, or form that improves the chance of survival for an animal or plant within a given environment. Most living things have a variety of adaptations. These are classified as either behavioral or physical. Behavioral adaptations are what an animal does or how it behaves in order to survive (plays dead, runs away, migrates, hibernates, etc.). Physical adaptations are the body structures or forms that a plant or animal has that help it survive (body coverings, colorings, leaf patterns, bark texture, characteristics of beaks, legs, wings, etc.).

"Roly-polys," also called pillbugs (*Armadillidium vulgare*), are closely related to sowbugs. Roly-polys look like insects but they are actually crustaceans in the isopod family. Roly-polys have many physical and behavioral adaptations such as a hard outer skeleton with overlapping "armored" plates,

jointed legs, segmented body, and two pairs of antennae. They cannot bite or sting. They are about 1/2 inch long and live in dark, moist places, under rocks, in decaying wood, or in the soil in a schoolyard. Long periods of sunlight dry them out and ultimately cause death. Roly-polys get their name from the adaptation they display when in danger - they curl up into a ball for protection. They also can make a stinky odor like a skunk as a defense against enemies. Roly-polys are important decomposers in our ecosystem. They eat decaying matter such as leaves, mulch, and "scat" (excrement, droppings from other animals) and recycle it back into the soil.



ACTIVITY: ROLY-POLYOLOGY 101

LESSON

Motivational Activity

Introduce or review the terms *physical adaptation* and *behavioral adaptation*.

Role-play an animal with body parts (physical adaptations) that help it survive. Wear a hard hat and "protective armor" (cardboard covered in duct tape) into class. Demonstrate how these body parts would provide protection and help the animal survive, e.g., curl up in the armor for protection, butt the hard hat against an imaginary nut to crack it open, use the hat to protect eyes from the sun to improve vision.
(Option: dress up a student and have him/her demonstrate.)

Next, exhibit and discuss possible behavioral adaptations: play dead (lie on floor), run away from danger (run around the classroom), gather food (munch on pretend plants), etc.

Students can create a name for this imaginary animal. Older students could write and illustrate in a journal, describing the imaginary animal's life, habitat, food sources, and enemies. Students could add additional adaptations – both physical and behavioral – and include them in a story about survival.

Have students discuss, list, and role-play scenarios where real animals or plants exhibit certain behaviors or physical adaptations for protection and survival. Examples: deer raising its tail to signal danger, opossum playing dead, a very tall tree with thick bark, turtle hiding in its shell, fawn's camouflage.
(*Option: Play a game of charades to demonstrate these adaptations.*)

Activities

1. Carefully collect several roly-polys (or other small creatures) and place them in a container for the classroom. Remember to provide the proper temporary environment for the creatures and return them to their habitat when finished.

   Ask if anyone can identify the creatures. Discuss what the students might know about roly-polys: where they live, what they eat, what their importance is in their ecosystem, what adaptations they exhibit, etc. These hypotheses will be tested in the following steps. Have students document their scientific research in journals.

2. Divide the class into small groups of 4-5 students each. Send the groups out with magnifying lenses and bug boxes on a "roly-poly search." Have the students test their hypotheses by looking for roly-polys in different locations. Once roly-polys are discovered, have students gather together

to make careful observations. Remind the students to be patient and careful while observing and handling the animals. They should describe the habitat, identify probable food and water sources, and note specific behaviors.

Students should use magnifying lenses to examine the physical adaptations they see and discuss their findings. Is the "hard hat" and "armor" the teacher wore similar to the outer shell of the roly-poly? What behavioral adaptations are observed? Why might the roly-poly behave that way and how does that behavior help it to survive? As a decomposer, what service does the roly-poly provide in its habitat? What might eat a roly-poly? What would happen if roly-polys disappeared from their ecosystem?

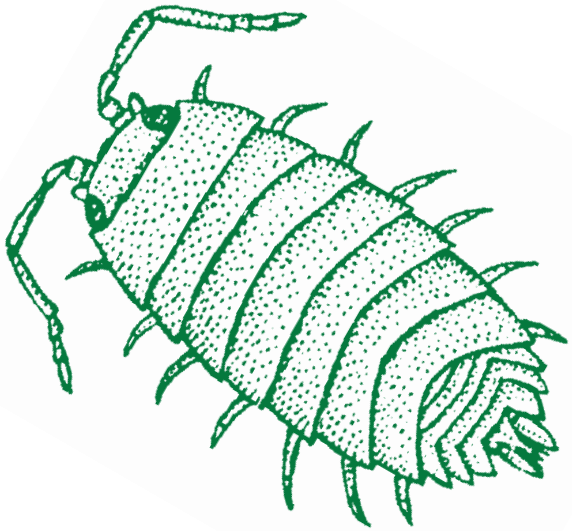
When finished observing, remind the students to return the creatures and leave the roly-poly's habitat the way it was found. Ask, "How would you feel if someone took the roof off of your house?"

3. To learn responsibility and respect for small creatures, have the students temporarily care for a roly-poly or other small creature (ant, cricket, worm, mealworm). Discuss the importance of gently handling the creature and model this behavior. Students should create a small temporary habitat using shoeboxes, soil, leaves, mulch, and construction paper and supply adequate food and water for the creature to survive. Older students can enter day-by-day observations in their journals.

   Have students share their experiences and discoveries related to their new responsibility. Discuss why demonstrating care and respect for the roly-polys is important. Journal entries might include future behaviors that the students could exhibit to protect Earth's small creatures.

4. Relate the responsibility of caring for the roly-poly with the role of national parks in taking care of plants and animals. How do national parks protect animals both large and small? Why is it important to protect the small creatures, too? What can people do to help national parks care for plants and animals and their habitats?

5. Have students discuss, write, and illustrate facts about their discoveries and conclusions and return the roly-polys carefully to their natural habitat. Create a bulletin board display with pictures and facts that explain why it is important to respect and care for the tiny creatures of the world.



Assessments

1. Observe and document behavior, participation, and understanding exhibited during the search for small creatures and in the classroom.
2. Written projects can be evaluated according to the number of facts and the amount of understanding the students express; the effort shown; and the use of age-appropriate language, grammar, and editing skills. These standards should be shared in advance and posted for all students to see.

3. Assess students' lists of facts and discoveries related to the roly-polys or other small creatures. A rubric scoring criteria that might be used to assess this information is 9-10 facts or discoveries = A, 7-8=B, 5-6=C, 3-4=D.
4. Evaluate journals according to criteria set: e.g., labeled pictures, scientific steps and observations, clear descriptions, conclusions, stated changes in behaviors and attitudes.
5. Question and document understandings and behavioral changes a student may have achieved from this study. Is there a greater appreciation and respect for tiny creatures? Ask, "What would you do if you found a cricket behind the classroom door?" or "There are ants on the sidewalk outside the school. What should you do?"

Going Further

1. Small groups or individuals can further their understanding of roly-polys by developing scientific questions and using the scientific method to solve the questions:
   a. How fast can a roly-poly go?
   b. Can a roly-poly dig?
   c. Do roly-polys like the dark or the light?
   d. What do roly-polys like to eat?
   e. Do roly-polys prefer a moist or dry environment?

   Note: If it is very dry outside, another small creature might have to substitute for the roly-poly. Call it "Antology 101," "Wormology 101," etc. Any small creature would work for the above activities.

2. List other animals and describe their adaptations. Have students determine if adaptations are physical or behavioral.
3. Ask students to write creative stories about their "pet" roly-poly. Use either personification to create a fictional story or facts to write a non-fiction story. They might introduce a villain or hero to their story illustrating the character traits of responsibility and caring. Adaptations used for survival should also be identified.
4. As a culminating activity, invite other classes and parents to participate in a graduation from "Roly-polyology 101." Develop a certificate to give each student who performs satisfactorily on the above assessments.

Related Subject Activities

1. Math - Graph the types and numbers of small creatures found. Measure the length of the roly-polys found.
2. Art - Create a Habitat Box. Decorate it to look like the animal's natural home.
3. Extensions in Science - Research other isopods and list their characteristics.
4. Language Arts - Read more about small creatures in the *Backyard Buddies* series by Michael Elsohn Ross. Assign journal writing - daily 5-minute observations documented in journal.

Resources and References

Project Wild. U.S.A.: Council for Environmental Education, 2000 Edition.
Grasshopper Gravity. 4-6.
Adaptation Artistry. 131-132.

Ross, Michael. *Rolypolyology*. Lerner Publishing Group, 2001.

Lyon, William F. *Sowbugs and Pillbugs*. The Ohio State University Extension Fact Sheet, HYG 2072-94. Ohio State University Extension, 2000.
http://ohioline.osu.edu/hyg-fact/2000/2072.html

ACTIVITY: BUILDING RESPECT FOR THE PAST, PRESENT, AND FUTURE

Overview

History provides a wealth of knowledge and facts about the events, conditions, and people of the past. By studying history, people can learn from the past to gain perspective and insights for living in the present and the future. Applying the lessons learned can lead to a new sense of purpose and responsibility. Through the study of the history of national parks, students can understand and respect the National Park Service's stewardship mission and learn to be responsible citizens who care for the parks and the environment.

Objectives

Students will be able to

1. conduct research to gain knowledge and understanding of historical events;
2. create a timeline of events that reflects the history, development, impact, and significance of a national park;
3. discuss and debate an issue taking into consideration various opinions, perspectives, and feelings;
4. explain the responsibilities and stewardship goals of the National Park Service;
5. understand and explain the value of the national parks for our country.

Background

As of August 2003, the National Park System of the United States consisted of 388 areas covering more than 84 million acres. A person could visit a national park area each day for a year and not visit them all! National park areas, which include national parks, monuments, memorials, preserves, seashores, historic sites, and battlefields have such national significance that special recognition and protection is justified. Each park area has a special characteristic such as a natural resource, historical significance, or societal value for which it was designated.

The first national park worldwide was established by the U.S. Congress in 1872. The Yellowstone National Park Act of 1872 set aside more than one million acres of public domain lands from settlement, occupancy, or sale to be

HISTORY AND SOCIAL SCIENCE: Virginia Studies, Civics, and Economics

CHARACTER: Respect, Responsibility, Citizenship

GRADE LEVEL
4th and 5th Grades, adaptable for other grade levels

VIRGINIA STANDARDS OF LEARNING
Science: 5.7
History and Social Science: CE.4, VS.1, VS.9
English: 4.1, 4.7, 4.8, 4.9, 5.1, 5.3, 5.6, 5.7, 5.8

LENGTH/DURATION
6-8 weeks

MATERIALS
2 well-worn hardcover books, resource materials including books, articles, and Internet sources, stamps, envelopes, poster board, paper, pencils, coloring materials

VOCABULARY
national park, monetary value, protection, preservation, natural resources, impact, significance, debate, perspective, commitment, value, environment, ethics, responsibility, citizenship, stewardship

ACTIVITY: BUILDING RESPECT

"dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people." Yellowstone National Park was placed under the exclusive control of the Secretary of the Interior, who was to "provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition." The Secretary of the Interior utilized the Department of the Army to oversee the lands. This set the precedent for other natural reserves under federal jurisdiction and began a worldwide national park movement. Currently, more than 100 nations contain more than 1,200 national parks or equivalent preserves.

With the **Organic Act of 1916,** signed by President Woodrow Wilson, Congress created a new agency called the National Park Service. Placed in the Department of the Interior, the National Park Service became responsible for protecting the national parks and monuments "currently managed by the Department of the Interior and those yet to be established." The "Organic Act " states that

the Service…shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations…by such means and measures…to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

National parks hold a special place in the hearts of all Americans, to whom the parks belong. Each park tells a story and represents a special characteristic important to our country through its history, location, or amazing natural features. These stories are just waiting to be discovered and valued by students who will realize that national parks are part of their history, their future, their pleasure, and their responsibility. As responsible citizens, students can ensure that these national treasures will be here for generations to come!

For more information on the history of the National Park Service, visit the following website:
http://www.cr.nps.gov/history_nps.htm

Yellowstone National Park

LESSON

Motivational Activity

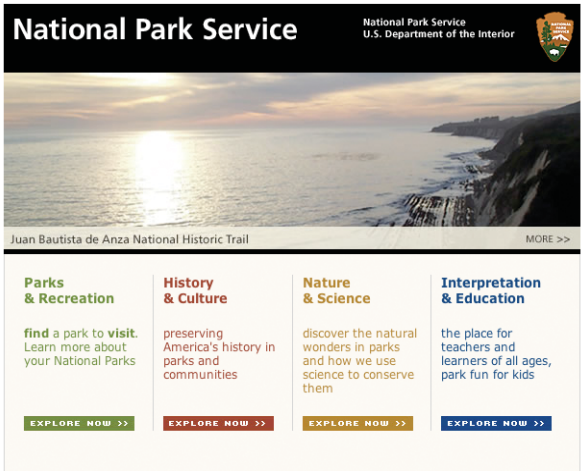
Show students an old, loved, well-worn, hardcover book. Ask students the following question: "If you had to place a monetary value on this book, what would it be and why?" Ask, "Does the idea that this book has endured many years of use and has been part of so many fond memories make it more valuable? What if it is out of print and can't be replaced? Would that make it worth more? Why?" Develop the concept that history can influence respect and value.

Activities

1. Create a fictitious history for another well-worn book and share it with the students. For example: "I borrowed this book from a Civil War museum. It belonged to Abraham Lincoln and was given to his son, Tad. Inscribed inside is a short note to his son written by Mr. Lincoln. The note tells his son that he read the book by firelight in a small cabin in Kentucky." Ask the question: "If you had to place a monetary value on this book, what would it be and why?" Would it be more valuable than the first book? Do the students think the book should be kept in a museum for preservation? Encourage them to relate the value of this book to personal and family heirlooms that are respected, cherished, and treasured.

2. Introduce students to the National Park Service as the primary protector of our national treasures, the National Park System. Discuss the goals of the Park Service to provide recreational and educational opportunities for citizens and to preserve and protect the parks for future generations. Outline the Congressional acts leading to formation and development of national parks.

   Individually or in pairs, have the students choose a national park in the United States to research. They can begin by visiting the National Park Service's website at **www.nps.gov**. Each park in



   the Service has a web page with an "In Depth" button for expanded information. After selecting a park, have the students locate and mark the park on a U.S. map. Have them conduct research on the website or in the library. Have the students draft letters to the parks to request information packets and park brochures. Allow at least 1 month for the students to receive the information.

