

Potomac Gorge

Potomac Gorge

A Natural Monument
in the Shadow of National Monuments



Bridging the Watershed

An outreach program of the Alice Ferguson Foundation in partnership with the National Park Service and area schools

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Teacher's Guide

Student Booklet



Resource Booklet

BRIDGING THE WATERSHED



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September 15, 2009

Dear Educator:

We at the Alice Ferguson Foundation and the National Park Service invite you and your students to join in the effort to preserve our nation's parks. The goal is to ensure that these treasured sites will continue to be available for generations to come. In the *Bridging the Watershed* program, we offer you a "real-world" setting in which to teach science and other disciplines' concepts such as those included in your Scope and Sequence and/or benchmark expectations.

Bridging the Watershed offers hands-on opportunities for students to examine our local watershed and study the impact humans have on it. In national parks, students will apply what they learn in the classroom to studies of trash, invasive plants, water quality, runoff, and/or macroinvertebrates. More importantly, the program will help them develop a greater sense of ownership for their environment and understand the impact of personal choices.

Field study is an excellent vehicle for concepts in context. Unfortunately, this vehicle is not always available in urban or suburban settings, leaving a gap between learning and application. Bridging the Watershed can help bridge that gap. Though national parks have been somewhat protected, what occurs in society does impact the parks. Students will collect and analyze authentic data to better understand this impact.

It is our hope that student experiences in the parks will foster a heightened sense of ownership and responsibility that will last a lifetime. Let us join together as partners in teaching our young people stewardship of their watershed.

Sincerely,

Peggy O'Dell
NPS Regional Director,
National Capital Region

Tracy Bowen
Executive Director,
Alice Ferguson Foundation

BRIDGING THE WATERSHED



Bridging the Watershed is an outreach program of the Alice Ferguson Foundation, in partnership with the National Park Service and area schools that offers secondary school students opportunities to study real-world science in national parks. Its purpose is to promote student academic achievement, personal connections with the natural world, lifelong civic engagement, and environmental stewardship through hands-on curriculum-based outdoor studies in national parks and public lands.

Many thanks go to the Alice Ferguson Foundation, National Park Service, and Prince George's County Public Schools, who have provided in-kind and financial support to foster the development and sustainability of the BTW program. The BTW administrative office is based at the Alice Ferguson Foundation, a 330-acre environmental center on the Potomac within Piscataway Park—10 miles downstream from Washington, D.C.

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“NATIONAL PARK LABS:” BRIDGING THE WATERSHED

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“National Park Labs” is a program of the National Park Service, the National Park Foundation, and Toyota USA Foundation. These model programs, the first of their kind, provide high school students with opportunities to study real-world science in the national parks and foster stewardship of park resources.

Thanks to a growing list of partners and sponsors, *Bridging the Watershed* has grown throughout the Potomac Watershed since its inception as a National Park Labs program.

Founding Partners

Alice Ferguson Foundation
C&O Canal National Historical
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Chesapeake Bay Foundation
District of Columbia Public Schools
George Washington Memorial
Parkway
Howard University
National Mall and Memorial Parks
National Capital Parks-East
President’s Park
Prince George’s County Public
Schools
Rock Creek Park
Student Conservation Association
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

Founding Sponsors

Toyota USA Foundation
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The Morris and Gwendolyn Cafritz
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Partners

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Park
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Prince William County Schools
Prince William Forest Park
National Oceanic and
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Maryland Park Service

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*without whose vision this program
would not have been possible.*

An Overview of the *Bridging the Watershed* Program



Bridging the Watershed is an environmental education program for secondary school students designed to promote understanding and stewardship of the Potomac watershed. The program, the product of a partnership among twelve national parks within the National Capital Region, two school districts in the Potomac River basin and countless schools throughout the region uses national parks as outdoor learning laboratories. Part of every module is a field study in one of these national parks, where students use the processes of science to learn about the health of the natural resources in the Potomac watershed. These processes include analyzing the water quality of streams, identifying benthic macroinvertebrates, assessing runoff and suspended sediment in waterways, quantifying the kinds of trash found in the watershed, and conducting surveys of alien and native plants to discover the impact of human activity.

One of the main goals of the BTW program is to make the activities relevant to students' lives, serving to bridge the divide between science in the classroom and science in the natural world. Many students have had little or no contact with the natural environment or with national parks. This program aims to provide students with exposure to science in a natural setting, broadening their understanding of scientific study. The activities are based on sound pedagogical principles and correlated to national, state, and local education standards. As a result, the activities in all modules are inquiry-based and “hands-on/minds-on,” encouraging students to experiment and then draw conclusions based on the results of the experiment. The program follows the constructivist pedagogy and uses the 5 E's of the teaching/learning cycle—Engage, Explore, Explain, Elaborate, and Evaluate—as its structure. All activities are student-directed, with the teacher acting as the guide and facilitator.

Each of the modules focuses on a particular discipline of science: chemistry, biology, Earth science, or environmental science. Nonetheless, the activities are interdisciplinary with a major emphasis on math. While each module is meant to stand alone and be used primarily in the science class on which it focuses, environmental education teachers may find it helpful to use more than one module with their students. All modules contain pre-field study activities and preparation, a one-day field study in a national park, and follow-up analysis and reflection on the experience. At the conclusion of each module, students are encouraged to engage in a service project during which they can apply what they have learned about the environment to their own community or in a national park.

The Core Modules in the BTW Curriculum: The following summaries describe the core modules in the BTW curriculum. Included in the summary is the science discipline or disciplines to which the module is most closely related.

Watershed Watchdogs: Assessing Water Quality Chemistry or environmental science students study nine parameters that will help them determine the Water Quality Index (WQI) for the Potomac River or one of its tributaries.

Water Canaries: Assessing Benthic Macroinvertebrates Students in biology or environmental science classes learn to identify benthic macroinvertebrates and then determine water quality by using the sensitivity ratings for the macroinvertebrates found in the stream during their field study.

Alien Invaders: Assessing Exotic Invasive Species Biology and environmental science students study the importance of biodiversity, learn the basics of plant identification, and explore the extent of alien plant invasion in a local national park.

Don't Get Sedimental: Runoff and Sediment in the River Students in Earth science or environmental education classes explore the impact that runoff from increasing development has on the watershed.

Talkin' Trash: Make a Litter Difference Students in any science class examine the impact of trash in their watershed. They learn how trash reveals a lot about the lifestyle of the residents that create it, how trash impacts the environment, what to do with all the trash we produce, and how personal choices can make a difference.

Additional Components of the BTW Program: The program also offers professional development for teachers and a web site with additional activities. The web site contains authentic data collected by students who have completed the program. More information about these two components follows.

Professional Development for Teachers and Rangers. Professional Development for Teachers and Rangers: Only teachers who have participated in a BTW professional development experience are eligible to bring students to a *Bridging the Watershed* program in a national park. A training institute is held each summer at participating national parks. Teachers work with park rangers to explore the modules in depth. Teachers earn a stipend and can receive graduate credit. Shorter inservice workshops are held during the school year.

