

# SOIL EXPLORATION



*Ranger Led  
Program*

THEME: Soils

GRADE LEVEL: Sixth, Seventh, or Eighth grade

BEST TIME TO PLAN TRIP: Spring or Fall

## UNIT RATIONALE

Soils are the literal foundation of life in Great Smoky Mountains National Park. As a habitat, an influence on the climate of micro-niches, a sponge for rainfall, a surface for plant and tree growth, soils are a valuable resource. Students are often unaware of the biotic and abiotic factors of soils. This field experience allows classes to explore the elements of a deciduous forest with emphasis on the world below their feet. Using scientific measuring tools, collecting techniques and examinations of forest life with a microscope, students have an opportunity to realize the relationship between macro-invertebrates and their environment.

## STATE CURRICULUM STANDARDS - TENNESSEE

### SIXTH GRADE

#### SCIENCE

##### Embedded Inquiry

- SPI 0607.INQ.2
- SPI 0607.INQ.3
- SPI 0607.INQ.4
- SPI 0607.INQ.5

##### Interdependence

- SPI 0607.2.1
- SPI 0607.2.2
- SPI 0607.2.3
- SPI 0607.2.4

#### ENGLISH

##### Communications

- SPI 0601.2.4
- SPI 0601.2.5

### SEVENTH GRADE

#### SCIENCE

##### Embedded Inquiry

- SPI 0707.2
- SPI 0707.3
- SPI 0707.4
- SPI 0707.5

##### Earth and Space (The Earth)

- SPI 0707.7

#### ENGLISH

##### Communications

- SPI 0701.2.7
- SPI 0701.2.8

### EIGHTH GRADE

#### SCIENCE

##### Embedded Inquiry

- SPI 0807.2
- SPI 0807.3
- SPI 0807.4
- SPI 0807.5

##### Biodiversity and Change

- SPI 0807.5.1
- SPI 0807.5.2
- SPI 0807.5.3
- SPI 0807.5.4

##### Physical Science (Matter)

- SPI 0807.9.12

#### ENGLISH

##### Communications

- SPI 0801.2.7
- SPI 0801.2.8





## SIXTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0607.Inq.2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0607.Inq.3 Interpret and translate data in a table, graph, or diagram.

SPI 0607.Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0607.Inq.5 Identify a faulty interpretation of data that is due to bias or experimental error.

#### Interdependence

SPI 0607.2.1 Classify organisms as producers, consumers, scavengers, or decomposers according to their role in a food chain or food web.

SPI 0607.2.2 Interpret how materials and energy are transferred through an ecosystem.

SPI 0607.2.3 Identify the biotic and abiotic elements of the major biomes.

SPI 0607.2.4 Identify the environmental conditions and interdependencies among organisms found in the major biomes.

### ENGLISH/LANGUAGE ARTS

#### Communication

SPI 0601.2.4 Select the most appropriate behaviors for participating productively in a team (e.g., contribute appropriate and useful information and ideas, understand the purpose for working as a team, understand the responsibilities of various roles within the team).

SPI 0601.2.5 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).

## SEVENTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0707.Inq.2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0707.Inq.3 Interpret and translate data in a table, graph, or diagram.

SPI 0707.Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0707.Inq.5 Identify a faulty interpretation of data that is due to bias or experimental error.

#### Earth and Space Science (The Earth)

SPI 0707.7.7 Analyze and evaluate the impact of man's use of earth's land, water, and atmospheric resources.

### ENGLISH/LANGUAGE ARTS

#### Communication

SPI 0701.2.7 Select the most appropriate behaviors for participating productively in a team (e.g., ask primarily relevant questions that move the team toward its goal and contribute to the topic of discussion, articulate the goals that have been provided for the team work and ask clarifying questions, come to agreement by seeking consensus or following the majority).

SPI 0701.2.8 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).





## EIGHTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0807.Inq.2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0807.Inq.3 Interpret and translate data into a table, graph, or diagram.