   Have students prepare a presentation on their selected parks. This might be in the form of a collage, poster, diorama, or report. The presentation should include why the park was created (the unique or

special characteristics for which the park was established); the sacrifices, consequences, and impacts, both positive and negative, that resulted from creating the park; how the park preserves, protects, and provides enjoyment; and the responsible behavior citizens must demonstrate in order to protect and preserve the park for now and for future generations.

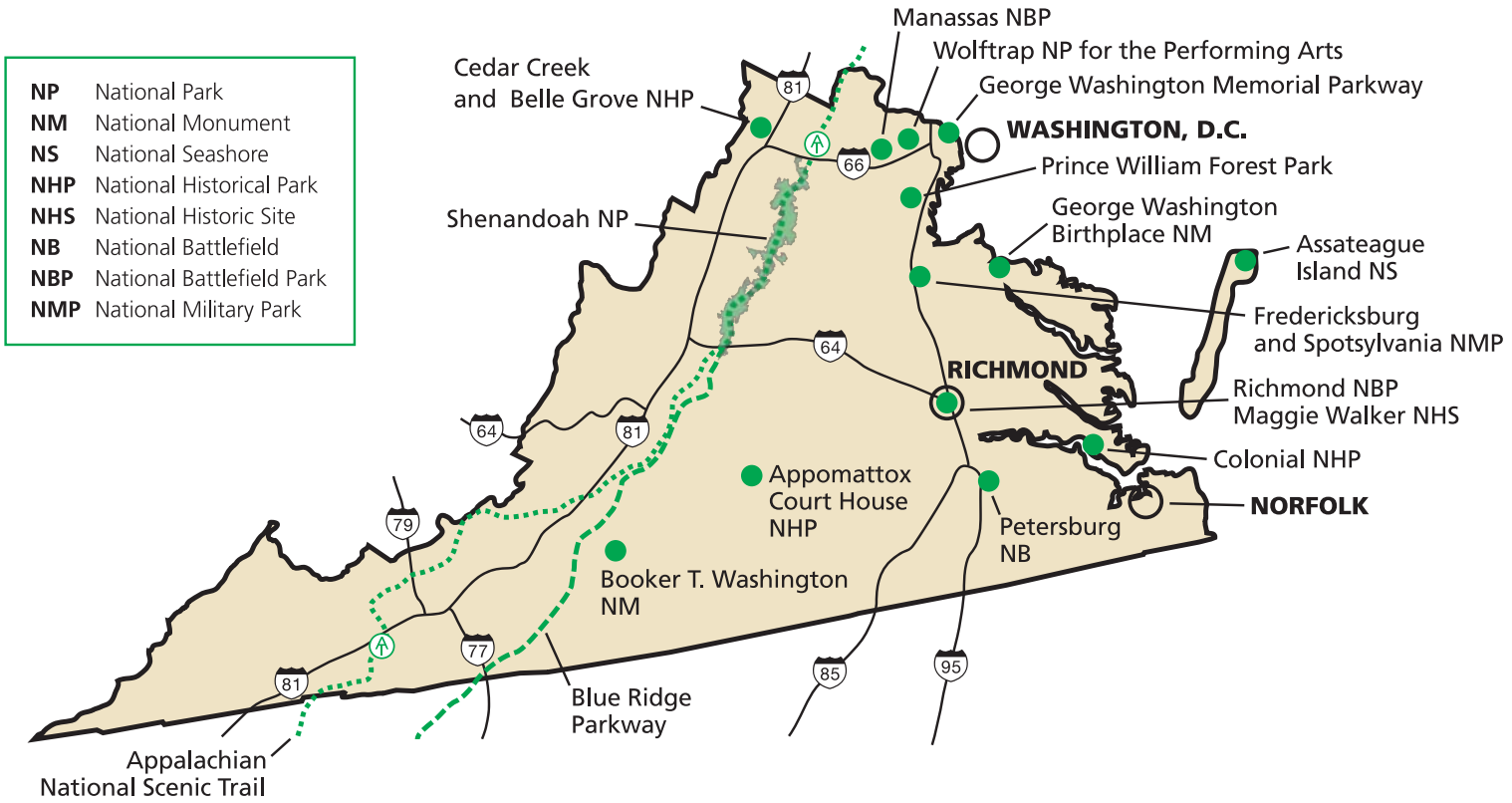
3. After the presentations, ask for student opinions: "What difference do the national parks make in our lives, in the future of our nation, and in plans and feelings about recreation and travel? How is protection and preservation important to the future? What might happen if these natural and historical resources were not protected?" Introduce the term *stewardship* and ask how individuals can demonstrate responsibility and good citizenship to insure the continuation of the national park stewardship goals. Have the students write in a journal or portfolio about their ideas, feelings, and aspirations regarding the parks and stewardship.

4. As a class, identify the national park sites in Virginia and locate each on a state map. Determine the national park site nearest to your school. Have the students research and discover the park's purpose and significance, any problems related to its formation, and the park's status and importance to the community today. Create a class timeline of the park's history, including events leading to the park's designation and development. Take a field trip to experience the national park site firsthand. Take a walk on a park trail, go on a ranger program, or stop at a visitor center to view exhibits and films. Share the students' work and discoveries with other classes, the school, parents, or the community.

Page 27 is an example and format for a study of Shenandoah National Park.

National Park Areas in Virginia

NP	National Park
NM	National Monument
NS	National Seashore
NHP	National Historical Park
NHS	National Historic Site
NB	National Battlefield
NBP	National Battlefield Park
NMP	National Military Park



Other Virginia National Parks

Arlington House, The Robert E. Lee Memorial (GW Pkwy)
Cape Henry Memorial (Colonial NHP)
Claude Moore Colonial Farm (GW Pkwy)
Great Falls Park (GW Parkway)
Jamestown National Historic Site (Colonial NHP)
Yorktown Battlefield (Colonial NHP)

Shenandoah National Park

Divide the history of the park into enough time periods for every 2-4 students in the class. Post the time periods on the board. Shenandoah National Park's history is on the park's web page at **www.nps.gov/shen/historyculture/index.htm**

The Civilian Conservation Corps (CCC) built much of Shenandoah National Park's infrastructure.

Examples of time periods:

a) Geological formation of the mountains.
b) Native American use and presence.
c) Exploration by Governor Spotswood.
d) Pioneer expansion and settlement.
e) Pre-park economy and land use.
f) Congressional authorization and land acquisition for the park.
g) Establishment and development of the park (Civilian Conservation Corps, President Roosevelt's dedication of the park).
h) Present conditions and status of Shenandoah National Park.
i) Future projections for Shenandoah National Park.

Divide the class into teams and assign (or have the students select) time periods. Have the teams research the time period, take notes, and write a report following the writing process of write, revise, edit, and rewrite.

Have the teams use their reports to create posters that depict the history of the park during the chosen time period. Use the following criteria:

- Each poster must be a standard size determined by the teacher.
- Each poster must be oriented vertically.
- The time period, title, and time span in years must be clearly posted and centered at the top of the poster.
- Posters should have a colorful border.
- Pictures should be created with a 3-dimensional effect.

Have the students combine their completed posters to create a class timeline that represents the chronological history of the national park.

Class discussion and journal or portfolio writing topics:

a) What have you learned that you didn't know about Shenandoah National Park?
b) Have your research and knowledge of the history of the park increased your respect for the environment of Shenandoah National Park?
c) How could we help others to gain this historical perspective and increased respect?
d) How will you use this new understanding and appreciation to change your behavior and commitment to the preservation and protection of national parklands along with designated wilderness areas?

Take a field trip to experience Shenandoah National Park firsthand. Take a walk on a trail, go on an education program, and stop at a visitor center to view exhibits and films.

5. Review the parts of a friendly letter and have students write letters to the ranger and/or the park that they visited. Have each writer explain one item that he/she learned or describe a favorite, meaningful experience. Each letter should express his/her appreciation for the national park and its resources. Each letter should also describe new resolutions and behaviors of responsibility, respect, and stewardship that the writer will follow as a result of his/her learning experiences and the park visit.

6. As a culminating activity, conduct a debate in which speakers present diverse facts and opinions on issues concerning the impact of national park areas. Select a park and critical issue to debate. Example issues:
   - Reactions to the establishment of a park, including current and future impacts.
   - Construction and development of land adjacent to a park.
   - Effects of pollution on park resources.
   - Illegal or inappropriate use of park resources.
   - Effects of increased (or decreased) park visitation.

   Divide the class into 4-5 different interest groups. Perspectives might include
   - people who use and enjoy park resources such as visitors, campers, tourists, fishermen, tour companies, school classes, or senior citizens;
   - people who were displaced or moved for the creation of the park (some happy and others not);
   - homeowners or community representatives concerned about water, land, and air use quality and availability;
   - businesses such as factories, farms, or transportation industries impacted economically by environmental laws;
   - local hunters;
   - historical societies and civic organizations.

   A group might even represent the viewpoint of the plants, animals, or historic resources protected by the park.

   Write a brief description of the issue to debate and provide to all the groups. Allow time for the groups to develop presentations that explain the differing points of view. Have each group select a spokesperson to present the group's case. Encourage the students to consider the validity and value of different points of view. Parents or other classes might be asked to be the audience and discuss the debate results. As a conclusion, have students determine the park's value, future needs, and the ways the students can contribute to the park's present and future.

7. Knowing the history and mission of an individual national park site can help students value and respect the school, their community, and the environment. Have students express, in a journal or a creative writing format, the personal values and ethics they have gained and the behavior changes that have resulted from this study. Allow time to share the writings with others, if desired. Discuss how they will become better, more respectful stewards and responsible citizens as a result. The students could also create a "contract" with themselves detailing a personal plan for stewardship activity. Suggest that each person keep the contract in a safe place and review it in 5 or 10 years to see what he/she has accomplished. *Option*: Collect the contracts and return them to the students at a later time.

Assessments

1. Each student should organize and display the information received from a national park and explain the park's location, formation, development, and unique or special characteristics.

2. Students should demonstrate, through a debate, timeline, and their individual writings, their understanding of the importance of a national park, the legislation that created it, the methods of protection and preservation employed for its resources, and the impact parks have on people.

3. A personal connection and sense of responsibility should be expressed in a portfolio and/or journal writings, in observed behavior, and in each student's ability to educate others using historical facts, information, and personal values.

Going Further

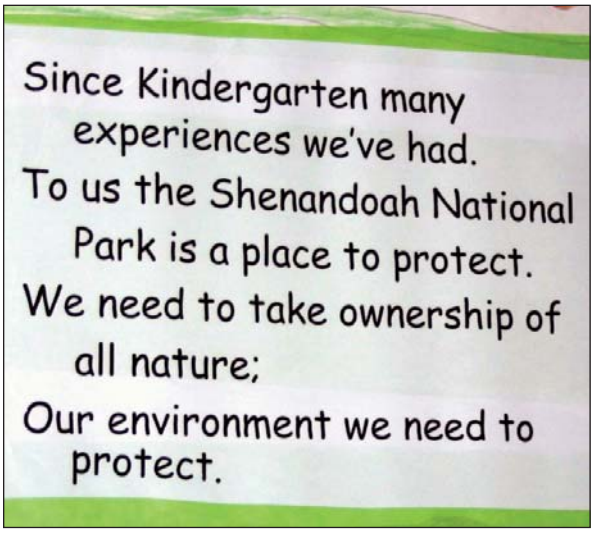
1. Conduct "Loving It Too Much" national park activity from *Project Learning Tree*.

2. Host a class national park celebration or "**Park Day**" and have students share their findings, reports, and posters with the school, parents, and the community.

3. Create a progressive timeline of Virginia national park sites using adding machine tape or drawer lining paper. This may be displayed in the hall and might be accompanied by a display of significant parallel social, historical, and cultural events from Virginia or United States history.

4. Have students create brochures featuring information on a national park site in the U.S. Make copies to mail to local park rangers or to the site itself. Each brochure should highlight building respect for the environment of the national park through a knowledge of its past, present, and future.

ACTIVITY: BUILDING RESPECT



Related Subject Activities

1) Art - posters, displays, dioramas
2) Social Science - location of parks in the U.S., study of the history of an area and events leading up to present conditions
3) Speech – debating a controversial issue
4) English - research, letters, reports, poetry

Resources and References

The U.S. National Park Service website:
http://www.nps.gov
History of the NPS:
http://www.cr.nps.gov/history_nps.htm

Exploring the Real Thing: A Guide to Educational Programs at National Park Sites in Virginia. United States Dept. of the Interior. National Park Service, Northeast Region, 2001. **http://nps.gov/ert**

Project Learning Tree. Washington, D.C.: American Forest Foundation, 2003. "Loving It Too Much." 108-113.

Everhart, William C. *The National Park Service.* Praeger Publishers, Inc., 1972.

Sellars, Richard West. *Preserving Nature in the National Parks: A History.* Yale University Press, 1997.

National Geographic's Guide to the National Parks of the United States. The National Geographic Society, 1994.

The Story Behind the Scenery. (A series of books on national park areas.) KC Publications, Inc.

The National Parks: Index 2004-2006. Washington, D.C. United States Dept. of the Interior, National Park Service.
http://bookstore.gpo.gov

The National Parks: Shaping the System. Washington, D.C., United States Dept. of the Interior, National Park Service, 1991.
http://bookstore.gpo.gov

ACTIVITY: INTERDEPENDENCE

Overview

Living things are intricately woven into a web of mutual dependence on other living things and their non-living surroundings, creating a system of interdependence. Through the development of knowledge, cooperation skills, and responsible, caring behavior, students will learn the importance of stewardship and their role in maintaining a healthy environment.

Objectives

Students will be able to

1. understand that living things are part of a system;
2. describe the relationship between the sun, plants, and animals;
3. define interdependence and give examples;
4. demonstrate appreciation to the workers in the school community for the services they provide;
5. appreciate the value of cooperation and teamwork;
6. understand that responsible, caring behavior is important to the welfare of their lives and the world they live in.

Background

A healthy habitat provides the food, water, shelter, and space that a plant or animal needs to survive. A habitat can be as vast as a meadow for a rabbit or as limited as the underside of a rock in a stream for a caddisfly. A plant may serve as only a part of an organism's habitat (as does the milkweed plant for a monarch butterfly) or it may be the organism's entire habitat (as a plant is for an aphid). In an ecosystem, living organisms interact with and depend on other organisms and non-living things. For example, plants depend upon soil for water and nutrients and use sunlight and air to produce food through photosynthesis. Animals may get food from plants while pollinating flowers, scattering seeds, and fertilizing the soil. These interrelationships and interdependencies may be greatly affected when one or more of the habitat components is reduced or lost.