BTW Web Site. The interactive web site, found at www.bridgingthewatershed.org, provides an essential link to enrich and reinforce the educational experience of the program. Participants or any interested web surfers can find online activities to prepare for a visit to the parks, gain valuable knowledge about parks and their natural resources, or subscribe to receive an electronic copy of the BTW newsletter. Students' results of their field study can be uploaded to a database, making the web site a valuable community resource of watershed data. Teacher pages provide information about upcoming events, workshops, and the annual BTW institute.

Timeline of the Potomac River Watershed The timeline can be used by history or social studies classes, as well as by science students, to learn many interesting, often little-known facts about our past. The timeline begins with Native American pre-history and continues to the present day. Major events that have affected the watershed are interspersed with colorful sidelights, delighting "trivia" fans as well as historians.

Online Interactive Activities "Go Fish" is an interactive simulation game intended to appeal to students in middle and high school. During the game, virtual anadromous fish leave the open ocean each spring and travel into estuaries, coastal and freshwater rivers, and creeks to release their eggs. As the season moves into late summer and early fall, the juvenile fish leave the shelter of the upper estuary and begin a journey to the open ocean from which their parents came. During this trek, the fish encounter many perils, and not all of them will survive to reproductive maturity.

Plant and macroinvertebrate identification activities teach students of all ages basic techniques biologists use to classify organisms. The macroinvertebrates in two streams are identified with a key and then used to assess the relative health of their stream. Students learn basic invertebrate anatomy as well as how to use a key.

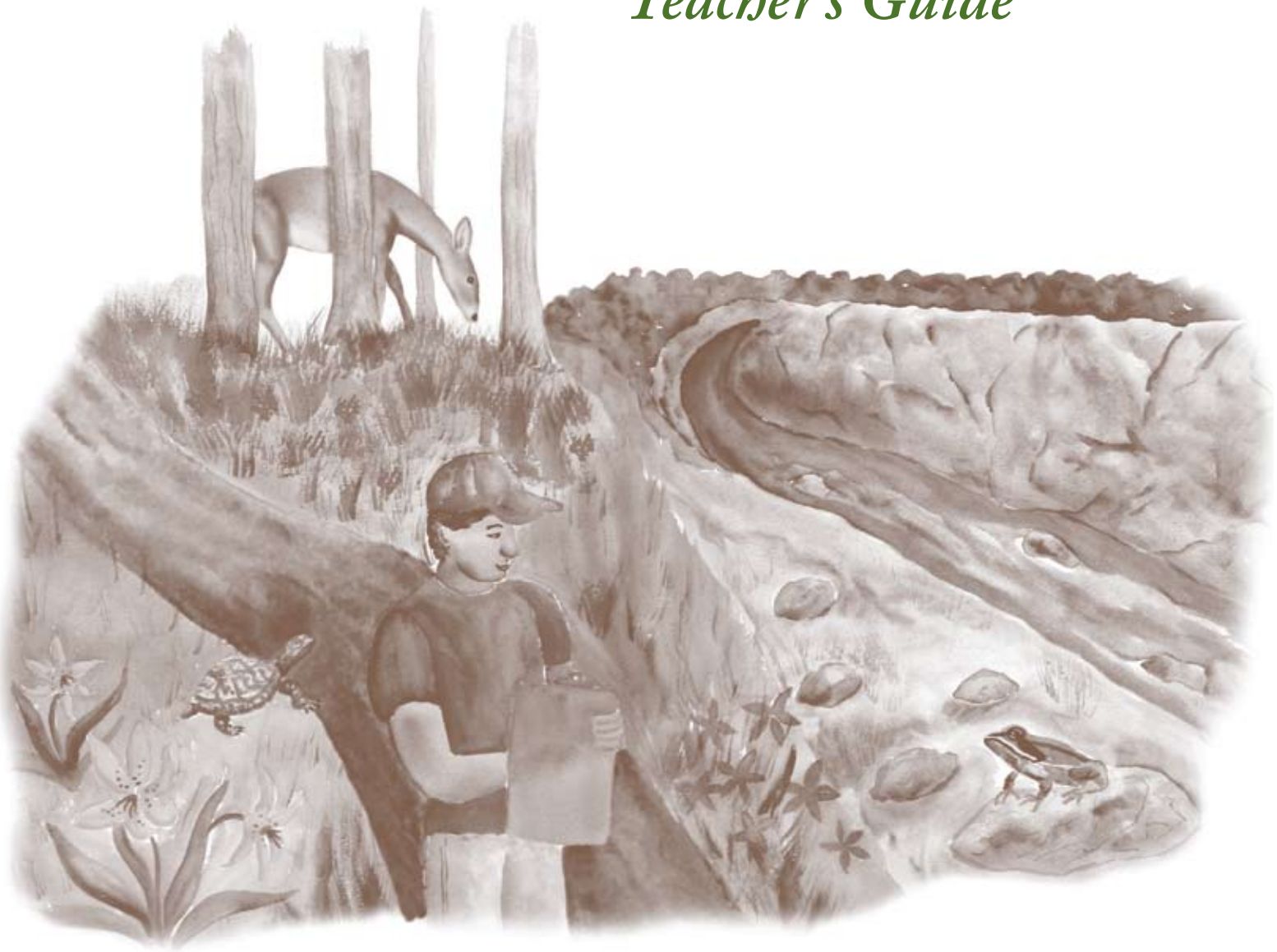
The plant identification key is unique in that it uses leaves as a starting point rather than flowers. Since a large percentage of plants in a sample area will not be in bloom, this technique is much easier to use to identify plants. As each plant is keyed-out, a lot of interesting information about it is presented such as whether the plant is native or an exotic introduction. If the plant is alien, reasons are given about why it is a threat to native species.

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Bridging the Watershed Activities: A Constructivist Approach

It sounds like a simple proposition: we construct our own understandings of the world in which we live. We search for tools to help us understand our experiences. To do so is human nature. Our experiences lead us to conclude that some people are generous and other people are cheap of spirit, that representational government either works or doesn't, that fire burns us if we get too close, that rubber balls usually bounce, that most people enjoy compliments, and that cubes have six sides. These are some of the hundreds of thousands of understandings, some more complex than others, that we construct through reflection upon our interactions with objects and ideas.

Each of us makes sense of our world by synthesizing new experiences into what we have previously come to understand. Often, we encounter an object, an idea, a relationship, or a phenomenon that doesn't quite make sense to us. When confronted with such initially discrepant data or perceptions, we either interpret what we see to conform to our present set of rules for explaining and ordering our world, or we generate a new set of rules that better accounts for what we perceive to be occurring. Either way, our perceptions and rules are constantly engaged in a grand dance that shapes our understanding.