SPI 0807.Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0807.Inq.5 Identify a faulty interpretation of data that is due to bias or experimental error.

#### Biodiversity and Change

SPI 0807.5.1 Use a simple classification key to identify an unknown organism.

SPI 0807.5.2 Analyze structural, behavioral, and physiological adaptations to predict which populations are likely to survive in a particular environment

SPI 0807.5.3 Analyze data on levels of variation within a population to make predictions about survival under particular environmental conditions.

SPI 0807.5.4 Identify several reasons for the importance of maintaining the earth's biodiversity.

#### Physical Science (Matter)

SPI 0807.9.12 Identify the basic properties of acids and bases.

### ENGLISH/LANGUAGE ARTS

#### Communication

SPI 0801.2.7 Select the most appropriate strategies for participating productively in a team (e.g., gain the floor in orderly ways, meet or set deadlines for completing each task, come to agreement by seeking consensus or following the majority).

SPI 0801.2.8 Identify the functions and responsibilities of individuals within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).



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# PLANNING A SUCCESSFUL TRIP

## SOIL EXPLORATION



### SCHEDULE FOR A DAY OF ACTIVITIES IN GREAT SMOKY MOUNTAINS NATIONAL PARK

- Arrive at Twin Creeks Science and Education Center for restrooms and to meet rangers
- On-site activities with lunch in between activities
- Reload bus and return to school

### Planning a Successful Trip

- The location for this trip is at the Twin Creeks Science and Education Center, located near Gatlinburg.

#### Directions:

- Turn at traffic light #8 (can only turn one way) onto Airport Road/Cherokee Orchard Road/Roaring Fork Motor Nature Trail.
  - Continue for 2 miles (stay to right on Cherokee Orchard Road at intersection with Park Vista Hotel).
  - Turn right at sign for Twin Creeks Science and Education Center.
  - Science and Education Center will be on your left.
  - Take first right (toward picnic pavilion) and park at pavilion or in bus parking along road (cars can park in gravel lot on right)
- There is no cost to use this site.
  - Arrange to have a teacher or chaperone available for every 10 students.
  - Safety is of the utmost importance, especially in a National Park. Be sure to read the safety