Pollution, loss of habitat, drought, and fire can negatively impact an ecosystem, or "web of life." Human restraint or intervention and responsible and caring behaviors are important factors for maintaining a healthy ecosystem.

SCIENCE: Life Systems

CHARACTER: Cooperation, Responsibility, Caring, Stewardship

GRADE LEVEL
2nd Grade

VIRGINIA STANDARDS OF LEARNING
Science 2.1, 2.5, 2.8
English: 2.1, 2.2, 2.9, 2.10
Math 2.21

LENGTH/DURATION
3-5 days

MATERIALS
name tags; yarn; notebook paper; markers; 4 poster boards; a large laminated sun; laminated construction papers with the names and pictures of a plant or animal on each (punch 2 holes in the top of each and use yarn to make a type of necklace); index cards; construction paper (different colors) with a character trait written on each: CARING, CITIZENSHIP, COOPERATION, TRUSTWORTHINESS, RESPONSIBILITY, FAIRNESS, RESPECT; "job cards" (index cards with the names of jobs found at the school)

VOCABULARY
interdependence, ecosystem, food chain, food web, web of life, energy, habitat, cooperation, stewardship

LESSON

Motivational Activity

Discuss and list the essential components of a healthy habitat: food, water, shelter, and space. If desired, "air" can be assumed. Note that if one of these components is missing from a habitat, a plant or animal may not be able to survive in that habitat.

Introduce the **"Habitat Chain"** tag game to illustrate the need for a complete and intact habitat. *Note*: For this activity, define the perimeter of the playing area and give clear directions on the level of physical contact allowed (gentle tagging).

In a large open area or gym, create "habitat teams" of at least 4 students each. Give each student a color-coded nametag labeled FOOD, WATER, SHELTER, or SPACE. Explain that the students represent habitat components. All four components must be on each team to create a healthy habitat.

Team members should interlock arms to form a *habitat chain*. On your signal, have the habitat teams move around the playing area. If the team members separate and break the chain, that team is out. Stop the game after 1 minute. Ask if any habitats came apart while moving. If so, why? Did the members work together as a team?

Ask the students to think of things that might harm or negatively impact habitats. Examples include pollution, flood, fire, drought, and construction. Select one student to represent one of these *habitat threats*. Then identify the habitat component that would be impacted the most by that

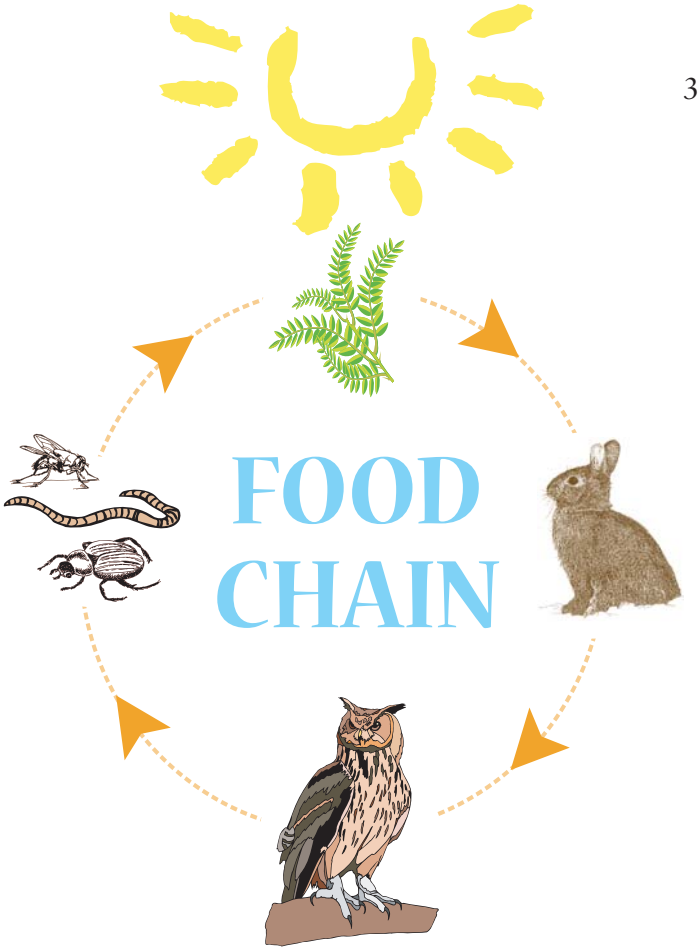
habitat threat. Examples: POLLUTION threatens FOOD, DROUGHT→WATER, FLOOD→SHELTER, CONSTRUCTION→SPACE. During the next round, the *habitat threat* will try to tag the identified habitat component in the habitat chains.

Play another round with the *habitat threat* introduced into the play area. On your signal, have the habitat teams move around the playing area while trying to avoid the *habitat threat*. If the *habitat threat* tags the identified component in a habitat, e.g., DROUGHT tags WATER, that entire habitat is *destroyed* and out of the game. If the *habitat threat* tags the incorrect component (e.g., DROUGHT tags SPACE), the habitat is not impacted and can continue to play. If a habitat chain breaks apart while trying to avoid the *habitat threat*, that team is also out. The last habitat team remaining is the strongest, healthiest habitat.

Ask the habitat teams how the *habitat threat* made them feel. Did they feel safe or threatened? Was it difficult to stay together as a team while trying to avoid the danger? What

happened to the habitat when one component was tagged? Re-enforce the idea that all components are necessary for a healthy habitat and there are many things that threaten habitats. Ask students what can be done to protect habitats and discuss the answers.

Options: a) Play more rounds, adding new threats to the habitats; b) designate a "safe zone" at one end of the playing area that represents a national park that protects habitats. The habitat teams try to reach the safe zone before being tagged by the habitat threat; c) designate several park "safe zones."



Activities

1. Do the "Habitat Lap Sit" activity (see *Project Wild* resource).

2. Have students write their own definitions for interdependence. Allow time to share ideas and suggestions. Write the correct definition on the board and have it copied. Have students relate this to nature by brainstorming a list of plants and animals that are interdependent as they interact together for survival. Help students describe and draw *food chains* from the list. Remind them about the important role that sunlight plays as the primary source of energy.

3. Conduct a "webbing" activity to demonstrate how plants and animals depend on the sun and how they interact with each other. Have one student hold a laminated "sun" in the center of an open area with a ball of yarn in the other hand. Give each remaining student a laminated card labeled with the name and/or picture of a plant or animal. Hang the card around the student's neck so it can be seen clearly. Form a circle around the "sun."

   Have the "sun" start by choosing a plant in the circle and explain how the sun is *connected* with that plant (provides energy). The sun should hold one end of the yarn and toss the yarn ball to a "plant." This represents the *connection.* The plant should then choose a different plant or animal, explain the connection, hold the yarn, and pass the ball. In turn, each student should continue until the yarn has connected all the students at least once and a *food web* has been formed.

Discuss how this web illustrates the *interdependence* of nature.

Ask the students what would happen to the web if one member *dropped out*? Who would be affected? Remove one plant or animal from the web, explaining that it is the result of drought, loss of habitat, over-hunting, or extinction. The student should gently tug on the yarn as he/she lets go. Observe the impact on the web. Who felt the tug? Have several others describe reasons for elimination, then "drop out." Have students observe the tugs, or impacts, felt by all the other members of the web. Discuss: "Can the other plants or animals survive? Is there a *domino effect* on the components?"

Explain how the web the students formed represents an ecosystem. What are the parts of a healthy ecosystem? Include both living organisms and non-living things (water, soil, air, etc.). Have students discuss and share why it is important to protect all parts of an ecosystem and how the components are interdependent. Discuss how responsible and caring behaviors can help.

4. After learning about the interdependence of plants and animals, discuss how people depend upon each other. Use the school community to illustrate this by discussing various jobs and roles at the school and the ways in which these jobs work together.

ACTIVITY: **INTERDEPENDENCE**

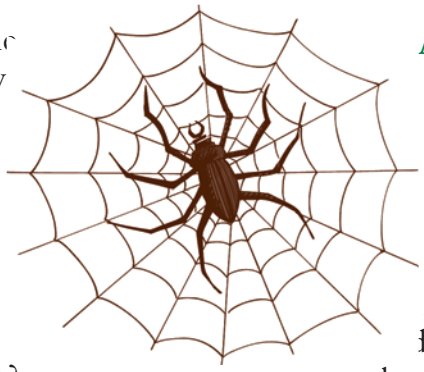
Place the character trait construction paper labels across the top of the blackboard to form 7 columns. Have each student choose a school "job card" and try to determine which character trait he/she thinks is most important for that job. For example, the teacher job card might best fit in the RESPONSIBILITY column while the principal job card might be placed in the FAIRNESS column. The student can lead a class discussion to arrive at a consensus and then place that job card under the chosen heading. After all cards are placed, use poster board to create a bar graph illustrating the results. What conclusion can be drawn from the graph about valued and recognized character traits in school personnel? Which trait is represented most often?

Review the term "interdependence" and guide the students to understand the importance of working together to achieve a common goal. Conclude the activity by having the students write about the importance of depending on others. Have the students give as many personal examples as they can and identify the valued character traits represented in each example.

5. Place the job cards from Activity 4 into a bucket. Review the components of a "friendly letter." Ask each student to choose a card from the bucket and write a "thank you" letter to the person who does that job in appreciation for the work that he or she does for the school. Have the letters describe the character trait the person exemplifies. The letters may be expanded to include additional character traits observed and appreciated.

6. Discuss how the students (people) are connected to the natural environment. Do people depend on things from nature for food, water, or shelter?

What would happen to the students if something they depended upon was no longer available? Discuss the role of national parks in protecting and preserving resources. Is this an important job? How does this job help ecosystems and food webs?



Have the students share how they might contribute to the protection and preservation of their environment. How do these actions demonstrate good character?

7. Do the "School Yard Safari" activity from *Project Learning Tree* to further illustrate the concept of interdependence.

Assessments

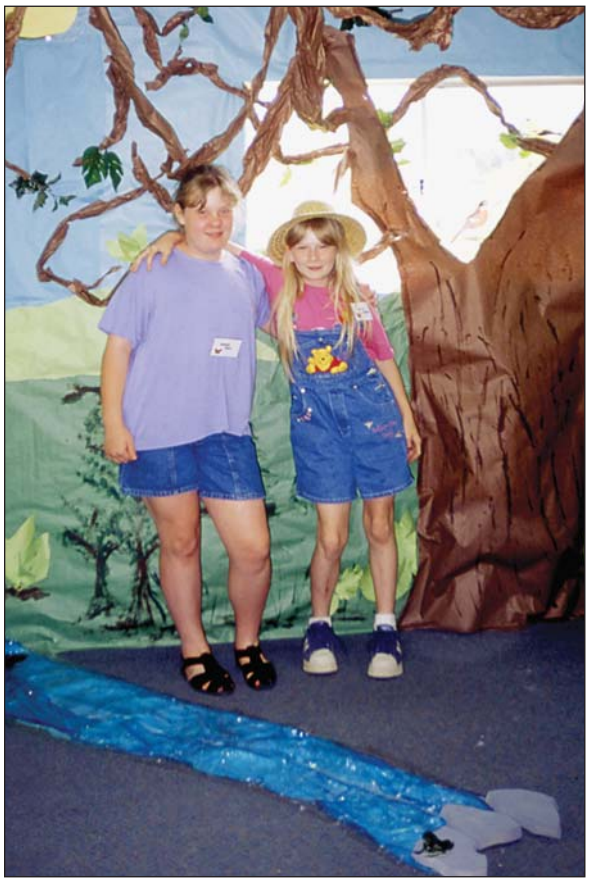
1. Observe and document behavior, participation, and understanding exhibited in the classroom and in conversations.

2. Assign students to be peer editors and to proofread each other's friendly letter.

3. Evaluate the friendly letters for correctly applying the components of a friendly letter, proper grammar and spelling, and expression of key concepts regarding character traits and interdependence.

4. Evaluate the students on their ability to understand *interdependence*, relating both to plants and animals and to our human

world. This may be in the form of a diorama, poster, skit, or written paper with criteria pre-established and posted for evaluation. Include an opportunity for presentation.



Going Further

1. Have the students describe their interdependence with others at school and at home. Identify good character traits exhibited by students in the classroom and family members at home. Graph results and write friendly letters.

2. Extend Activity 2 (above) by having each student draw a picture of their "piece of the web."

3. Create a bulletin board display that depicts a *web of life* using yarn to connect pictures of the sun, plants, and animals. Review concepts about interconnectedness and what happens when one member of the web is missing. Label the board "The Interdependence of Nature" and encourage students to explain it to visitors.

Related Subject Activities

1 Art - Create a life-sized habitat in one corner of your room representing the different plants, animals, and components of a pond, desert, ocean, or forest habitat.

2. Music - Compose a song for the workers around the school to the tune "You Are My Sunshine," to show appreciation for their work.

Resources and References

Project Wild. Council for Environmental Education, 2000 Edition.
"Habitat Lap Sit." 61-63.

Project Learning Tree. Washington, D.C.: American Forest Foundation, 2003 Edition.
"Trees As Habitats." 70-71.
"Web of Life." 148-150.
"School Yard Safari." 151-152.
"Are Vacant Lots Vacant." 153-155.

Cornell, Joseph. "Webbing." *Sharing Nature With Children*. California: Dawn Publications, 1998. 60-61.

ACTIVITY: WATERSHED WORDS OF WISDOM

Overview

Fresh water is a precious, non-renewable resource that all people need and use. People depend on it for drinking, transportation, livelihoods, and recreation. Water also provides habitat for many plants and animals. Through the study of Virginia's watersheds, students will investigate and understand how being caring and responsible citizens can affect the quality and availability of water for all.

Objectives

Students will be able to

1. describe, illustrate, and label a watershed;
2. develop a watershed vocabulary which includes scientific terms and geographical locations pertaining to the Virginia watersheds;
3. explain water's role in the social and economic development of the region;
4. understand how caring for local streams affects macroinvertebrates, fish, animals, people, and the Chesapeake Bay ecosystem;
5. identify 3 ways to protect and preserve water resources and demonstrate responsible actions to take care of our usable water supply.