Consider, for example, a young girl whose only experiences with water have been in a bathtub and a swimming pool. She experiences water as calm, moving only in response to the movements she makes. Now think of this same child's first encounter with an ocean beach. She experiences the waves swelling and crashing onto the shore, whitecaps appearing then suddenly vanishing, and the ocean itself rolling and pitching in a regular rhythm. When some of the water seeps into her mouth, the taste is entirely different from her prior experiences with the taste of water. She is confronted with a different experience of water, one that does not conform to her prior understanding. She must either actively construct a different understanding of water to accommodate her new experiences or ignore the new information and retain her original understanding. This, according to Piaget and Inhelder (1971), occurs because knowledge comes neither from the subject nor from the object, but from the unity of the two. In this instance, the interactions of the child with the water, and the child's reflections on those interactions, will in all likelihood lead to structural changes in the way she thinks about water...

As human beings, we experience various aspects of the world, such as the beach, at different periods of development, and are thus able to construct more complex understandings. The young child in this example now knows that the taste of seawater is unpleasant. As she grows, she might understand that it tastes salty. As a teenager, she might understand the chemical concept of salinity. At some point in her development, she might examine how salt solutions conduct electricity or how the power of the tides can be harnessed as a source of usable energy. Each of these understandings will result from increased complexity in her thinking. Each new construction will depend upon her cognitive abilities to accommodate discrepant data and perceptions and her fund of experiences at the time.

—Excerpted from *The Case for Constructivist Classrooms*
by Jacqueline Brooks and Martin Brooks

The activities in this module use a constructivist, interdisciplinary approach. Students construct their own knowledge of the science underlying the problems/issues they explore. Activities include active discussions, writing, research, and the use of the scientific method to observe and gather authentic data. Students observe problems in the watershed in which they live from a historical perspective, from the perspective of being a member of the human community, and from the perspective of an environmental scientist. Working in cooperative groups, and at times individually, students work on activities that include engaging questions and situations. They are guided through

field and laboratory explorations that invite them to hypothesize about what will happen, to interact with natural phenomena, to observe, and to collect data about their observations. They will test their theories, explain results, and decide whether to keep or abandon their theories.

The teacher's role is to help students express their preconceptions about the problems and ideas presented in this module. After conducting the hands-on investigations, students are provided with opportunities to modify any misconceptions. Data collection combined with class discussions about alternative theories will provide motivation for further exploration and will

help students restructure their knowledge base. In the process, students gain confidence in their abilities to learn and understand science as well as gather useful scientific data about the watershed in which they live.

Several different models of instruction can help create a constructivist approach to learning. One model is based on the 5 E's (Engage, Explore, Explain, Elaborate, Evaluate), an instructional model in five phases. The phases, explained on the following page, form the structure around which the activities and procedures are organized.

Engagement Engagement Engagement

This phase is designed to grab the student's interest. An object, situation, or problem that relates to the student's world is presented with an authentic question, a problem description, or an interactive scenario. The engagement is meant to lead the student to the task to come. The role of the teacher in this phase is to present the situation or problem and to identify the task. If this phase is successful, students are motivated to continue to the next phase: the exploration.

Exploration Exploration Exploration

Exploration activities are meant to provide students with concrete experiences, which they can build upon as they discover new concepts and learn new processes and skills. These activities bring answers and, if successful, satisfaction to the student. During the exploration phase, students need time to explore objects, events, or situations. They gather data to help them establish relationships, construct mental pictures, observe patterns, and question preconceptions. The teacher facilitates the exploration and coaches students from the sidelines. The teacher answers students' questions and helps them to begin restructuring their knowledge. At the end of this phase, students should be prepared to explain what they have discovered.

Explanation Explanation Explanation

This is the phase in which students should "see the light." The concepts, processes, and skills to which they have been exposed become clear. The learning is internalized. During the explanation phase, students and teachers agree on appropriate vocabulary to discuss the discoveries students have made. The teacher's role is to ask students to summarize what has happened in their own words. Then, the teacher begins to introduce scientific terms to describe the results. Explanation often provides order to the earlier phases and should lead quickly to the ability to elaborate on what has been learned.

Elaboration Elaboration Elaboration

This phase is designed to provide students with a chance to take what they have learned and extend or apply the concepts, processes, or skills to their lives. Often, elaboration activities are interdisciplinary and may involve writing, mathematics, or social studies. When students can clearly connect the early explorations with the explanations and the concepts with the observations, learning has been internalized. They are ready to evaluate their work.

Evaluation Evaluation Evaluation

Students need to receive feedback on whether their explanations have been adequate. Informal evaluations occur all during the learning task, but a more formal evaluation should occur after the elaboration phase. Students should evaluate their own work and understanding, as well as be evaluated by the teacher. Authentic assessment techniques can be employed to give students meaningful feedback on their individual work or any group work.

Addressing the National and Local Curriculum Standards

Educational reform and the drafting of national education standards in many of the disciplines for curriculum development, assessment, and teaching have had a major impact on educators. National standards are not meant

to suggest a “national curriculum” but to guide local- and state-level curriculum developers in raising the expectations in classrooms across the country. The modules presented as part of the *Bridging the Watershed* program address many

of the standards developed across disciplines. Listed below are some of the national and local standards relevant to the “Potomac Gorge” module.

District of Columbia Learning Standards		
Content Standard		Description of Standard
Resources	6.6	<p>Broad Concept: Sources of materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept, students:</p> <ol style="list-style-type: none"> 1. Explain that fresh water is limited in supply and uneven in distribution; describe why it is essential for life as we know it and also for most human activities, including industrial processes. 2. Recognize that fresh water is a resource that can be depleted or polluted, making it unavailable or unsuitable for humans. 3. Recognize that the Earth’s resources for humans, such as fresh water, air, arable soil, and trees, are finite. 4. Explain that the atmosphere and the oceans have a limited capacity to absorb wastes and recycle materials naturally. 6. Explain that recycling, reuse, and the development of substitutes can reduce the rate of depletion of many minerals. 7. Describe that most rainwater that falls in Washington, DC, will eventually drain into the Chesapeake Bay. 8. Explain the important role of the water cycle within a watershed.
Biological Evolution	7.6	<p>Broad Concept: Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students:</p> <ol style="list-style-type: none"> 3. Describe how biological evolution results primarily from the action of natural selection on the available variation in a population of organisms. 5. Using specific examples, explain that extinction of a species is a result of mismatch of adaptation and the environment.
Ecology	7.8	<p>Broad Concept: Organisms in ecosystems exchange energy and nutrients among themselves and with the physical environment. As a basis for understanding this concept, students:</p> <ol style="list-style-type: none"> 1. Recognize that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, farms, cities, and others, organisms with similar needs and living strategies compete with one another for resources, including food, space, water, air, and shelter. 2. Describe how two types of organisms may interact in a competitive or cooperative relationship, such as producer/consumer, predator/prey, parasite/hosts, or as symbionts. 4. Create a food web to explain how energy and matter are transferred between producers, primary consumers, and secondary consumers. 6. Explain how dead plants and animals, broken down by other living organisms (especially microorganisms and fungi), contribute to the cycling of matter through the system as a whole. 7. Describe how, as any population of organisms grows, it is held in check by one or more environmental constraints (e.g., depletion of food or nesting sites, increased numbers of predators or parasites). 9. Describe that all organisms, including the human species, are part of and depend on two main interconnected global food webs: the ocean food web and the land food web. 10. Recognize that entire species may prosper in spite of the poor survivability or bad fortune of individuals.