# SAFETY CONSIDERATIONS AND OTHER IMPORTANT INFORMATION



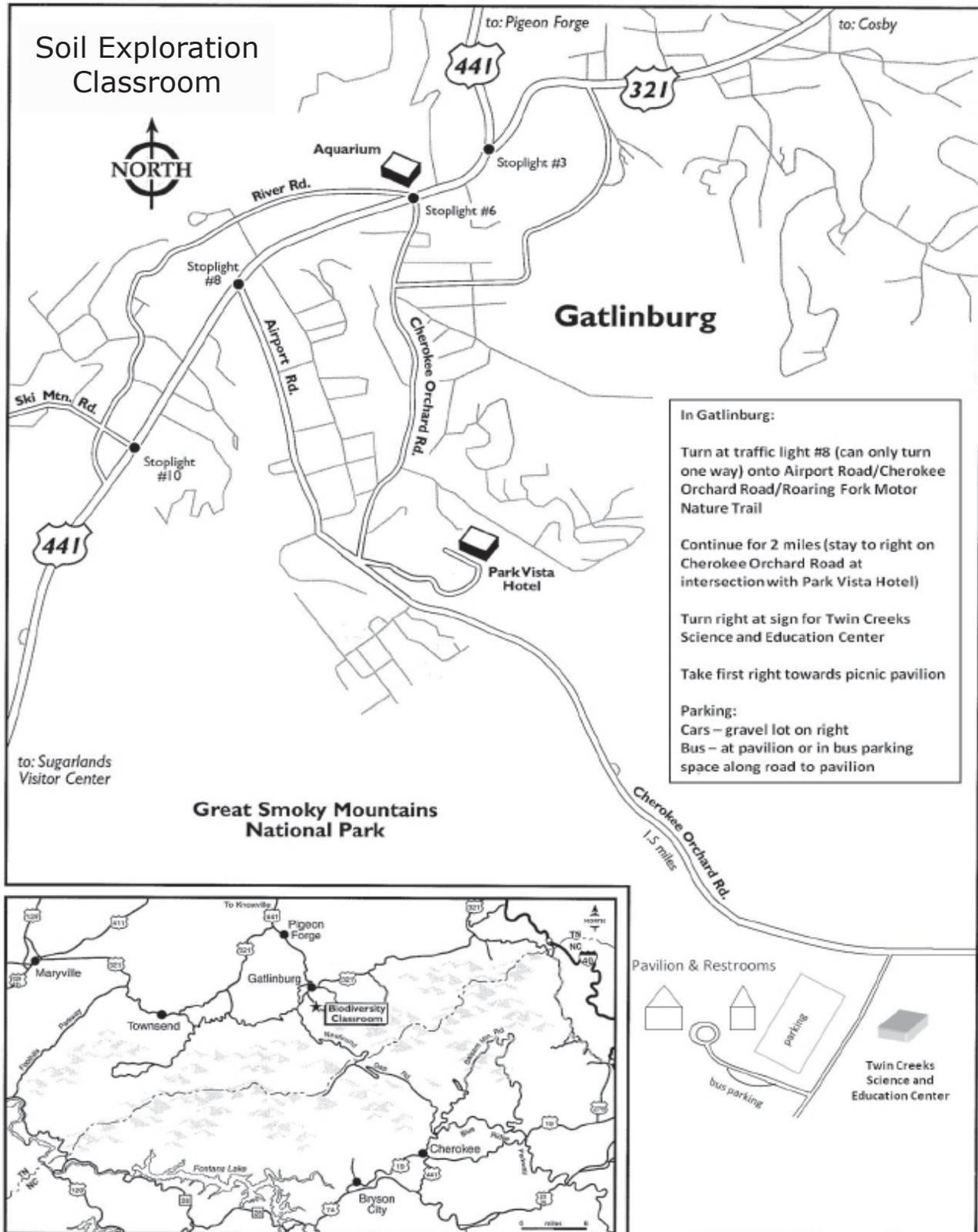
- Great Smoky Mountains National Park is a federally protected public use area. Please help the rangers keep all of the plants and animals protected in the park by not picking the plants or taking anything from the park.
- Please remind your students to wear appropriate footwear and clothing for this extended outdoor experience. Flip flops, slip-on shoes, or sandals are not appropriate for the program.
- Temperatures in some parts of the park can be 10-15 degrees colder than at your school. Long pants and layers are suggested for the program. Pants are the best precaution against cool temperatures, bee stings, ticks, and poison ivy.
- Within the park, cell phones are not always reliable. Rangers will follow the on-site agenda. If an unexpected problem occurs, rangers do carry park radios to make contact with the park dispatch office. For non-emergencies, call the Park Ranger dispatch at 865-436-1230 or contact a park employee.

## Animals and Plants of Concern in the park

- All animals in the park are wild and their behaviors are unpredictable. Treat all animals with caution.
- Venomous snakes - Two species of venomous snakes live in the Smokies, the copperhead and timber rattlesnake. Students should be cautious where they place their hands and feet.
- Insects - Yellow jacket wasps are the insects of greatest concern. They build nests in the ground along trails and streams and are aggressive when disturbed. Stings cause local swelling and can lead to severe allergic reactions in sensitive individuals. Such persons should carry epinephrine kits.
- Poison Ivy - Poison ivy is a three-leaved plant which can grow on the ground as well as on “hairy” vines up trees. To avoid chances of an allergic reaction wear long pants, stay on trails, and avoid direct contact with vegetation. If contact occurs or is a concern, wash affected parts in cold soapy water immediately.
- It is extremely helpful to rangers leading the program for students to wear clearly labeled name tags with first names only.
- Pets are not allowed on most park trails. Please do not bring them on the field trip.
- For more information about the park (Things to Know Before You Come) please visit the park’s website: <http://www.nps.gov/grsm/planyourvisit/things2know.htm>