Background

When rain or snowmelt saturates the ground, the excess water becomes runoff that eventually collects in a stream channel, lake, reservoir, or other body of water. The collection area from where all this water drains is called the *drainage basin* or *watershed*. High elevation areas called *divides* or *ridgelines* separate watersheds. Irresponsible human actions can dramatically affect the natural balance of watersheds by causing unnecessary erosion from property development, destruction of wetlands, and overuse or contamination of the fresh water supply.

SCIENCE: Resources - Watersheds and Water Resources

HISTORY AND SOCIAL SCIENCE: Virginia Studies, Civics and Economics

CHARACTER: Responsibility, Caring

GRADE LEVEL
4th and 6th Grades

VIRGINIA STANDARDS OF LEARNING
Science: 4.1, 4.5, 4.8, 6.1, 6.7, 6.9, ES.9
English: 4.1, 4.2, 4.9, 6.1, 6.5, 6.7
History and Social Science: CE.1, CE.4, VS.1

LENGTH/DURATION
6 weeks or throughout the year

MATERIALS
large bulletin board or wall space, copies of the letters A-Z, entry blanks for suggested words, journals or portfolios, gallon jug, water, tablespoon, eyedropper, pH test kit and/or red cabbage juice, stream study equipment

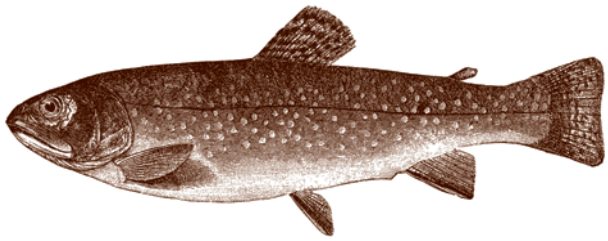
VOCABULARY
watershed, drainage basin, runoff, ridgeline, macroinvertebrates, pH, acid, alkaline, neutral, pollution, wetlands, groundwater, abiotic, contaminated

Activity: Watershed Words of Wisdom

Pollution is an alteration in the character or quality of the environment that causes it to be less suited for life. Water pollution is caused when harmful chemical or waste materials are discharged or deposited directly into the water. Acid rain, fertilizers, animal waste, chemicals, and sediments from erosion can become harmful to the plants, animals, and people that depend on water for survival.

The quality or health of a body of water can be measured by investigating the water chemistry and the types of organisms living in the water. Oxygen content, pH, and mineral content are typical abiotic (non-living) factors that affect water chemistry. Contaminants such as acid rain, factory emissions, and fertilizer runoff can alter water chemistry. *pH* measures the relative *acidity* (and *alkalinity*) of a substance. pH levels range from 0 (highly acidic) to 14 (extremely alkaline), with 7 being the neutral rating given to distilled water. Most plants and animals prefer a balanced or almost neutral pH level. Many animals are pollution "sensitive" and are unable to survive in either highly acidic or highly alkaline conditions. Mayflies, stoneflies, and caddisflies are *macroinvertebrates*, small animals without backbones, which require clean, uncontaminated water. Midge fly larvae, blackfly larvae, leeches, and snails are more "pollution-tolerant." Many types of bacteria are also pollution-tolerant and can survive in either highly acidic or highly alkaline conditions.

Many types of water pollution can be cleaned up by using natural or man-made filtering systems and by reducing or eliminating the sources of pollutants that are released into the environment. Healthy wetlands and buffer zones along the riverbanks are crucial to provide natural filters for some contaminants. Pollution control systems, new technology, energy conservation, and responsible personal habits can contribute to clean water and a healthy environment for the future.



ACTIVITY: WATERSHED WORDS OF WISDOM

LESSON

Motivational Activity

Watch and discuss the *National Geographic* video: *Water: A Precious Resource at Risk*.

Demonstrate the limited availability of usable, fresh water. Water covers approximately 3/4 of the earth's entire surface. Have students create a list of water sources: oceans, rivers, lakes, ponds, glaciers, polar icecaps, groundwater, and rain. Ask how much of that water is fresh water available for people to use.

Display a gallon jug (3.8 liters) of water. (This can be colored blue for a more dramatic effect). Explain that this gallon of water represents all the water on the Earth. Ask the students to estimate what portion of the gallon would represent salt water and how much would be fresh water. Pour out 2 tablespoons or use an eyedropper (1 fluid ounce or 30 milliliters) from the gallon jug and explain that this would represent the amount of fresh water available on earth. (For effect, pour the "fresh water" into an empty metal bucket.) Explain that most of this fresh water is frozen in glaciers and icecaps or is unavailable groundwater. Dramatically, take out one drop and put it in a cup. This visually represents all the fresh water that is in a form readily available for use.

Conclude that fresh water is a precious, limited resource. The amount of water available for human use depends not just on quantity, but also on its condition, or quality. Ask how this limited amount of available fresh water affects humans. Discuss ways people waste and misuse water and what people can do to help protect the water supply. Discuss the responsibility individuals have to protect water resources for the health of the ecosystem and for people. Brainstorm ways students can help conserve and protect water resources.

The water in our environment today is the same water that was available to the dinosaurs millions of years ago. The process of purifying the limited amount of available fresh water for human use and consumption involves time, energy, and money. This use and consumption also has the potential to create new environmental problems as people divert water away from its initial source and use.

Activities

1. Create a "Watershed Words of Wisdom" display on a bulletin board or classroom wall. After each watershed activity, encourage students to add new words that they have learned to the word wall. Use A-Z letters to arrange the words alphabetically. Encourage the use of these words in discussions and written work.

2. Students should begin an ongoing journal or portfolio of their water studies. Include a list and usage of new vocabulary, illustrations, facts, explanations, and compiled, completed activities. As the research and study continue, students should express new insights, progressive levels of understanding, and desires to improve their "water world."

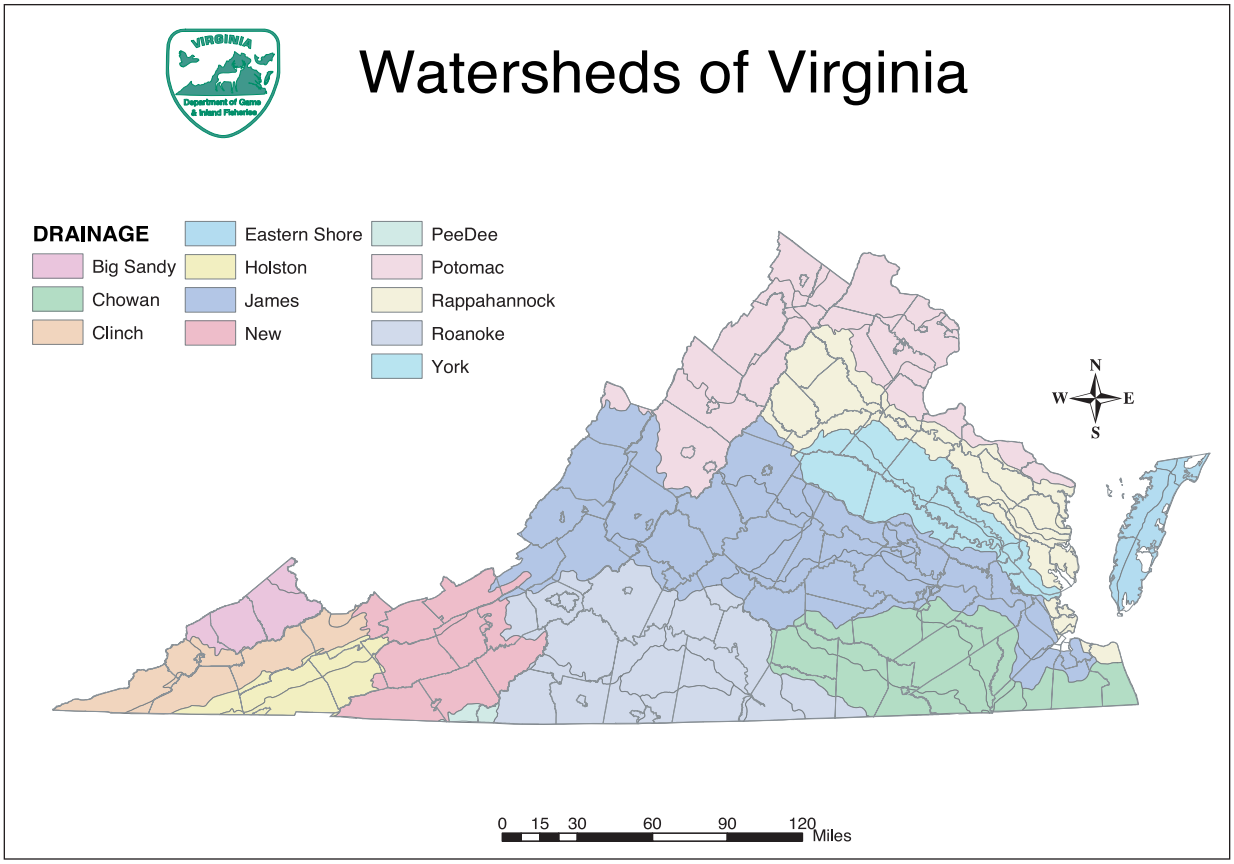
3. Introduce the term "watershed." To demonstrate how watersheds are separated by ridgelines, have the students interlock their fingers, palms up, to form a peak with their fingertips. Explain that when it

rains the water will run off both sides of the ridge (fingertips) and into stream channels (between the fingers). Several streams may join together to form a drainage basin. Display and discuss a map or an illustration of a watershed. Have the students illustrate and label the watershed.

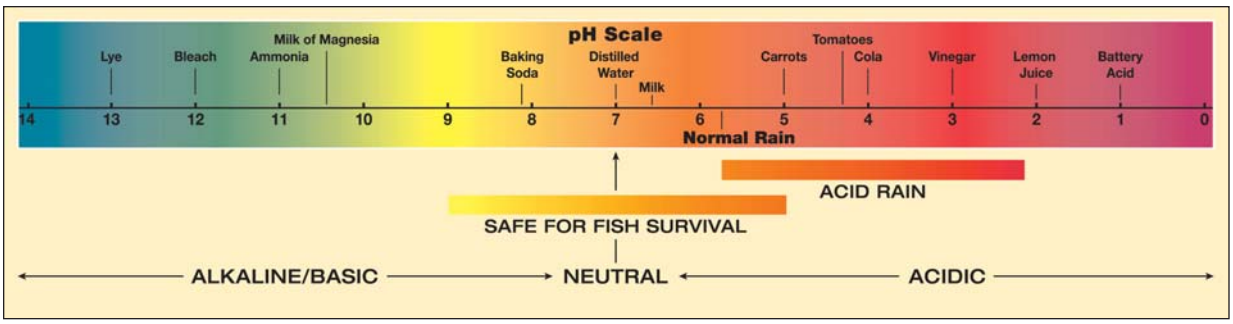
4. Use a Virginia map to discuss and color code the major Virginia river watersheds: Potomac-Shenandoah, Rappahannock, York, James, Roanoke, New, Tennessee-Big Sandy, and Chowan. The Virginia Department of Game & Inland Fisheries has watershed maps available at **www.dgif.virginia.gov/education/sol/watersheds.asp**

   Have the students locate each watershed and determine each watershed's destination: the Chesapeake Bay, the Atlantic Ocean, or the Gulf of Mexico. Have the students determine which watershed they live within.

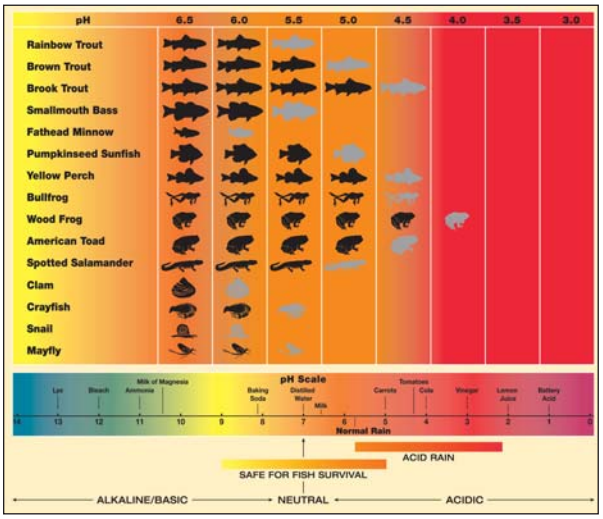
5. Have the students research the interwoven function water plays in the development, prosperity, and survival of communities and societies in a watershed, both past and present. Why is water so important to an area? How do people depend on water for jobs, transportation, food, and recreation? Have students illustrate and write about their discoveries.



ACTIVITY: WATERSHED WORDS OF WISDOM



6. Test for the acidity and alkalinity of several sources of water: distilled, tap, stream, pond, and salt water, using red cabbage juice or a pH test kit. Cook red cabbage until it is tender and strain the juice into a jar. Add a few drops of the cabbage juice to the water sample to test the pH. The juice will turn bright pink when exposed to an acid (0-6 pH) and green or blue when exposed to an alkaline (8-14 pH). pH test kits provide the pre-made indicator solution and a color-coded chart. Gather data from each water source and develop a chart to compare pH information. Using a pH scale, create a hypothesis for the types of plants and animals that could survive in each sample.



7. Go on a stream study field trip. Using dip nets, magnifying lenses, buckets, and macroinvertebrate illustrations (see Resources and References), search for and identify macroinvertebrates in the stream. Test the pH of the stream. Based on the findings, have students determine the relative health and purity of the water. Demonstrate care and responsibility by carefully handling the living organisms and returning them to their natural environment. Upon return to the classroom, have students compile a list of animals found and write conclusions.

8. In the classroom, discuss how people can influence the quality of water and how human actions in one part of a watershed might impact others downstream. Consider the consequences of pollution, unplanned land development, acid rain, draining of wetlands, and overuse of water by a community. Discuss ways people can protect water resources.

   Discuss the role that national parks play in protecting water resources. Use the Virginia watershed map from Activity 4 (above) to determine if any national park

sites are located within the students' watershed. Do national parks have a responsibility to manage and protect water within the park boundaries? How do the parks protect those water resources? How do a park's actions affect people and habitats that depend on the water downstream in the watershed?

Ask the students to determine ways to conserve water, reduce pollution, and improve water quality at school, at home, and in their community. Discuss and write about how such actions demonstrate citizenship, caring for others, and stewardship.