Virginia Standards of Learning

LIVING SYSTEMS (6th Grade)

<i>Content Standard</i>	<i>Description of Standard</i>
6.5	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include: f) the importance of water for agriculture, power generation, and public health; and g) the importance of protecting and maintaining water resources.
6.7	The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include: a) the health of ecosystems and the abiotic factors of a watershed; b) the location and structure of Virginia’s regional watershed systems; f) major conservation, health, and safety issues associated with watersheds; and g) water monitoring and analysis using field equipment including hand-held technology.
Scientific Investigation, Reasoning, and Logic 6.1	The student will plan and conduct investigations in which a) observations are made involving fine discrimination between similar objects and organisms; c) precise and approximate measurements are recorded; and h) data are collected, recorded, analyzed, and reported using appropriate metric measurements.

LIFE SCIENCE

<i>Content Standard</i>	<i>Description of Standard</i>
LS.4	The student will investigate and understand that the basic needs of organisms must be met in order to carry out life processes. Key concepts include: a) plant needs (light, water, gases, and nutrients); b) animal needs (food, water, gases, shelter, space); and c) factors that influence life processes.
LS.7	The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include: b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; and d) energy flow in food webs and energy pyramids.
LS.9	The student will investigate and understand interactions among populations in a biological community. Key concepts include: a) the relationships among producers, consumers, and decomposers in food webs; b) the relationship between predators and prey; c) competition and cooperation; d) symbiotic relationships; and e) niches.
LS.10	The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include: b) characteristics of land, marine, and freshwater ecosystems; and c) adaptations that enable organisms to survive within a specific ecosystem.
LS.11	The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time (daily, seasonal, and long term). Key concepts include: b) factors that increase or decrease population size; and c) eutrophication, climate changes, and catastrophic disturbances.

Maryland Voluntary State Curriculum

<i>Content Standard</i>	<i>Description of Standard</i>
6.B.1	Recognize and explain that human-caused changes have consequences for Maryland’s environment as well as for other places and future times.
6.1.c.	Identify and describe that ecosystems can be impacted by human activities. <ul style="list-style-type: none"> • Protection of the Chesapeake Bay watershed • Resource acquisition and use • Land use decisions (agriculture, mining, and development) • Recycling • Use and disposal of toxic substances
7.A.a.	Based on data identify and describe the positive and negative impacts of an increasing human population on the use of natural resources.
8.B.b.	Identify and describe how human activities produce changes in natural processes: <ul style="list-style-type: none"> • Climate change • Loss of habitat due to construction • Introduction of nonnative species • Cycling of matter

West Virginia Science Content Standards

6th Grade

<i>Content Standard</i>	<i>Description of Standard</i>
SC.S.6.3	Students will demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices.

7th Grade

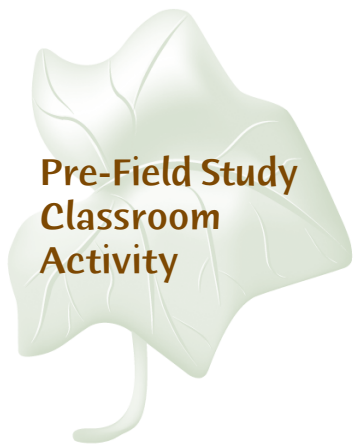
<i>Content Standard</i>	<i>Description of Standard</i>
SC.S.7.3	Students will: <ul style="list-style-type: none"> • explore the relationship between the parts and the whole system; construct a variety of useful models; examine changes that occur in an object or system. • demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices.

8th Grade

<i>Content Standard</i>	<i>Description of Standard</i>
SC.S.8.1	Students will demonstrate the ability to use the inquiry process to solve problems.
SC.S.8.2	Students will apply knowledge, understanding and skills of science subject matter/concepts to daily life experiences.
SC.S.8.3	Students will: <ul style="list-style-type: none"> • synthesize concepts across various science disciplines to better understand the natural world (e.g., form and function, systems, or change over time); • investigate, compare and design scientific and technological solutions to personal and societal problems; • and communicate experimental designs, results and conclusions using advanced technology tools.

Module Organizer

Potomac Gorge Activities		
Title	Goal(s)	Materials List (per group)
Pre-Field Study Activities		
The Potomac Gorge: A Natural Monument in the Shadow of National Monuments	Familiarize students with the unique biology, botany and geology of the Potomac Gorge and identify how humans impact the gorge inside, out of, and adjacent to its boundaries.	A copy of the introduction for each student or, if you prefer, a copy to be shared by a group of students.
History of the Potomac Gorge Through the Camera's Lens	To have students explore the natural and human history of the Potomac Gorge through photographs and text.	<ul style="list-style-type: none"> • 12 photographs of the Potomac Gorge, one for each group of children; • Accompanying descriptions of photographs • Explorers' Notes (one for each group) • For the extension, students will need Internet access
Gorgeous Gorge Game	To practice Leave No Trace principles and to get students familiar with the parks and destinations in the Gorge.	<ul style="list-style-type: none"> • Gorgeous Gorge Frontcountry information for each student or group • Game boards (11" x 17"), one for each group of four students • The Gorgeous Gorge Game cards and playing pieces (one set for each game board) • 1 die for each game board
Field Study in a National Park		
All Things are Connected	To engage students in the field study activity, to identify some of the ways human impacts affect organisms that live in the Potomac.	<ul style="list-style-type: none"> • Appropriate clothing • Adequate food and drink • All other materials provided
Data Collection	To assess human impact on a 20-meter stretch of trail in the park.	To be provided by BTW Educator
Post-Field Study Activities		
Impressions of Your Park Visit	To reflect on what you experienced at the park.	Index card & pencil for each student <i>Note: If time permits, this can be done at the end of the field study in the park, or on the bus ride back to school.</i>
Town Hall Meeting	To analyze data collected in field study and apply the findings of your analysis to the needs of an organism that lives in the Potomac Watershed.	<ul style="list-style-type: none"> • Data from field study • Critter card information • Map of study site (and surroundings) • Blank overhead transparencies (1 per group) • Transparency with park trail map and key landmarks printed on it (optional to lay under trail suggestions) • Transparency markers (each group draws their trail system in a different color)
Keeping the Gorge Gorgeous	Develop a product (podcast, bumpersticker, short video, audio) that encourages visitors reduce their impact on the Gorge and to help improve the Gorge.	<ul style="list-style-type: none"> • Field study data • Paper and pen, for scripting and colored pencils/markers if students are making posters or bumper stickers • Access to a computer & the Internet for research and audio/video production • Microphone to attach to computer for audio/video production • Video recorder



Pre-Field Study Classroom Activity

Goals:

Familiarize students with the unique biology, botany and geology of the Potomac Gorge and identify the how humans impact the Gorge inside, out of and adjacent to its boundaries.