# MAP TO TWIN CREEKS



# ON-SITE ACTIVITY

## PARK RANGER DIRECTED LESSONS



**Grade Level:** Middle School

**Subject Area:** Science

**Activity Time:** 3 hours

**Class Size:** Maximum of 50 students

**Setting:** Outdoors and Indoors

**Skills:** Analyzing; Classifying; Gathering information; Listing; Listening; Measuring; Observing; Recording data

**Vocabulary:** abiotic; bias; biodiversity; biotic; invertebrates; pH; soil

**Objectives:** Students will explore the soil in Great Smoky Mountains National Park to learn about the biotic and abiotic factors in the environment.

**Materials:** Study equipment provided by park rangers

### **Background:**

The following is a brief description of your on-site activities. These activities will be led by park staff, but please be familiar with them, as the classroom teacher may be asked to assist on-site.

### **Invertebrate Inventory (1.5 hours)**

The park ranger will demonstrate various scientific tools to assist in conducting an insect inventory. In small groups, students will explore the biotic factors of the deciduous forest floor. A few sample invertebrates will be taken to the Twin Creeks Science and education center for further examination through microscopes.

### **Soil Properties (1.5 hours)**

Students will work in small teams to record properties of soil. The abiotic factors such as pH, temperature, consistency and moisture will be examined in an effort to uncover why Great Smoky Mountains National Park is a biological hot spot for diversity.



# POST-SITE ACTIVITY

## MAKE THE CONNECTION!



**Grade Level:** Middle School

**Subject Area:** Science

**Activity Time:** as time allows

**Setting:** In classroom

**Skills:** Analyzing; Comparing; Contrasting; Describing; Discussing; Presenting; Researching

**Vocabulary:** Varying vocabulary depending on organisms selected

**Objectives:** To further expand students understanding of the relationship between biotic and abiotic factors in the environment.

**Materials:** internet or library access

### Procedure:

While visiting Great Smoky Mountains National Park, students explored the relationships between biotic and abiotic factors of the environment. To expand upon their experience, place students into small teams to conduct further research. Ask students to pick three organisms from the following list that live in the national park.

Using the internet, allow each team to research their choices and identify the following:

A.) What does each organism eat?

B.) What eats or preys upon each organism?

C.) What happens to each organism when seasons change in a deciduous forest?

D.) Connect the three organisms in a relationship (this could be their placement in a food web, their habits within the ecosystem, a comparison of shelter etc).

Once information has been gathered, ask students to illustrate the connections between their organisms with the rest of the class. Students may do this through drawings, skits, or other creative measures.

American Beaver

American Bull Frog

Bald Eagle

Black Bellied Salamander

Black Rat Snake

Brook Trout

Bumblebee

Centipede

Common Snapping Turtle

Corn Snake

Coyote

Deer Mouse

Dobsonfly

Eastern Box Turtle

Eastern Cottontail

Eastern Garter Snake

Eastern Gray Squirrel

Elk

Firefly

Five-lined Skink

Land Snails

Meadow Vole

Millipede

Mink

Monarch Butterfly

Northern Cardinal

Northern Copperhead

Raccoon

Red-shouldered Hawk

Red-spotted Newt

Red Squirrel

Screech Owl

Stonefly

Striped Skunk

Timber Rattlesnake

Walking sticks

White-tailed Deer

Wild Turkey

Wood Frog

Wood Roach



# POST-SITE ACTIVITY

## STEWARDSHIP



**Grade Level:** Middle School

**Subject Area:** Science

**Activity Time:** 30 minutes

**Setting:** Classroom

**Skills:** Applying;  
Communicating; Connecting

**Vocabulary:** conservation;  
protection; stewardship

**Objectives:** To understand what the term “Stewardship” means and how students can become a steward in their school and their community.