Assessments

1. Observe and document behavior, participation, and understanding exhibited in the classroom and in conversations.
2. Evaluate each individual's responsibility and contribution to the word wall. Suggested criteria for evaluation:
   20+ words = A
   15+ words = B
   10+ words = C
3. Create a rubric to evaluate the watershed map. Criteria would include correct labeling, responsibility in following directions, and effort.
4. Determine the level of understanding expressed in discussions and writings about the value water has in the development of surrounding areas.
5. Use the completed portfolio or journal entries as criteria for assessment of understanding and responsibility, effort, and content standards.

Activity: Watershed Word of Wisdom

Going Further

1. Create a bulletin board display called "A Day in the Life of a Bay Animal." Have students pretend they are a specific animal or plant that inhabits the Chesapeake Bay watershed. Students should first research an animal and then use personification to write about its characteristics, habitat, adaptations, and how pollution and disrespect for the environment affect its life. Writers should also try to persuade the reader to develop a caring attitude and to behave responsibly to protect and preserve the environment and water resources. Have students use words from the "Watershed Words of Wisdom" word wall, create illustrations, and share their stories.

2. Have students make a crossword puzzle using the "Watershed Words of Wisdom." They should create the puzzle using the descriptions or definitions of the words. They can exchange with a friend to solve.

3. Build a model watershed for the classroom. See "Branching Out," *Project Wet*.

4. Study the impact of pollution on a watershed. See "Sum of the Parts," *Project Wet*.

5. Expand the stream study by testing the water chemistry using a dissolved oxygen test kit, thermometers, and water velocity tests. Combine with results of macroinvertebrate study to draw conclusions on the relative health of the stream.

6. "Adopt a Stream" near the school or in the community. Hold a stream cleanup day and help keep the stream clean during the school year. Sign your class (or school!) up for the Adopt-A-Stream Program at **www.dcr.state.va.us/sw/adopt.htm**

7. Utilize "A River Puzzle" available from the National Geographic website.

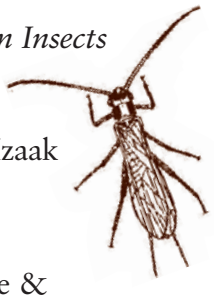
Related Subject Activities

1. Social Studies - Participate in map studies of Virginia waterways.
2. Drama - Present the play "Life is One Big Adventure" featuring Sammy Stonefly and his friends (see Resources and References).
3. Language Arts - A variety of writing assignments can be used emphasizing issues relating to the watershed. Students can use vocabulary from the word wall in their essays and letters.

ACTIVITY: WATERSHED WORDS OF WISDOM

Resources and References

Okay, Judy. *Life is One Big Adventure. Love-a-Tree - Streams: Where water, trees and animals meet.* Virginia: Virginia Department of Environmental Quality.
www.vanaturally.com/



Kellogg, Loren Larkin. *Stream Insects and Crustaceans: Monitor's Guide to Aquatic Macroinvertebrates.* Izaak Walton League of America, 1994. 38-39.

Virginia Department of Game & Inland Fisheries, watershed maps,
www.dgif.state.virginia.gov/education/sol/watersheds.asp

Sevebeck, Kathryn P., and Nancy L. Chapman, *Virginia's Waters.* Virginia Water Resources Research Center. Virginia: Virginia Polytechnic Institute and State University, 1989.

Homemade pH Indicators
www.mr-damon.com/experiments/6svt/ph_cabbage.htm

National Geographic Society Videos
www.ngsp.com
Geography Action! Rivers 2001
www.nationalgeographic.com/geography-action/rivers.html

Izzak Walton League, Virginia Chapter
Save Our Streams Water Quality Monitoring Program
7598 North Lee Hwy
Raphine, VA 24472
888-656-6664
www.vasos.org

Virginia Department of Environmental Quality
www.deq.state.va.us/water

Virginia Department of Conservation and Recreation
Adopt-A-Stream Program
203 Governor Street, Suite 206
Richmond, VA 23219
(804) 692-0148
www.dcr.state.va.us/sw/adopt.htm

Project Wild Aquatic. Council for Environmental Education, 2001 Edition.

Project Wet. The Watercourse and Western Regional Environmental Education Council, 1995 Edition.
"Branching Out." 129-132,
"A Drop in the Bucket." 238-241,
"Sum of the Parts. " 267-270.

Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, Maryland 21403
www.chesapeakebay.net/index.cfm
www.bayeducation.net

ACTIVITY: ONE SOLUTION FOR POLLUTION . . .MACHINES!

Overview

Pollution is waste materials or harmful chemicals discharged into the water, soil, or atmosphere. This contamination affects everyone and everything it contacts. Current technology is being developed to use machines to remove or contain contaminated materials. Through an awareness of the consequences of pollution and the means to prevent it, students will develop a desire and responsibility to keep their world clean.

Objectives

Students will be able to

1. define pollution and describe its origins;
2. list the negative effects of pollution on our environment;
3. list the six simple machines: lever, pulley, wheel and axle, inclined plane, screw, and wedge; and explain the difference between simple and compound machines;
4. visualize and illustrate a machine that could potentially clean up pollution;
5. explain and demonstrate a caring, responsible attitude about cleaning up pollution.

Background

Machines are mechanisms or tools that help people accomplish a task. Simple machines such as the lever, pulley, wheel and axle, inclined plane, screw, and wedge were created to make work easier. A compound machine is a combination of two or more simple machines. Over time, machines have become very complex. Today, people depend on a wide variety of machines to make life easier. However, there can be negative consequences from using machines. For example, machines that burn fossil fuels (coal, oil, and gas) are major contributors to pollution.

Most types of pollution can cause some type of harm. Some pollutants can make people sick! As the world population continues to increase, more complex, technologically advanced machines will be developed to make life better, but they may also cause new environmental problems. Everything people do has the potential to cause some type of pollution if we are not careful. However, with a lot of thought and

SCIENCE: Resources; Force, Motion, and Energy – Simple Machines; Living Systems

CHARACTER: Responsibility, Caring

GRADE LEVEL
3rd and 4th Grades

VIRGINIA STANDARDS OF LEARNING
Science: 3.2, 3.10, 4.5
English: 3.2, 3.7, 4.2, 4.7

LENGTH/DURATION
2-3 weeks

MATERIALS
world, national, or state map; sketch pad or drawing paper; construction materials, e.g., blocks and building toys that interlock, buttons, corrugated cardboard, paper tubes, various examples of simple and compound machines; pictures, slides, and videos showing different types of pollution; books on pollution

VOCABULARY
pollution, simple machines, compound machines, lever, wheel and axle, pulley, inclined plane, wedge, screw, resource, responsibility, caring

creativity, new machines can be created to reduce, contain, or control pollution.

As children become more aware of the causes and negative effects of pollution, they may seek ways to prevent or reduce it. Teaching children to be accountable for their actions and to be responsible, caring citizens will be a beginning step toward a healthier world.

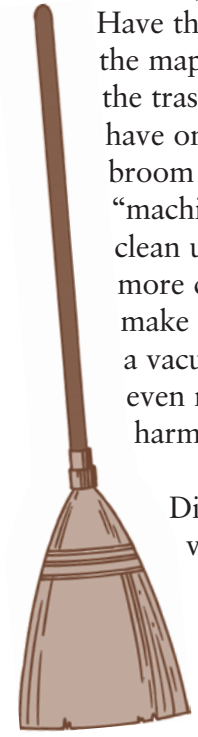
ACTIVITY: ONE SOLUTION FOR POLLUTION

LESSON

Motivational Activity

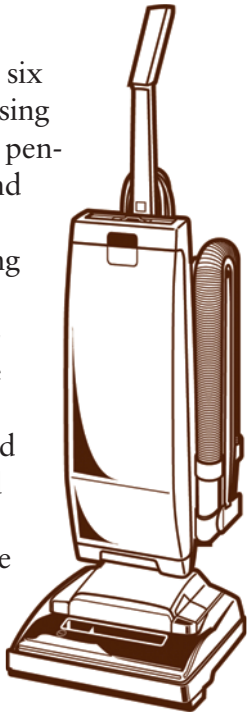
Discuss pollution and introduce various types of pollution using pictures, slides, or videos. What is pollution and where does it come from? Discuss the harmful effects pollution has on our world. What impact does it have on wildlife, water, air, plants, and human health and enjoyment? Read books on pollution to understand the harmful effects that can impact all living things. Do machines contribute to pollution?

Take a "pollution walk" around the school grounds. Observe and record any type of pollution found in the surrounding air, land, or water. In the classroom, place a world, national, or state map on the floor. Have the children throw litter on the map. Discuss their feelings about the trash and the effects it would have on the world. Bring out a broom as an example of a simple "machine" that can be used to clean up the trash. Ask if there is a more complex machine that would make the cleanup easier. Bring out a vacuum cleaner. Would this be even more efficient? Might it harm or destroy the map?



Discuss the possibilities and value of machinery that could be used to eliminate or contain pollution. Reflect on the types of litter and trash found on the "pollution walk." Ask the students what simple tools or machines could be used to clean up the pollution they observed. If possible, have the students clean up the school grounds.

Activities



1. Have the children learn the six types of simple machines, using classroom materials such as pencils, rulers, books, string, and weights. Discuss the definitions and their use in helping people to accomplish work. Compare these with a compound machine, such as the vacuum cleaner. What are the advantages of compound machines? Is the compound machine more efficient? Would there be any negative consequences of using these more complex compound machines? (The energy source for the machines may consume a lot of natural resources and operating the machine could cause pollution.)

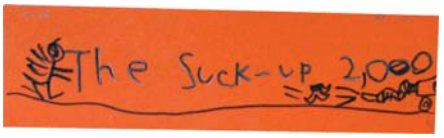
2. Discuss why preventing and reducing pollution is important to the community and the environment. Why should people care? Ask the students, "If machines are contributors to pollution, can machines be used to clean up pollution?" Have the students work in small groups to brainstorm types of machines that are used to clean up or prevent pollution. Ask the students to name the character traits that are represented in their concern for reducing pollution.

3. Visit or study a national park. Have students determine the significant

resources the national park protects. Is the park primarily a natural area that protects wildlife, forests, rivers and streams, and scenery? Or is the park primarily an historic area that preserves the memory of historic events or people and protects historic buildings, battlefields, and memorials? What kinds of pollution would impact the national park? What are the sources of the pollution? Could the pollution damage the resources the park is trying to protect? Are the same kinds of pollution found in the national park and on the "pollution walk" around the school grounds? What does the national park do to reduce the effects of pollution? How can park visitors help reduce or prevent pollution?

4. Have each student design and sketch an imaginary machine that might be used to help reduce pollution in a national park or in their community. Then give the machine a creative name such as "Smoke Sucker-Upper," "River Skimmer," or "Trash Picker-Upper." Provide the materials to create models of the machines. Each student should write a brief summary to explain his/her machine, how it would work, and how it would reduce or clean up pollution.

5. Have students create props and present plays, either individually or in small groups, to demonstrate the use and effects of their machines to help improve the environment. They should explain why it



ACTIVITY: ONE SOLUTION FOR POLLUTION

is important to not pollute and to express and demonstrate the character traits of responsibility and caring in resolving real-life scenarios.

Assessments

1. Students should be able to list the six simple machines, give examples of each, and differentiate between simple and compound machines.

2. Base the evaluation of the machine sketches on the student's thinking process and the level of commitment and effort, not on the product itself.

3. Assessment of the plays should be based upon the students' abilities to demonstrate an understanding of what pollution is and how it affects our world. Actors should illustrate how their simple machines would help reduce pollution and the responsible behavior individuals might use to minimize pollution's negative effects.

4. A written summary by each individual student should indicate how his/her simple machine could reduce pollution, which type of simple machine it represents, and how it can help to responsibly take care of the Earth. Evaluation should include creativity, effort, organization, and editing skills.

5. Students should be able to list reasons why pollution is harmful, what causes it, and express the personal desire and specific responsible behaviors he/she can exhibit to prevent pollution or help clean it up.

Going Further

1. Have students research types of pollution and write reports about the negative effects on the environment and how pollution could be prevented or reduced.

2. Combine some of the simple machines to create compound machines. Have the children rename them and describe how the compound machines would reduce pollution.

3. Use the activity of charades to have the children BE the machine they created. Their actions should indicate the machine's impact on pollution.

4. Have the children make a class book with sketches of their simple machines. Have them type a summary that gives the reader information on each "pollution reducer."

ACTIVITY: ONE SOLUTION FOR POLLUTION

Related Subject Activities

1. Science – Research worldwide effects of pollution and the way machines have contributed and/or are used to combat or contain it.
2. Language Arts – Write stories and short reports about pollution and machines, write letters to companies to ask how they minimize pollution, research future projections for pollutant control techniques.

Resources and References

Ranger Rick's Nature Scope. Pollution: Problems and Solutions. Braus, J., Editor. Washington, D.C.: National Wildlife Federation, 1990.

Project Learning Tree. Washington, D.C.: American Forest Foundation, 2003 Edition.
"Pollution Search." 114-117.
"Talking Trash, Not!" 119-121.

Pollution Solutions: Litter and Pollution Prevention Activities for Virginia Teachers. Virginia Resource-Use Education Council, Virginia Department of Environmental Quality, 2001 Edition.
www.deq.state.va.us/education/polsol.html

ACTIVITY: GEOLOGY ROCKS

Overview

The Earth is constantly changing and evolving. Some of these changes occur naturally while others are caused by human actions. By studying Earth's dynamic geologic make-up and rock cycle, students will understand the forces and processes that create Earth's various landforms and develop an appreciation for the importance of geology in people's lives. Through this appreciation, students will develop a sense of responsibility and respect for the land and demonstrate good citizenship behaviors that will ensure a healthy environment for the future.

Objectives

Students will be able to

1. describe and illustrate the layers of the earth;
2. explain the rock cycle, including the identification and formation of rock types and the difference between weathering and erosion;
3. demonstrate an understanding of plate tectonics, fossil evidence, earthquakes, and volcanoes;
4. create a timeline of sequential events leading to today's geological features and hypothesize future possibilities;
5. describe and demonstrate responsible behaviors and good citizenship regarding human impact on the land.

Background

There are four main layers of the earth – the *crust*, *mantle*, *outer core*, and *inner core*. The *crust* is Earth's outer layer composed of solid, rocky material. If the Earth were compared with an apple, the crust would be as thin as the apple's skin. The *mantle* is the middle layer made of a soft, solid material (like butter left out on the dinner table). The *mantle* is very hot and under tremendous pressure. The *outer core*, which begins more than 1,800 miles beneath the surface, is hot molten liquid. Scientists think this is rich in iron and nickel. The movement of this liquid probably causes Earth's magnetic field. The *inner core*, also mostly iron and nickel, is squeezed solid due to extreme high pressure. The combined inner core and outer core at the center of the Earth is larger than the planet Mars.