Class Time:

45 minutes

Materials:

A copy of the Potomac Gorge Overview for each student or, if you prefer, a copy to be shared by groups of students.



The Potomac Gorge: A Natural Monument in the Shadow of National Monuments

E N G A G E M E N T

Background Information:

This activity provides students with a foundation for understanding the Potomac as a rugged but fragile environment, whose biological diversity is heavily impacted by the dense human population surrounding it.

After the students read the introduction, have them complete the following assessment.

Assessment Questions and Answers:

Why is the Potomac Gorge considered a natural monument among national monuments?

The Potomac Gorge is one of the most biologically diverse natural areas in the United States. Unlike other diverse ecosystems, like the Amazon, the Potomac Gorge is surrounded by millions of residents on both of its banks. It also flows past some of this country's most recognized landmarks and monuments.

What makes it such a remarkable ecological environment?

Over 1,400 different species of plants in the Gorge, including over 100 rare species and rare plant communities.

How much water do residents on both sides of the Gorge take from the Potomac each day?

Residents on either side of the Gorge take roughly 488 million gallons of water from the river each day

What reasons are given for the variety of natural communities that have developed over time?

A large number of natural communities have developed in the Potomac Gorge due to its location on the fall line between two physiographic regions — the Piedmont and the Atlantic Coastal Plain. In addition, the river's headwaters in the mountains transport seeds from plants in the mountains downriver, providing transportation of mountain species which take root in the Gorge as well.

Why is biodiversity important?

A variety of plant and animal species is critical for a healthy environment. If species on the lower end of the food web disappears, it won't be long before the diets of plants and animals higher up are negatively impacted.

Name three state rare or globally rare plant species.

Wild false indigo, buttercup scorpion-weed, and potato dandelion.

Why is the return of the American shad to the Gorge so important?

The American shad used to be plentiful in the Potomac and was critical to economic stability back in George Washington's day. A fish notch at Little Falls Dam now allows shad to migrate back up the river to the base of Great Falls. This return to the Potomac increases the biodiversity of the region.

What was the goal of the 2006 BioBlitz?

BioBlitz was a 30-hour survey period to find out which plant and animal species live in the Gorge.

What are some of the ideas for keeping the Gorge a healthy environment?

Some ideas for keeping the Gorge healthy including improving water quality, changing park trails to protect plants along the river's edge, and putting up deer exclosures to keep them from eating plants in the park.

History of the Potomac Gorge Through the Camera's Lens



Pre-Field Study Classroom Activity

Goal:

To have students explore the natural and human history of the Potomac Gorge through photographs and text.

Class Time:

45 minutes

Materials:

- Set of 12 photographs of the Potomac Gorge, one for each group of students.
- Accompanying descriptions of photographs.
- Explorers' Notes (one for each group)
- Each group will need someone to record answers
- For the extension, students will need Internet access

Special Considerations:

Depending on the background of the students, you may need to review the concepts of an ecosystem and genetic diversity. Students should have some understanding of how species become extinct.



Background Information:

In this pre-field study lesson, students will have a chance to take an armchair tour the Potomac Gorge using photographs. Some images illustrate the impact that animals have on the Gorge. Others, such as the picture of Boy Scouts camping along the C&O Canal towpath, tell you a bit about human impact. At the conclusion of the activity, each group will share its findings with the rest of the class, providing a brief lesson (based on their photograph) highlighting the history of this “natural monument among the national monuments.”

Procedure:

- Make a copy of each picture, the photo's corresponding notes and one Explorers' Notes sheet for each picture. Write a number on the photo (1 through 12) as well as its note sheet. This will make it easier to pair them up later in the activity.
- Divide the class into 12 groups of equal size.
- Provide each group with a copy of the Explorers' Notes and one of the images. Let the students work through the questions, up to the point where they are asked to read the information for the photo card.
- Hand out the background note sheet to each group. Have them go back over their sheet and finish — or revise — their answers based on the information provided.

Assessment:

When all the groups have completed their notes, take the last section of the class to have groups make brief presentations about their assigned photos. You might want to write a couple of questions on the board for students to answer:

- Describe the picture for the class.
- Explain what this has to do with the Potomac Gorge.
- What did you learn, from this picture, about the Gorge that you didn't already know?

Extensions/Modifications:

You might have the students do a more in-depth lesson using their pictures. The group with the picture of Great Falls Tavern might do a bit more research into the river as transportation or how the railroad quickly made this mode of moving goods from one part of the country to another obsolete. Students with the picture of the BioBlitz can do further research on the biodiversity of the Gorge.

Gorgeous Gorge Game

Pre-Field Study Classroom Activity

Goals:

To practice the Leave No Trace principles to understand how to minimize impacts to parks and other frontcountry destinations.

Class Time:

40 minutes

Group Size:

Groups of 3–4 students

Materials:

- Gorgeous Gorge Frontcountry information for each student or group
- Game boards (11" x 17"), one for each group of four students
- The Gorgeous Gorge Game cards and playing pieces (one set for each game board)
- 1 die for each game board



Background:

What is the frontcountry? The best description comes from the Leave No Trace Center for Outdoor Ethics which developed the guidelines:

“Although the genesis of the Leave No Trace program is along wilderness trails and backcountry campsites, studies have shown that the majority of outdoor use occurs along open space trails, in urban and state parks and in established campgrounds. In an effort to address the explosive use of America’s “frontcountry” or day-use areas, the Leave No Trace Center for Outdoor Ethics has expanded its educational focus to include these sites. The Leave No Trace Frontcountry Program, developed in cooperation with land managers, has experienced significant growth over the past few years. Land managers at several sites have worked closely with the Leave No Trace Center for Outdoor Ethics to tailor local Leave No Trace education programs.”

Procedure:

Get Students Thinking About Parks:

Start the lesson by asking students about their visits to local parks? Do they visit any parks? Do they have favorites? What do they like to do when they go to a park? You might ask if they’ve ever heard the terms “backcountry” and “frontcountry.” You might define these for students so you start to build on a common language for the remainder of the module. The backcountry refers to areas inaccessible by car and where backpackers bring everything they’ll need for a few days or a few weeks — including food, emergency supplies, tent, sleeping bag, etc. The frontcountry, as described above, refers to areas when people take day hikes or where they are able to drive and offload tents, food, etc.

Hit the Highlights of the Leave No Trace Frontcountry Ethic:

- You will want to ask students for their understanding of what “ethic” means. (An ethic could be considered a code of conduct that encompasses the “right” or “wrong” way to behave.)
- The game will provide opportunities for students to discuss/debate the bulleted points, but you might want to discuss the seven main categories. Leave No Trace — Outdoor Ethics for Frontcountry is provided in the Resource Guide.

Play the Game:

- Divide the class into groups of four and hand out board games, sets of cards, playing pieces, and dice.
- Students roll their die. If the square they land on instructs them to pick a card, have them do so and then discuss possible answers to the question posed.
- Possible answers to the questions are provided in the following pages.
- When everyone has completed the game, move on to the assessment.