**Materials:** Internet access

**Procedure:**

To view the Stewardship podcast video go to

<http://www.thegreatsmokymountains.org/eft/10modules.html> Turn the microscope knob that appears on the computer screen to Section 7, Backyard Stewardship. Click “Watch Video” and view video. Ask students how they can become stewards within their own school and community.



# POST-SITE ACTIVITY

## EXPLORE YOUR NATIONAL PARKS



**Grade Level:** Middle School

**Subject Area:** Science

**Activity Time:** 30 minutes

**Setting:** Indoors

**Skills:** Varying skills depending on activities selected

**Vocabulary:** Varying vocabulary depending on activities selected

**Objective:** To teach students about the various aspects of the National Park Service.

**Materials:** internet access

### Background:

The Great Smoky Mountains are world renowned for their diversity of plant and animal species. This great variety makes the park an exemplary outdoor laboratory for the study of relatively undisturbed native flora, fauna, physical environs, and processes of the Southern Appalachians. The park is the largest federally preserved and protected upland area east of the Mississippi River offering park visitors a refuge from the stresses of everyday life.

You and your students can learn more about this special place as well as participate in on-line activities to further your knowledge

of the National Park Service and other federally protected lands. Please check out the following web addresses:

### Especially for Kids

To learn how to become a web ranger for the National Park Service, go to:

[www.nps.gov/webrangers](http://www.nps.gov/webrangers)

To learn how to become a Junior Park Ranger at Great Smoky Mountains National Park or other parks, go to:

[www.nps.gov/learn/juniorranger.htm](http://www.nps.gov/learn/juniorranger.htm)

### Especially for Teachers

For a comprehensive understanding of the background and development of the National Park Service, that is perfect for teachers and others those who need the maximum amount of accurate information in the minimum amount of time, go to: <http://www.ParkTraining.org> The U.S. Department of Education is pleased to announce the newly remodeled and updated Federal Resources for Education Excellence (FREE) website.

It now provides richer, more expansive resources to teachers and students alike. There are over 1,500 resources to take advantage of at FREE ranging from primary historical documents, lesson plans, science visualizations, math simulations and online challenges, paintings, photos, mapping tools, and more. This easily accessible information is provided by federal organizations and agencies such as the Library of Congress, National Archives, National Endowment for the Humanities (NEH), National Gallery of Art, National Park

Service, Smithsonian, National Science Foundation (NSF), and National Aeronautics and Space Administration (NASA). Go to: <http://www.free.ed.gov/>



# PARENT/CHAPERONE LETTER

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Greetings Parents/Chaperones:

Park rangers are pleased to be presenting an educational program to the students in Great Smoky Mountains National Park. In order to achieve the goals for a successful program, the park rangers will need your assistance in the following ways:

(These points will help to ensure that park rangers and teachers will be able effectively conduct the lessons and activities throughout the trip.)

- The program will be conducted outside and there will be some hiking throughout the trip. Prepare your student with appropriate footwear, long pants, layers, and rain gear.
- If your child is bringing a lunch from home, we recommend that students bring water to drink and a lunch with minimal packaging. Soft drinks are usually left unfinished by students, and remaining sugary drinks cannot be poured out on the ground. (Minimally packaged lunches lead to less trash being left behind or scattered by the wind. Additionally, this reduces the accumulated trash to be disposed).

If you are a chaperone attending the field trip:

- Please be an active part of the lessons. Keep up with the group and listen to the information being given in the case that you may be called upon to assist (handing out materials, sub-dividing groups etc.).
- Please do not hold conversations with other chaperones or use a cellular phone while the rangers are teaching the students.
- Refrain from smoking during the trip. If you must smoke, please alert a ranger or teacher and remove yourself from the group.
- Please be aware that the program will be conducted outside and that there will be some hiking throughout the trip. Prepare yourself with appropriate footwear, long pants, layers, and rain gear.
- We recommend that parents and students bring a small towel in their backpacks to sit on at lunch (there are no picnic tables at the program site).

Thank you for your needed assistance. We look forward to meeting you on the program!

Sincerely,

The Education Staff at Great Smoky Mountains National Park