SCIENCE: Earth Patterns, Cycles, and Change - Geology

CHARACTER: Responsibility, Respect, Citizenship

GRADE LEVEL
5th Grade

VIRGINIA STANDARDS OF LEARNING
Science: 5.1, 5.7, 6.9, ES.6, ES.8
English: 5.1, 5.3, 5.7, 5.8

LENGTH/DURATION
4-6 weeks or intersperse activities throughout the year

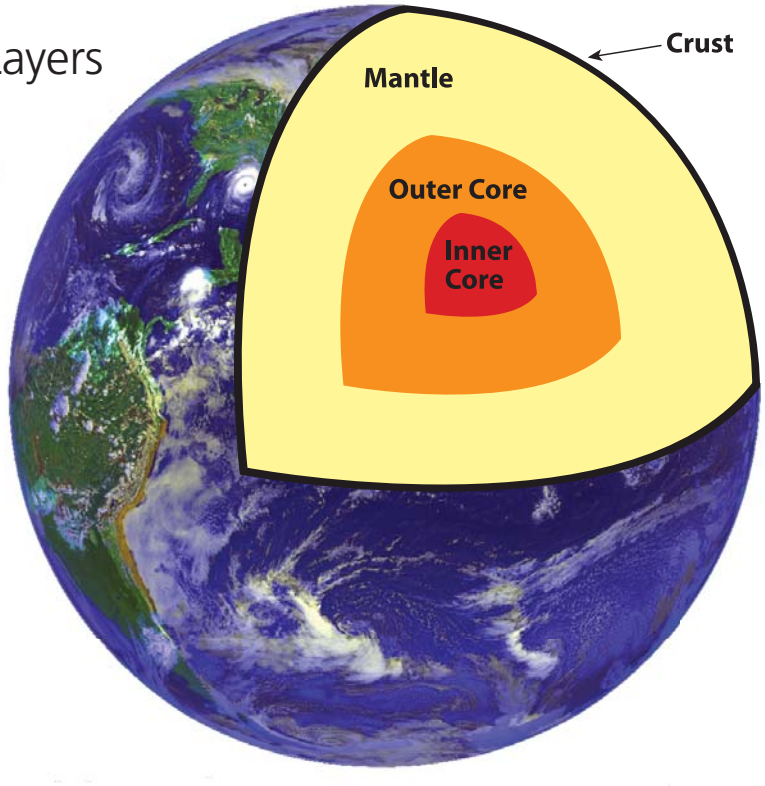
MATERIALS
hard-boiled eggs, poster board, rock samples, paper, pencils, shaved crayons, flour, water, wooden blocks, pie plates, bread (white and wheat), peanut butter, raisins, dark chocolate chips, honey, marshmallows, jelly, gummy worms, plastic straw or sections of plastic tubes

VOCABULARY
geology, crust, mantle, inner core, outer core, rock cycle, igneous, sedimentary, metamorphic, weathering, erosion, core sample, minerals, plate tectonics, divergence, convergence, transform boundary, subduction, folded, uplift, magma, lava, volcano, rift, earthquake, fossils, stewardship

Scientists believe that the Earth is approximately 4.6 billion years old. Its geology is constantly changing, being restructured and reformed through natural phenomena and also by human impact. The modern theory of *plate tectonics* (formerly called continental drift) states that the outer *crust* of the Earth is separated into several "plates," some containing continents, which move slowly, but continually. Geologists generally agree that there are 6-8 large plates and a number of smaller ones.

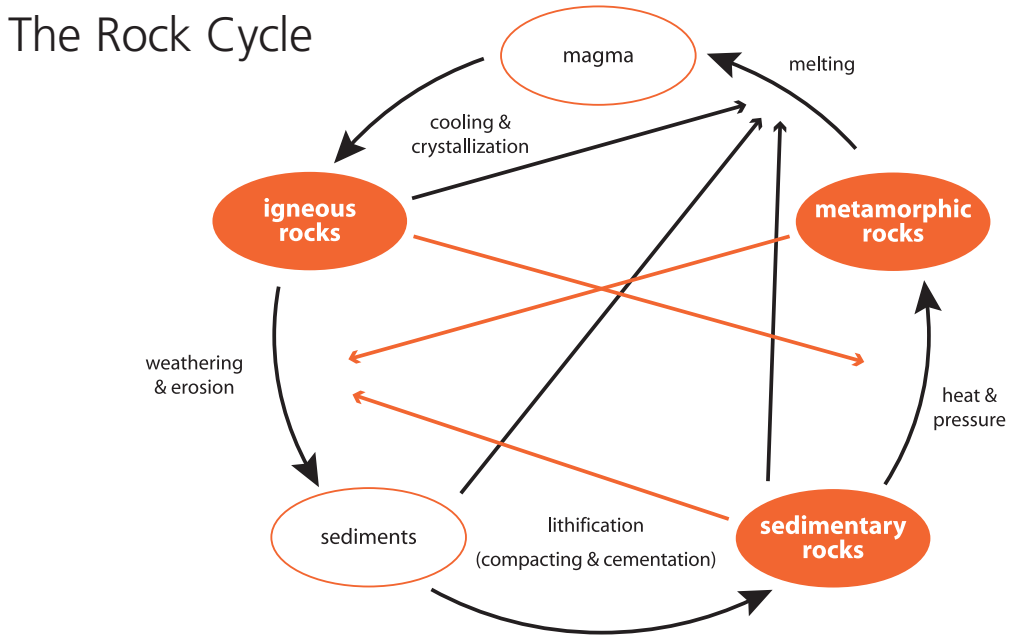
There are three main types of plate boundaries: *convergent, divergent,* and *transform fault*. Tectonic activity, such as earthquakes and volcanoes, often occurs along these boundaries. A *convergent* boundary occurs when plates move towards one another. Their collision (convergence) causes folding and uplifting of rocks. Mountain ranges can form through *subduction* as one plate slides beneath the other or by *uplift* of the plate boundaries at the collision area. Volcanoes form when the subducted plate melts deep in the Earth and the molten rock rises as *magma* to the surface.

The Earth's Layers



A *divergent* boundary occurs when plates pull apart (diverge) from each other. A *rift zone* is formed causing the Earth's crust to thin and form a valley. If the plates continue to pull apart, magma will rise through the rift, causing volcanoes to form.

A *transform* boundary occurs when plates slide laterally past one another. Friction from



this movement along plate boundaries can create earthquakes.

The Earth is undergoing continuous change through the formation, weathering, erosion, and reformation of rock. This process is called the *rock cycle*. There are three main types of rocks: *igneous, sedimentary,* and *metamorphic*. Rock deep within Earth encounters temperatures high enough to make it melt. This liquid stage is called *magma*. *Igneous* rock is formed when the magma cools and solidifies. Magma that is forced to the surface cools to form *volcanic* rock, while magma that cools beneath the Earth's surface forms *granitic* rock.

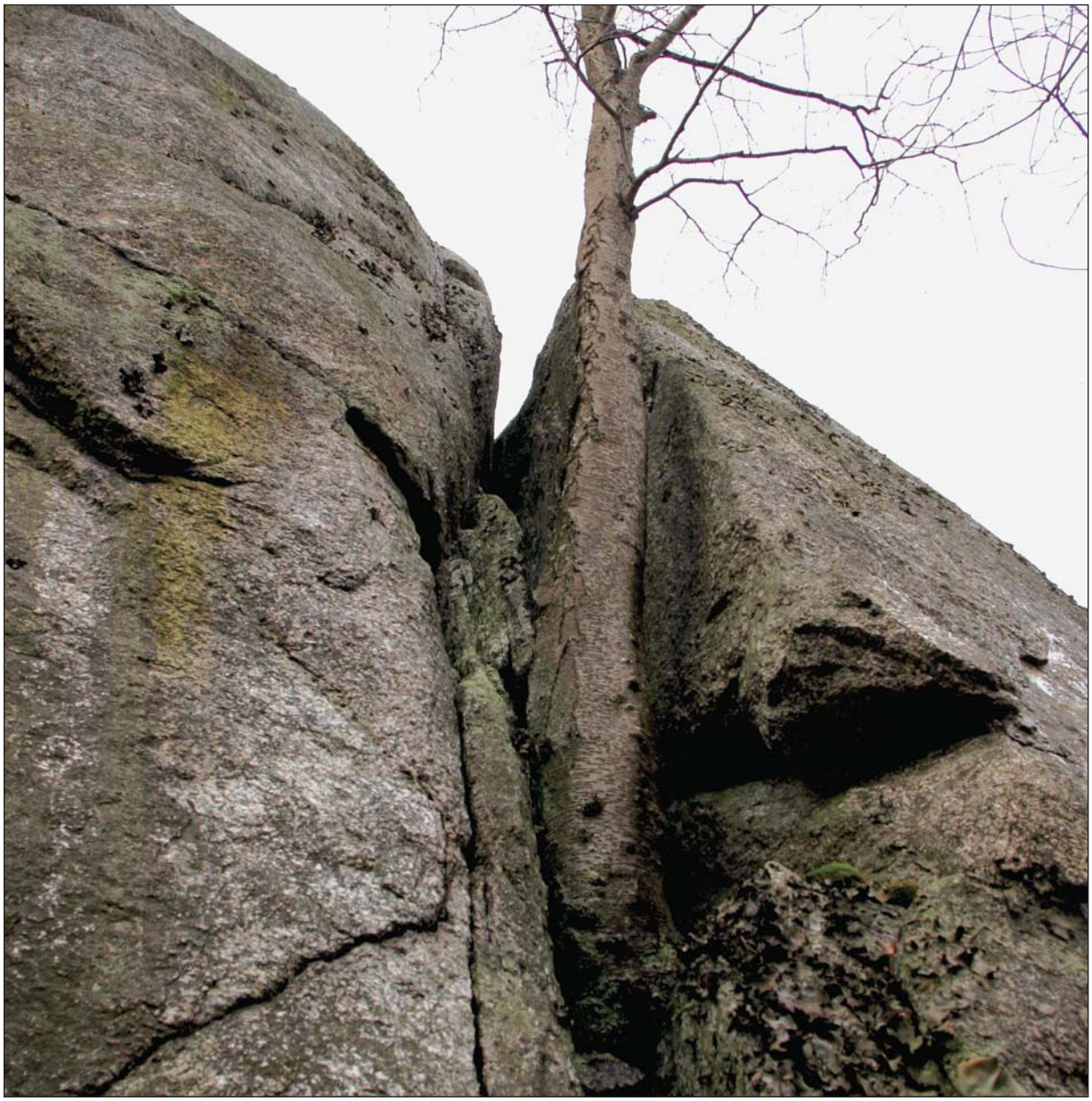
As rocks are *weathered* (broken down into smaller pieces) and *eroded* (moved to new locations), the rock fragments (*sediments*) build up in layers. The combined weight of the layers along with other pressures within the Earth causes the layers to compact. The tiny spaces between rock fragments fill with natural cementing agents and mineral grains in the rock may grow and interlock. Thus *sedimentary* rock has been formed. Sedimentary rock is also formed under water when shells and skeletons of sea creatures accumulate on the ocean floor. Over a long period of time, these sediments compact and harden to form rock. *Fossils* are most often found in sedimentary rock.

Sedimentary and igneous rocks can be altered by the tremendous pressures and high temperatures associated with the movement and collision of tectonic plates. *Metamorphic* rock is formed under these extreme conditions. Ultimately, any of the rock types may again return to a hot, molten state deep in the Earth, thus completing the rock cycle.

Studying geology helps people to understand how today's geological formations were created and to predict future changes. The

consequences of natural events and human activity can be better analyzed with knowledge of the underlying rock formations. Geologists often take a "core sample" by drilling into a rock formation and pulling out a layered specimen of the rocks to determine a timeline of geologic events for that area.

Stewardship of the land can begin with an understanding of geology and how natural and human impacts affect the Earth. Through this understanding, a student may develop a new sense of respect for our environment and a new commitment to the responsible, caring, and protective behaviors of good citizenship.



LESSON

Motivational Activity

Use a hard-boiled egg to illustrate the layers of the Earth. See "All Cracked Up," Project *Earth Science: Geology* or "Our Earth," *Delta Science Module II – Earth Science: Earth Movements*. First, gently tap the egg on a hard surface to create several cracks in the shell. Using a marker, outline enough of the cracks so that there are eight large "plates." Carefully cut the egg in half lengthwise and make a dot in the center of the yolk with the marker. The shell represents the Earth's crust, the outlined cracks the tectonic plates, the egg white the mantle, the yolk the outer core, and the dot the inner core. Discuss the fact that the real tectonic plates on the Earth's crust actually move, causing geological phenomena such as earthquakes and volcanoes.

Activities

1. Have students "build" the Earth. Divide into four groups. Have Group 1 (2-3 students) hold hands and stand close together to represent the inner core. Have each core member flex his/her muscles to represent dense, solid metal. Have Group 2 (4-5 students) form a circle around the outside of the inner core and hold hands. This group represents the outer core and should move counterclockwise, slowly moving their arms up and down to represent the moving liquid content. Group 3 (6-8 students) represents the mantle. Have them form a circle around the outer core with joined hands, chanting "hot rock, hot rock." Group 4 (8-10 students) holding hands in a ring around the outside of the mantle represents the crust. Have them face outwards and move slowly, chanting "moving plates, moving plates."

   Have students create a computer-generated model of the earth using *Kidpix*, *ClarisWorks*, or other available graphics software. They should review or research the components of the image, then draw and label the crust, mantle, inner core, and outer core. **Option**: Create a bulletin board display showing the layers of the Earth. Start with an unlabeled diagram of the Earth's layers. Have the students conduct research to find facts about each layer and then label and illustrate the diagram.

2. Read to the class *The Magic School Bus: Inside the Earth* and *The Magic School Bus Blows Its Top!*

3. Introduce the theory of *plate tectonics*. Students can use dough and block models to simulate typical tectonic plate movement and the resulting landforms: uplift - plates crash into one another, creating mountains; subduction - one plate slips under another causing folding of the upper layers; divergent – plates drift apart and separate causing rifts; and transform

fault – plates slip laterally past each other causing earthquakes. See "Plate Tectonics," *Project Earth Science: Geology and Delta Science Module II – Earth Science: Earth Movements*.