Assessment:

Ask students to list three ways in which people can minimize their collective impact on the Potomac Gorge.

Possible Answers to the Game Cards

Know Before You Go

How should you dress for the day if you don't know what the weather will be?

In order to know what to wear, check the weather first. If there's a chance of change in weather, dress in layers and peel off — or put back on — as needed.

Some of the trails on Bear Island and other places can be tricky. What do you need to bring with you to keep from getting lost?

A park map is a good insurance policy against getting lost.

What research should you do before biking the C&O Canal towpath? Where can you stay if you want to make it an overnight adventure?

You can go online and get information about the trail, mile by mile, and where you can pull off the trail. You can also get good information about where to camp along the way.

What research should you do before hiking the Billy Goat Trail on Bear Island?

You'll want to know what kind of shoes to wear, how long the trail is, whether you need to bring food and water, and how much time to allow.

You want to bring your dog, but pets can trample all over plants and small critters without trying to. How will you keep your dog on the trail?

The best way is to keep your dog on a leash.

It's a warm April day and you want to rent a kayak to paddle around Theodore Roosevelt Island. Can you? How would you find out?

You might look online and see where you can rent a boat. Even if the day is warm, the water will still be cold. You might ask an experienced kayaker for advice.

Animals poop in the woods, so why can't your dog do it? Isn't all poop pretty much the same?

If you have a lot of dogs visiting an area, this adds up to too much poop. Bring a bag and pack it out.

Does the Great Falls Tavern still serve ale to weary travelers? Why is this building so historic?

The Great Falls Tavern was built to provide shelter for the workers who built the canal. Also, people traveling by boat along the canal could stop in here as well. The tavern doesn't sell ale any more. Now it's an office for the National Park Service rangers.

What tools can you use to learn about the area you're visiting?

You can learn about an area through maps, historic information, and local newspapers to name a few.

Who actually owns the Potomac River. Do Virginia and Maryland split it right down the middle?

The Potomac River is owned by many jurisdictions, including Maryland, Virginia and Washington, D.C.

Locate Ft. Marcy on your map.

Locate Bear Island on your map.

Locate Theodore Roosevelt Island on your map.

Locate Chesapeake & Ohio Canal National Historical Park on your map.

Locate Great Falls Park on your map. Mather Gorge is popular with highly experienced kayakers. Find it!

What is the “fall line,” and how does it impact the kinds of plants you find in the Potomac Gorge?

The fall line is where the Piedmont Plateau meets the Atlantic Coastal Plain. Because these two distinct provinces are so close together, it results in rare combinations of plants not typically found in the same area.

Stick to Trails and Camp Overnight Right

Where should you walk when hiking through any of the parks along the Potomac Gorge?

Only walk on established trails.

What would happen if you camped on a place you weren't supposed to?

If you camped anywhere, you could kill plants, displace animals, and harm a beautiful area where other people like to visit.

Does it really matter where to pitch your tent if you go camping? It's all woods, isn't it?

Well, in the frontcountry, there are so many people that it wouldn't be long before all the woods looked like a campground.

Why do they say you can't pick flowers or take home any rocks or shells?

If everyone did it, or even just a few of the 2 million visitors to the Gorge, soon there wouldn't be any pretty flowers or shells or neat rocks left.

You want to build a lean-to by your tent. The ranger asked you not to. What's the big deal?

Leave it as you find it. Collecting materials to create a shelter takes them away from wildlife that may use the materials for shelter, food or other habitat needs.

What “rules of the road” do you need to know when riding your bike in the Gorge?

When biking in the Gorge, stay on the trails and let people pass on your left.

Should you blaze your own trail and set up camp where ever you want?

No, that would ruin the beauty of the place you love.

Where should you ride your bike when riding through a National Park?

Only ride your bike on trails marked for bikes.

Should you step on flowers or small trees? What will happen to them if you do?

If you kill young plants now, you won't have any older plants later.

The public areas owned by the National Park Service are right next to private property. What's the big deal if you wander onto someone's private land?

None of us likes people tramping through our yard. So, jst because your yard is next to a park doesn't mean its parkland. Be respectful.

Trash Your Trash and Pick Up Poop

They say that I should pack my trash in and out. It's a big place. Why does one little candy wrapper matter?

First it's your wrapper, then my wrapper, and then a few other kids' wrappers. See where this is headed?

What should you do with crumbs, peels, and cores when you're in the woods?

Pack your trash out of the park.

What should you do if there's not a bathroom or outhouse near or on your campsite?

Check first before your visit for the closest location of a bathroom and plan accordingly. Before you go into the backcountry or remote areas, check with a ranger about backcountry bathroom etiquette.

What should you use to pick up your pet's poop?

You should pick up dog poop with a bag, which you probably brought along because you love picking up after your pet in the park.

Sometimes the porta-potties are so stinky. What's the big deal if I pee in the woods?

Your pee isn't good for plants. Plug your nose and use the porta-potties.

Should you keep the water clean? Why or why not?

Definitely keep the water clean! People, plants and animals are all healthier when they have access to clean water.

Should you wash your face with soap in the river or any body of water?

Never wash your face in the river.

Won't animals eat my apple cores and bread crusts? Why do I have to pack that stuff out with me?

Sure, they'll eat your trash. But this isn't a healthy diet for animals and, worse, they might come to expect people to feed them. Animals do best when they forage for their own food.

Should you pee or poop in any body of water?

Not unless it's in the toilet.

Should you dump your pet's poop in any body of water?

No, this spreads germs and disease. Bring a bag and take it home.

Leave It as You Find It

You see a family walking off with big rocks in their arms. Do you tell them to stop, tell a ranger or just let it go?

If you see people taking things from a park, the best thing to do is to find a ranger. Sometimes people get angry when you point out that they're doing something wrong. Rangers are trained to talk with people in parks.

That plant looks like something your mom would like in her garden. Why not just take it home with you?

It belongs here in the park. If everyone took something, there would be nothing left.

They said that all the arrowheads have been discovered, but you just found one. Why not just tuck it in your pocket?

Everything in a park is federal property. It is illegal to take something from the park. Besides,

if you do, no one else may ever see the cool arrowhead you found. So, take a picture of it and leave the arrowhead where you found it.

You're not supposed to carve your initials in a tree. Kids have been doing this for generations! What's the big deal now?

This is a park. Defacing property is against the law. In addition, bark is like skin to a tree. Trees can get infections from open wounds, just like you can.

You want to drag a log out of the woods to sit on while you eat your lunch. Your teacher says no. It's not like you're hurting anything. Right?

Yipes! Think of all the little bugs and other critters who make this home. And, think of all the plants you might kill walking back and forth to get the log. Listen to your teacher and look for a picnic table.

Be Careful With Fire

It's a park with plenty of dry wood for a fire. Why pack a camp stove when you can just use the wood that nature provides?

There's only so much wood in the park. There is not enough for everyone plus the animals that need the wood for food and shelter. So bring your camp stove.

Should you build a campfire before checking if it's safe?

Check with a park ranger before you start a fire. Sometimes, when it's been especially dry, there will be a ban on fires. Plus, many parks don't allow campfires at any time.

You cooked too much dinner for everyone. What about burning the leftovers in the fire?

Fires are not garbage cans. Pack your leftovers back out with you.

Big bonfires are so cool. So, why not have a rip-roaring fire that shoots sparks up to the tree tops?

Even if you have a bucket of water, it is very difficult to put out a fire that is high up in a tree. Your fire could start a larger forest fire.

There's a fire ring at your campsite, but you want to build a fire closer to your tent. What's the best choice?

Choose the fire ring. It's far enough away so that you won't risk catching your tent on fire.

Should you throw your trash into the campfire? That way, you don't have to pack it out?

Pack it out. Your campfire isn't a garbage can.

Is it okay to gather firewood at your campground? How would you find out?

Ask a ranger either before or during your visit.

Should you leave your fire unattended? Why or why not?

Fires can get out of control very quickly. Never leave them unattended.

Should you burn all your wood to ash before you leave? Why?

Yes, you should. You want to make sure that your fire is completely out and there's nothing left to catch on fire.

There are still a few glowing embers in your campfire. But, it is really late and you're tired. Do you stay up or just hope that it burns itself out?

Spread the embers out in the fire pit. Then wait until they are cool. Oh, and enjoy the stars in the sky while you're waiting!

Keep Wildlife Wild

We all want to be the kind of people who can earn the trust of wild animals. Is it a good idea to get close to a wild animal?

Enjoy the deer and other wildlife from a distance.

What's the best way to observe wildlife, like deer?

From a distance.

How should you secure your food when you're camping?

If you're car camping, put your food in your car. If not, make sure that it is out of reach of animals.

Should you follow wild animals?

Only with your eyes.

How should you secure your trash when you're camping?

In bags or sealed containers.

Share Our Trails and Manage Your Pet:

What should you do when passing others on the trail? Why?

Stand to the side to let people pass.

Why should you keep your pet under control?

First of all, you will protect your pet. Also pets can scare away wildlife with their scent, noise and even just by being there.

Why should you listen to nature?

It has a lot to say.

Should you avoid making loud noises or yelling while in the forest? Why or why not?

Loud noises scare animals away, so you won't see as much stuff.

Why is it good not to bother anyone else?

Most people come to the woods get away from things that bother them.

Why do you think other visitors are there?

Visitors seek out parks for many reasons, including wanting to find a quiet way to enjoy the natural world, a good spot to enjoy some exercise, or a place to learn more about nature.

Why do you see more wildlife if you are quiet?

Animals won't be scared off.

What are good cellphone manners when hiking (Hint: Think movie manners.)

Silence your phone.

What is a trail blaze and what does it do?

A trail blaze is usually a painted line on a tree or a metal marker, which lets you know if you're on the right path.

Visit the Parks

Plan Wisely for Your Students' Field Study in the Park



Goal:

To help students plan and prepare for their field study in a national park.

Background Information:

It is crucial that all students be prepared for the field study in the park. For many students, working outdoors will be an unusual and challenging experience. The information in this section should be reviewed carefully with the class to help them prepare mentally for the field study and to ensure that they have the appropriate dress and supplies to be successful in the park. It may be beneficial to review this information several times before the park visit to be sure all students understand the required preparations and plan well for their visit.

Before the trip to a park, review the information about the field study in the Student Booklet and the Resource Booklet.

Be Prepared for Your Visit:

Students need to be *dressed appropriately* and have *adequate food and drink*. Expensive clothes and shoes are not appropriate for work in the out-of-doors, and wearing these expensive items makes students reluctant to engage in field studies. Advise students not to wear skirts, shoes with high heels, or sandals.

The BTW educator will have all the other supplies for the field study activities. Students do not need to bring Student Booklets, Resource Booklets, or data collection sheets; all materials will be available in the park.

Park Information:

Students can review information about the park on the *Bridging the Watershed* web site at www.fergusonfoundation.org to gain an understanding of the park's location and other pertinent information.

Things to Bring

- There will be no place to buy food. Students must bring a bag lunch and plenty to drink, preferably water.
- The hotter the weather, the more students should bring to drink. Have students pack their lunches and drinks in backpacks or bags that they can easily carry into and out of the park study site.
- Keeping in the ecology-minded spirit, suggest that students make their lunch as trash-free as possible. Some areas and parks have no trashcans. What is packed in must be packed out. Remember, there is nothing beautiful about trash.
- Make sure that students bring sunscreen and insect repellent.

Park Stewardship

- Remind students that no collecting of any type is permitted.

- Remind students to take only photographs and leave only footprints.

Tips about Clothing

- Students should wear comfortable clothing that allows them to easily move, hike, bend, and climb. Students may have to gather data in a wet and muddy environment, so they should choose clothes they don't mind getting wet and dirty.
- Dress for the weather. In cool weather, have students wear layers of clothing to keep them warm in the early morning, but that they can remove later in the day or while working. If the forecast calls for possible rain, students should wear a waterproof jacket, hat, and shoes, and bring a plastic bag for materials.
- Even in warm weather, have students wear long pants and a long-sleeved shirt for protection from poison ivy and briars. Students may be in a wooded area or walking through tall grass.

Potomac Gorge Field Study

E X P L O R A T I O N

Field Study in a National Park



Goals:

To allow students the opportunity:

- To identify the relationship between humans and natural resources.
- To determine how human behavior in protected areas can help or hurt an ecosystem.

Class Time:

Field Study will be completed in a single 4-hour visit to a national park.

Group Size:

Students will be divided into groups of four. Your BTW educator will contact you, in advance, to discuss whether you will pre-select the groups or if you will have the educator divide groups up at the study site.

Materials:

Provided by BTW Staff

Field Study Objectives:

Students will:

- Identify the location of the park in the Potomac River watershed to understand the impact land use in the watershed can have on data gathered in the field study.
- Create a detailed sketch and description of the field study site.
- Name at least one way that humans have an effect on an organism that lives in the Potomac Gorge.
- Name at least one link in a Potomac Gorge food web.
- Explain one way or reason that individual behavior can affect the Potomac Gorge.
- Use an appropriate tool (tape or stick) to measure distance.
- Observe fine levels of details in a natural setting.
- Calculate an index of human impact on a park.
- Explain why the study site is a national park.



Reflect on Your Park Visit

E X P L A N A T I O N

Post-Field Study Classroom Activity

Goal:

To reflect on your experience in the park.

Class Time:

45 minutes

Group Size:

Individual

Special Considerations:

Encourage students to think about how their experiences in this module, particularly the park visit, have influenced their thinking about the world, their relationship to the world, and how their future choices can impact the world.

Note:

Writings, poems, and other forms of written expression should demonstrate that students have thought about the personal meaning of the park visit. Students should recognize and reflect upon a personal connection to the world in which they live and a responsibility to the environment.