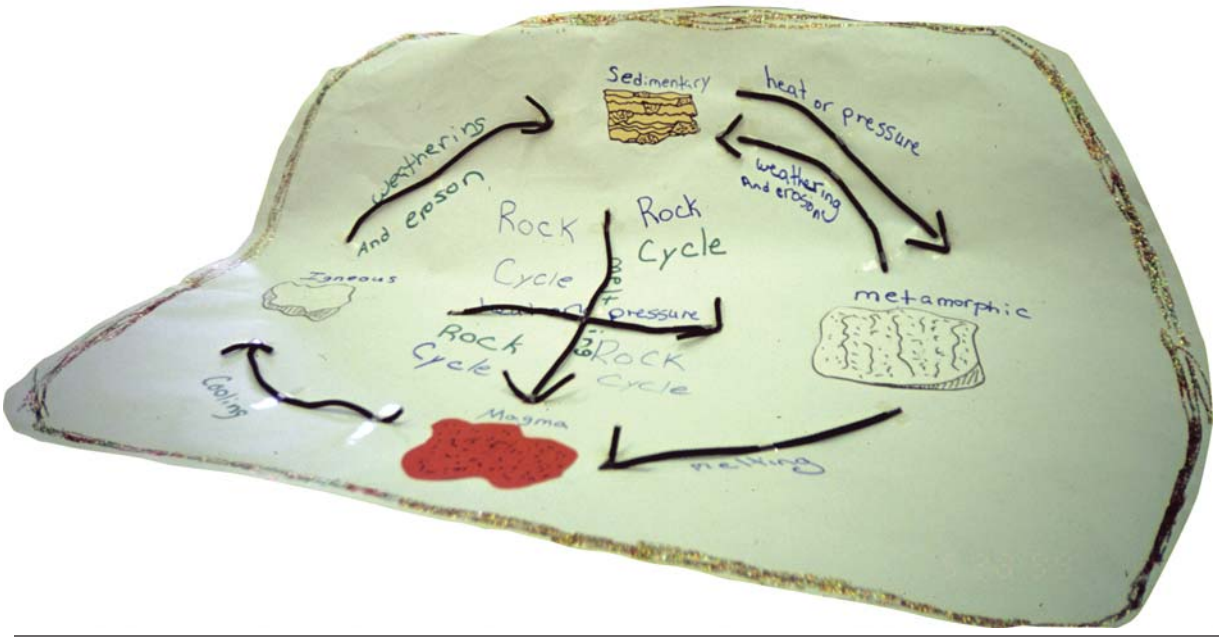
4. Have the students research the timeline of major geological events leading to the earth's features of today. This should include scientific data regarding plate tectonics and the creation and causes of local (or worldwide) land formations. Culminate their investigations with a display of posters, illustrated timelines, and/or dioramas. **Note**: Have the students research and create geologic timelines for the local area and use them for the *Building Respect for the Past, Present, and Future* lesson.

5. Introduce and discuss the rock cycle and the processes of rock formation. Use shaved crayons - layered, pressed, and then heated - to simulate the formation of the 3 types of rocks. See "Rock Around the Clock," *Project Earth Science: Geology*.

   Using rock samples, have the students identify various rock types (igneous, sedimentary, and metamorphic) based on appearance and feel. Have the students create a diagram or poster illustrating and correctly labeling the parts of the rock cycle. Or create a play to demonstrate the rock cycle.

6. Create a "sandwich" of earth layers using various types of bread and fillings. Have several sets of materials available and coverings for individual desks. Tell the following stories and ask students to simulate the history of various geological formations by building layered sandwiches.

a. White sand erodes from upper rocks and is transported by rain, melting snow, and gravity into a flowing stream to the foot



of a mountain. The sand is carried along the stream into a river that eventually widens, causing the flow of the water to slow down. This allows the white sand to drift slowly to the bottom. Over many years, this sand becomes cemented together, forming a layer of white sandstone. **First layer - white bread.**

b. A hurricane passes through the area, bringing torrential rains and wind. Trees, rocks, dirt, and gravel erode into the water and cover the white sand. **Second layer - chunky peanut butter, chocolate chip chunks, raisins.**

c. Over many years, the river erodes brown silt particles of clay from the land and carries them downstream. Again, the velocity of the water slows as the river widens and the silt gradually drops to the bottom. This eventually forms a sedimentary rock called shale. **Third layer - wheat bread.**

d. Meanwhile, glaciers are melting on the Earth causing the ocean to rise and cover the area. Millions of tiny marine organisms and shells begin to line the ocean floor. After many years, the ocean recedes and shells have cemented together forming a layer of rock called limestone. **Fourth layer – jelly.** Many fossils can be found in this layer. **Add candy worms or fish.**

e. Finally, a layer of brown sand is blown over the entire area. There has been a severe drought and mighty winds have sandblasted large, brown boulders with small bits of rocks. In time this layer will become brown sandstone. **Sixth layer - dark bread.**

The geology sandwich is now complete! Have students pretend to be geologists and use a plastic straw or a section of small-diameter plastic pipe to take a "core sample" of the layers. Have the students examine the core and identify the layers. Relate this to real core samples that help determine the composition and historical sequence of the Earth's formation.

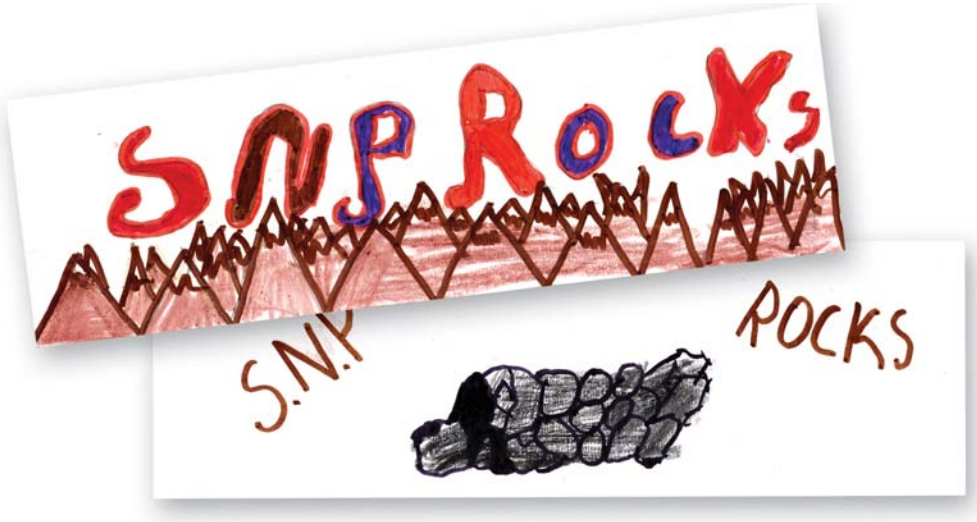
Bend and "fold" the sandwich to relate this model to the formation of mountains

as plates collide. Have them cut or break their sandwich in half and force one half to "subduct" under the other. Have students visualize the interior layers of mountains, documenting how the order of layers can change. After each "geological event," have students take another core sample and compare the results. Have the students illustrate, label, and explain the new concepts learned in their journals before eating their geological formations.

7. Review the geological concepts and processes and remind the students that the Earth is constantly changing and evolving. Geological change can occur very slowly, as in the formation of sedimentary rock or the weathering of exposed rocks. Change can also occur suddenly, as in a landslide or an erupting volcano.

   Ask the students how geology affects plants, animals, and people. Do plants and animals depend on geology for anything? (Rocks weather and erode and become part of the soil, providing plants with necessary minerals. Rocks provide homes for animals. Rocks can prevent or slow down erosion and provide protection.) Do people depend on geology for any resources? (People depend on "fossil fuels," oil, coal, and natural gas. Rocks weather and erode, adding minerals and nutrients to enrich soil for farming. People use many metals such as aluminum, iron, copper, and gold. Many types of rock are used for construction and building materials.) How important is geology to living things?

Take a field trip to a national park or other natural area to see geological features and processes firsthand. Discuss the geological history of the area and observe the formations and geological features. Classify rocks as igneous, sedimentary, or metamorphic. Identify evidence of weathering and erosion. Search for signs of plants and animals that use rocks as part of their habitat. Look for ways people use rocks and geology in the park. Remind the students about the role of national parks in the preservation and protection of rocks, geological features, history, and nature.



8. Conclude by asking, "Now that you realize how important geology is to living things, can you imagine life without geology?" We all live on land that is made of rocks and geologic features and depend on many geologic resources. Ask the students if they think human actions can affect the land and geology. Examples include the mining of metals and coal; drilling for oil and natural gas; farming; using geologic materials for construction; moving earth and rock for the development of homes, stores, and cities; and damming rivers. Remind the students that geologists think it took millions of years to create these geologic resources. Are these resources that we depend on replaceable? If not, how long before the resources are used up?

   Ask the students if people should care about geologic resources. Have the students brainstorm ways people can help conserve and protect resources for the future. Examples include recycling aluminum and other metals to reduce mining; using energy-efficient transportation and machines to reduce oil, gas, and coal consumption; following good farming practices to reduce erosion and soil loss; and reducing waste to conserve resources.

   Introduce the term *stewardship* and have students discuss the reasons why people should conserve resources and protect the land and the environment. Have students

express, in a journal or a creative writing format, the personal values, ethics, and behavior changes that they have gained as a result of this study. Allow time to share the writings with others, if desired. Discuss how they will become better, more respectful stewards and responsible citizens as a result.

The students could also create a "contract" with themselves detailing a personal plan for a stewardship activity. Suggest that each person keep the contract in a safe place and review it in 5 or 10 years to see what he/she has accomplished. **Option**: Collect the contracts and return them to the students at a later time.

Assessments

1. Evaluate the computer-generated model and/or illustration of the earth according to effort, facts, and correct labeling.
2. Observe and document behavior, preparation, participation, and levels of understanding exhibited during classroom activities and discussions.
3. Evaluate any journal entries or written explanations to determine students' knowledge of plate tectonics, rock cycle, fossils, earthquakes, volcanoes, weathering, and erosion.
4. Assess students' research, timelines, and projects based on accuracy, varieties of resources, clarity, labeling of illustrations, and effort. A rubric listing criteria for evaluation should be discussed and posted in advance leading to a positive and inspiring learning experience.
5. Final journal entries, discussions, letters, and written work should reflect students' attitudinal and behavioral changes concerning citizenship, respect, and responsibility for the care of the land.

Going Further

1. Host an "open house" in your classroom to share projects and concepts learned during the year. Invite parents and other classes to see students act out the rock cycle and plate tectonics.
2. Have the students do the "Lost River Village" activity from *Project Underground* to reinforce land use issues and environmental responsibility.
3. Have students research, classify, and compare geological formations found in other national parks or areas of the world.
4. Have students create a slide show presentation to demonstrate all the geological concepts they have studied. This should include commentary and slides demonstrating good citizenship and responsibility. This could be presented to other classes or schools.

ACTIVITY: GEOLOGY ROCKS

Related Subject Activities

1. Art - posters, displays, bumper stickers
2. Social Science - location of landforms in the world, study of the history of an area and events leading up to present conditions
3. Drama – acting out the rock cycle
4. English - research, letters, reports, poetry, debate

Resources and References

Overhead and Underfoot. CA: AIMS Education Foundation, 1994.

Peanut Butter and Jelly Geology. 78-83.

Cole, Joanna. *The Magic School Bus: Inside The Earth*. NY: Scholastic Inc., 1987.

Cole, Joanna. *The Magic School Bus Blows Its Top: A Book About Volcanoes*. NY: Scholastic Inc., 1996.

Ford, Brent. *Project Earth Science: Geology*. VA: National Science Teachers Association, 1996.

Rock Around the Clock, 139-147.
All Cracked Up, 34-37.
Plate Tectonics, 171-178.

Silver, Donald M. and Patricia J. Wynne. *Earth's Layers*. U.S.A.: Scholastic Inc., 1997.

Project Underground. VA: Richmond Area Speleological Society, Project Underground, Inc., 1993.

Delta Science Module II: Earth Science - Earth Movements. Delta Education. www.delta-education.com/index.html

Ranger Rick's Nature Scope. Geology: The Active Earth. DC: National Wildlife Federation, 1988.

Clifford, Dr. Nick, *Incredible Earth*. NY: DK Publishing, Inc., 1996.

Badger, Robert A. *Geology Along Skyline Drive*. Montana: Falcon Publishing, Inc., 1999.

Exploring Earth Science in Shenandoah National Park: An Integrated Curriculum for Grades 7-12. Shenandoah National Park, 2000.

ACTIVITY: A CIRCLE OF SERVICE

Overview

Stewardship is a personal, moral responsibility to care for earth's resources in the present and for the future. Students will have an opportunity to practice skills that demonstrate responsibility and stewardship through their participation in a service project benefiting a national park or local community.

Objectives

Students will be able to

1. explain the difference between producing goods and providing a service;
2. identify human, natural, and capital resources;
3. describe the stages of a plant's life cycle and explain why plants are valuable natural resources;
4. demonstrate the cooperative skills and teamwork needed to complete a service project benefiting the school or community;
5. develop a personal sense of responsibility, caring, and stewardship for the environment.

Background

Economics is the "science that deals with the production, distribution, and consumption of wealth" or "having to do with the management of the income and expenditures of the household, business, community, or government." Students can learn economic concepts through the process of actually producing goods and providing services. Students should be familiar with the following economics terminology:

goods/services

goods = movable personal property, merchandise, wares
services = work done or duty performed for others

producers/consumers

producers = a person who makes or manufactures
consumers = a person or thing that uses or absorbs

natural, human, and capital resources

natural resources = forms of wealth supplied by nature, such as coal, lumber, land, water.
human resources = people who are able to provide a work force
capital resources = commodities for use in production, such as raw materials, machinery, buildings.

SCIENCE: Life Processes – Plant: Life Cycle

HISTORY & SOCIAL SCIENCE: Economics, Civics

CHARACTER: Responsibility, Cooperation, Caring, Self-reliance, Stewardship

GRADE LEVEL
2nd – 4th Grades

VIRGINIA STANDARDS OF LEARNING
Math: 2.11, 3.8, 3.13, 4.5
Science: 2.4, 2.8, 3.8, 4.4, 4.8
English: 2.2, 2.3, 2.9, 2.10, 3.1, 3.6, 3.7, 3.8, 4.1, 4.2, 4.7, 4.8
History & Social Science: 2.7, 2.9, 2.10, 3.7, CE.3e, CE.4, CE.9, CE.12

LENGTH/DURATION
1–2 months including 1 morning for each service project at the school, community, and/or park.