Background Information:

An individual who believes that he/she is powerless to make changes in society is unlikely to act as a responsible citizen. Traditionally, in the field of environmental education, it was thought that behavior could be changed by making humans more knowledgeable about the environment and its associated issues. We have since learned that knowledge alone is not enough.

A newer approach suggests that a more complex dynamic creates the underpinnings for a person to act in a more desirable and responsible manner toward the environment. One variable in this newer approach that is a good predictor of behavior is environmental sensitivity, the empathic link with the environment. Providing students with the opportunity, in the field and in the classroom, to reflect and articulate a perceived experience is important to help students frame or reframe their thinking. The ability to connect to personal, internalized perceptions is not easy. Students must be open to their feelings and allow the time for these perceptions to surface. In addition, teachers must permit students the opportunity to convey these perceptions in whatever form of written expression that comes most naturally to them.

National parks are powerful places that educate, inspire, and provoke thought. They are powerful because they are relevant to our daily lives and speak to our very existence. Each park represents meanings that transcend its physical existence and therefore acts as an icon or window that focuses attention on some larger essence. When we visit a park, the meanings that pervade our day-to-day lives become more immediate and accessible. Parks provide the opportunity, in a very personal way, to ponder and experience the nature of life and the world in which we live...

—Ranger David Larsen, NPS Interpretive Specialist, Harper's Ferry, WV
The Power of Place: Teaching with National Park Resources

Procedure:

The reading above is one person's reaction to being in a national park. Now think about how you feel regarding your experience in the park. Write about the meaning this experience has for you and your future choices. Your reflection could be in the form of a paragraph, poem, letter, newspaper article, story, rap, song, or nature journal (i.e., words and drawings that capture a sense of place).

Town Hall Meeting

E L A B O R A T I O N

Post-Field Study Classroom Activity

Goals:

To analyze the data collected in the field study.

To apply the findings of data analysis to the life of an organism that inhabits the Potomac Gorge.

In this lesson students will...

- Calculate the score for the section of trail analyzed.
- Compare the score to an index.
- Assess the data collected from the perspective of one organism that inhabits the Potomac Gorge.
- Work with other students to develop a management plan for the trails in the Potomac Gorge.

Class Time:

Two 45-minute periods

Materials for Each Group:

- Data from field study
- Critter card information
- Map of study site and surroundings. (BTW educator will provide this at the field study)
- Blank overhead transparencies (1 per group)
- Transparency with park trail map and key landmarks printed on it (optional to lay under trail suggestions)
- Transparency markers (we suggest that each group draw their trail system in a different color)



Background Information:

The National Park Service preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. One of the principles by which NPS does this is by making “wise decisions: Integrating social, economic, environmental, and ethical considerations into the decision — making process.”¹

Students will be asked to make a wise decision about the trail system in the Potomac Gorge. You know that many people use the Gorge for recreation — running, walking, cycling and many other pursuits. You have also seen many of the critters that call the Gorge home, and know what they need to survive. The National Park Service has to balance the needs of all the users of parkland to come up with a good management plan for each site. This includes laying trails out in a way that creates the least harm or the most good to the largest number of people. A trail may even have to be closed in extreme circumstances — if, for example, an endangered bald eagle is nesting near it and could be disturbed by the trail traffic. The layout of the trail can be designed to reduce the likelihood of the creation of social trails. For example, a trail system should include several ways to reach good overlooks to reduce the possibility that people will create their own trails to go catch a glimpse.

Making a wise decision involves balancing the needs of all the critters that live in or use the Potomac Gorge.

Procedure:

- Divide the students into their field study groups. Provide each one with a critter card information, park map, blank overhead transparency, and a marker. Each group should have a different colored marker for their organism.
- Have groups calculate the score for their study sites. How does that score compare to the overall index of trail health? Are you concerned about the impacts on your critter?
- Look at your raw data. What impacts in particular (even if your overall index score is pretty good) can you see that would affect your plant or animal?
- Look at the trail map. Does the current trail system best suit your organism?

¹“U.S. National Park Service Mission.” U.S. National Park Service – Experience Your America. Web. Accessed 8 Dec. 2008. <http://www.nps.gov/aboutus/mission.htm>

- How can each group change the design of the trail system to be more advantageous? Lay the transparency over your map and draw a new trail system for your organism.
- Write a short justification of your trail system — where does it take humans (consider the views and destinations)? Is there anything in particular that it will avoid?

Now gather the class together.

- Put your map on an overhead sheet.
- Have each group come up, one at a time, and lay their transparencies on the trail map.
- How much overlap is there between the different trail systems?

Now come up, as a group, with a trail system that works for everyone.

Keeping the Gorge Gorgeous

E V A L U A T I O N

Post-Field Study Classroom Activity

Goals:

Create effective tools (podcast, short video, simple audio, bumper sticker) for students to communicate one or more of the Leave No Trace principles to Potomac Gorge visitors. The focus is on reducing human impact and improving the Gorge for the plants and animals that live there.

Class Time:

45 minutes

Group Size:

Students can work individually or in small groups

Materials:

- Field study data
- Paper and pen, for scripting
- Colored pencils/markers if students are making posters or bumper stickers
- Access to a computer & the Internet for research and audio/video production
- Microphone to attach to computer for audio/video production
- Video recorder



Background Information:

We've all seen the signs, "Please Do Not Leave Blazed Trails," with the words "Your footsteps could be deadly?" The signs explain that walking wherever you please harms rare species of plants and animals. You'd think that this would be clear enough. But, as you saw on your field trip, these signs don't seem to be doing the job. The big problem is that visitors to any of our parks only consider the impact of their own feet, which doesn't look very bad. Besides, what difference does it make if just one person does this? Well, with 2 million visitors to the Potomac Gorge each year, if even 1% of visitors decide to venture off the beaten path, that's 20,000 people each year who are trampling the Gorge's wildlife.

One of the other big problems is dog poo. Lots of people just leave it along the trail. The problem is that it isn't a natural part of the environment so it creates all kinds of health hazards to the native wildlife and to humans.

Procedure:

- Provide students with the background information from student booklet.
- Have them reflect on their recent visit. Did they make a difference? If you were hiking with friends, would you stay on trails? Pick up your trash? If they wouldn't, why not? Tell the students to be honest; their answers will help them complete this assignment. Write their answers on the board, as this is a good starting place for the activity.
- Explain that they have been asked to create signs, youtube video/podcast, simple audio, or some other communications tool to get the word out about keeping the Potomac Gorge healthy. They can create it from a human perspective or from the view of the plant/animal they were assigned at the field study. It can be from an historical perspective or current. Leave it fairly open-ended. Some students might want to write a song, others might create something most succinct like a bumper sticker. Whether you have them work independently or in small groups is up to you.

Assessment:

The students' projects are really the assessment tool for judging how well they synthesized the field study results with their overall understanding of the Potomac Gorge.

If your students do produce a public service announcement or post a video to the web, please let us know. We would love to know what this lesson has inspired in your students. Your BTW educator will provide you with information on how to share your students' materials.