MATERIALS
seeds, soil, plastic cups, books: *The Little Red Hen* and *Just A Dreamposter,* posterboard, markers, plants, mulch, shovels, spades, work gloves, supplies for lemonade stand or bake sale

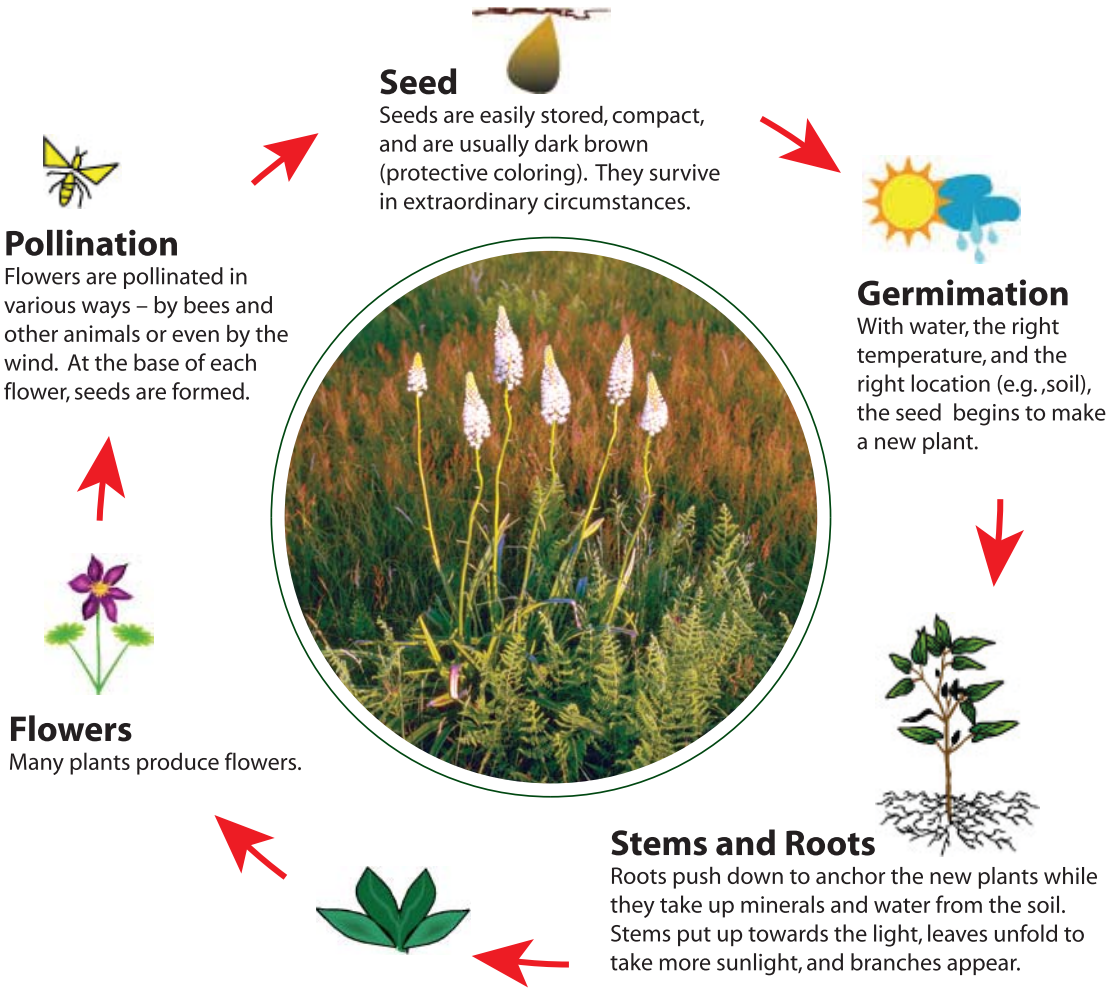
VOCABULARY
goods, services, producers, consumers, natural resources, human resources, capital resources, roots, stem, leaf, flower, fruit, seed, responsibility, cooperation, caring, stewardship

ACTIVITY: A CIRCLE OF SERVICE

Plants and plant products are important *natural resources*. Plants provide food and drink, habitats, clothing, shelter, and medicine. A plant is a living organism that needs sunlight, water, soil, air, and space to survive. A plant goes through a series of changes in its life cycle: a seed or bulb, sprout, root, stem, leaves, flower, and finally fruit.

Through the opportunity to plan and complete a service project, students will experience a real life application of economics and realize their abilities to contribute to society.

Plant Life Cycle



ACTIVITY: A CIRCLE OF SERVICE

LESSON

Motivational Activity

Introduce the economics terms *goods, services, producers,* and *consumers*. Invite a local florist to the classroom to describe aspects of his/her occupation–responsibilities, pleasures, and challenges. Ask him/her to bring in a flowering plant and talk about its different parts. Ask the students the following questions: "Does the florist provide *goods* or *services*? Who is the *producer* and who is the *consumer* in the florist's business?" Discuss their answers.

Have students begin a journal, writing about the florist's visit and illustrating a labeled diagram of a plant. This journal should be maintained throughout the unit, with entries made for each activity and level of understanding.

Activities

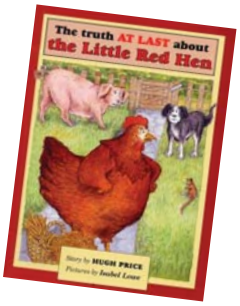
1. Talk about different types of *services* which workers provide, e.g., cleaners, taxi drivers, firefighters, policemen, florists, teachers. Contrast these *services* with physical *goods*, e.g., groceries, hamburgers, pizza, baseballs, pianos, bicycles. Brainstorm lists of *goods* and *services* that students have personally received and post them on the bulletin board. Discuss the importance of having both *goods* **and** *services*. Ask the students if they are able to provide any *goods* or *services* for others. Have the students keep a list of their ideas in their journals.

2. Discuss how plants are nature's *producers*. Have the students name things plants provide to animals and people and list them on the board, e.g., types of food, oxygen, homes for animals, shade, flowers, wood for furniture, buildings, and paper. Ask which items are the *goods* and which are *services*. Example: fruit from a tree could be considered goods while providing oxygen and shade could be considered a *service*. If plants are nature's *producers*, who are the *consumers*? Introduce the term *natural resource* and have students explain why plants are valuable resources and how plants contribute to a community and the environment.

3. Discuss the life cycle of a plant from seed to maturity and help students identify the *goods* and *services* a plant provides during its life cycle. Have students plant seeds, care for them, and enter in their journal the progress of their seed's growth.

The students may create a book or diagram to show the sequence of the plant life cycle. Have students identify the parts

of plants and the requirements for healthy growth. What things could be harmful to plant health? Ask students what would happen if plants did not have the necessary requirements to grow and reproduce.



4. Read aloud the book *The Little Red Hen*. Discuss the economic components involved and cooperation required for the successful production and distribution of a loaf of bread. Identify the *natural, capital,* and *human* resources represented in the book: *natural* – wheat, water, sun; *capital* – stove, rolling pin; *human* – the bread baker and other animals personified in the story. How important are plants for making the *goods* (the bread) in the story? What would happen if there were no natural resources available?

5. Introduce the concept of stewardship: being responsible caretakers of the environment now and for the future. Discuss the role of the national park Service as the steward and protector of our nation's diverse natural and cultural heritage. Discuss the goods and services National Parks provide to the nation. Create a list of each:

   services - protects and preserves nature, provides places for people to enjoy the outdoors, provides ranger programs to teach visitors, preserves places that commemorate our nation's history and heritage;

   goods - clean air, clean water, wildlife, forests, scenery, history, exhibits, books.

   How are these goods and services different from a business like the florist's? The resources in national parks are preserved and protected for future generations

instead of being sold for economic gain. Ask the students why this is important. Why should people be concerned about caring for resources for the future?

If possible, visit a national park to experience these goods and services firsthand.

6. Begin preparation and completion of a service project. Refer to the students' lists of goods and services from Activity 1 (above) or refer to *Project Learning Tree: Greenworks!* or *Project Wild: Taking Action* for possible service projects that the class could perform to benefit a national, state, or local park, their school, or their community. Also see *Branch Out* lesson for an example. Possible projects:
   - growing and planting flowers in the schoolyard or community garden area;
   - spreading mulch on a path in a park picnic area or trail;
   - providing funds to help support injured or endangered animals through rehabilitation, maintenance, or a re-introductory program (example: peregrine falcons);
   - picking up litter when visiting a park or picnic area.

   Select one or more of the projects and get prior approval from the recipients, school, and parents. Determine the funds and materials that are necessary to complete the project. Develop a plan on how to raise the money that is needed. List the resources - natural, capital, and human - that will be utilized. Identify and discuss how each component - producer, consumer, goods, and services –fits into the plan. Begin funding the project.

Possible funding sources:

- donations from parents through pledge cards, walkathons, or from student-earned monies at home;
- production and sale of a desired commodity: lemonade, baked goods, candy bars, bookmarks, bumper stickers, etc.;
- partnership funding and sponsorship: parent organizations, local businesses;
- funds from recycling drive: newspapers, aluminum cans.

Arrange for transportation, supplies, permission slips, and chaperones, then implement and complete each project. Upon completion, discuss the success of the project, its impact, and the economic and stewardship factors involved. Have

students write about their experiences in self-reliance, new levels of understanding, and their personal goals for future stewardship behaviors.

7. Create a "Circle of Service" poster for display in the school hall that illustrates the steps and accomplishments of the stewardship project that was completed.

8. Read aloud *Just a Dream* and discuss the future the boy dreamed about. What happened to the natural resources and the environment? Should people be concerned about caring for resources for the future? Discuss the idea that being good resource stewards today will make a difference for the future. What behaviors can people demonstrate to show care and responsibility for the environment?

9. Host an in-school "Service Day" to encourage students to provide services to others. Some examples could be peer-tutoring in reading, writing, math; sports advice and coaching; listening; guidance in good character traits shown through mini-skits; discussion groups.

Assessments

1. Administer pre- and post-test evaluations based on knowledge of economics, science, and character trait vocabulary words; an understanding of plant growth and contribution; and the basic components of economics.

2. Create a rubric to evaluate the student book or diagram from Activity 3 (above) . Assess the students' understanding of the life cycle of the plant. Evaluations should include correct labels for each stage of the plant's life cycle, illustrations, neatness, and effort.

3. Have the students express in their journals how they showed responsibility, respect, caring, and stewardship in the service project. Have them write at least one paragraph for each character trait involved.

4. Observe and document the students' participation in the service project and the behavior and attitudinal changes he/she feels as a result. Through writing, illustration, or conference, have students self-assess their learning.

Going Further

1. Welcome parents into the classroom to provide services for the students. This might include a coaching clinic on various sports, tutoring help, reading to the students, and chaperoning on field trips.

2. Take a class field trip to a local florist shop or other business.

3. On an annual basis, have each class maintain and care for the flowerbeds at school. This commitment would be a welcome introduction to the year.

4. Have students create their own story about fictional or real characters contributing to society through a service project. Pre-determine and post specific guidelines and criteria for evaluating students' creative writing including content, grammar, spelling, form, and effort. They should apply the writing techniques of rough draft, re-writing, editing, final copy, and illustrations. The stories could be read and donated to the library, younger students, or a nursing home.

5. Read "One At A Time" (see Resources and References) aloud to illustrate each individual's impact in helping our living resources.

Related Subject Activities

1. Math - money concepts and graphing
2. Art - murals, posters, displays, and signs to show advertising
3. Music - class or individual song about plants or goods and services
4. Drama - skits to advertise the different services that student will provide

Resources and References

Project Learning Tree. Washington, DC: American Forest Foundation, 2003 Edition.
"How Plants Grow," 135-136.
"Have Seeds Will Travel," 139-141.

Project Learning Tree: GreenWorks! Connecting Community Action and Service Learning. Washington, DC: American Forest Foundation, 2001.
www.plt.org/greenworks/index.cfm

Project Wild: Taking Action. An Educator's Guide to Involving Students in Environmental Action Projects. U.S.A.: Council for Environmental Education, 1995.
www.projectwild.org/TakingAction.htm

McQueen, Lucinda. *The Little Red Hen*. USA: Scholastic, Inc., 1985.

Van Allsburg, Chris. *Just A Dream*. New York: Houghton Mifflin Co., l990.

Canfield, Jack, and Mark Victor Hansen. *Chicken Soup for the Soul*. FL: Health Communications, Inc., 1993. "One At A Time," 22-23.

The Center for Conservation Biology Peregrine Falcon Website:
http://ccb.wm.edu/vafalcons/falconhome.cfm

The Wildlife Center of Virginia Website:
www.wildlifecenter.org/

Evaluation Form

Please make copies of this form and submit one for each unit you use. Your feedback will help make this a more valuable teaching tool. ***Please return this form to:***

Education Office • Shenandoah National Park • 3655 U.S. Hwy 211 East • Luray, Virginia 22835

Lesson Title:_____ Date:_____

Name:_____ Grade Level:_____

School:_____

Circle one response for each statement. **5 = Strongly Agree** **1 = Strongly Disagree**

1.	The lesson was complete and easy to use.	**5**	**4**	**3**	**2**	**1**
2.	The objectives were relevant to your school's curriculum and educational requirements including the Virginia Standards of Learning.	**5**	**4**	**3**	**2**	**1**
3.	The activities were engaging and enhanced student learning.	**5**	**4**	**3**	**2**	**1**
4.	The activities addressed a variety of student ability levels and learning styles.	**5**	**4**	**3**	**2**	**1**
5.	The assessments were effective tools for evaluating comprehension and application of concepts.	**5**	**4**	**3**	**2**	**1**

(Use back side of this form for if additional space is needed.)

Did you need to adapt or change the lesson to meet your needs? (Please specify how)

How was the lesson successful in connecting character education with other subject matter (science, math language, and social science)?

Did your students demonstrate an understanding of stewardship and its relevance to their lives? (Please give examples.)

Was the unit effective in developing an understanding of the importance and significance of the National Park Service's role as the steward and protector of our nation's diverse natural and cultural heritage?

• S T E W A R D S H I P •

I believe the students understood how important it is to preserve the environment. They were amazed at the beauty and realize it is beautiful because of respecting and honoring the land.

–Teacher comment from NPS
Education Program Evaluation