

High Elevations

Biodiversity Box



This sheet has been provided to give educators an idea of what each Biodiversity Box encompasses and which curriculum standards are met through these resources. The Biodiversity Box is intended for use in the classroom of middle school students and was designed with you, the teacher, in mind. For any additional questions, please contact Todd Witcher at todd@dlia.org, or through phone at 865-430-4757.

Biodiversity Box provides all materials needed to conduct student activities. Teacher curriculum guide is provided in the box to help guide the teacher with why activity develops students, materials needed, how to properly conduct activity, and follow up questions. To order a Biodiversity Box, please visit the teacher's resources section under education at www.dlia.org to fill out a request form.

Students use relief maps to acquaint themselves with the topography of the Great Smoky Mountain National Park and observe the elevation changes. From here, students analyze the factors associated with different elevation levels. Activities include temperature and organism distribution along various elevation levels. The interdependence of plants and organisms is analyzed, and students get into greater depth about birds and the ozone layer.

Activities

Getting a Feel for the Great Smoky Mountain National Park	Students use a raised relief map and their senses of touch and sight to orient themselves to the location and topography of the Great Smoky Mountains National Park Tennessee (6.2.3 6.2.4 8.5.5) North Carolina (6.L.2 8.L.3)
What's Your Elevation?	Students use pre-cut foam shapes to create a 3-D model of a topo map of a mountain Tennessee (6.2.3 6.2.4 8.5.5) North Carolina (6.L.2 8.L.3)
Climographs and Elevation	Students examine climographs to infer how elevation affects average temperature Tennessee (6.2.3 6.2.4 8.5.3 8.5.4) North Carolina (6.L.2.2 6.L.2.3)
Forest Types and Elevation	Students use laminated posters of Forest Types of the GSMNP to explore how forest types relate to elevation Tennessee (6.2.3 6.2.4 8.5.3 8.5.4 8.5.5) North Carolina (6.L.2.2 6.L.2.3 8.L.3)
Forest Floor Puppet Show	Students watch or perform a puppet show to learn how certain high-elevation plants and animals depend on one another Tennessee (6.2.1 6.2.2 6.2.3 6.2.4 8.5.3 8.5.4 8.5.5) North Carolina (6.L.2.3 8.L.3.1 8.L.3.2 8.L.3.3)
Birds of the Smokies	Students consider how calls and "field marks" can be used to identify birds. They interpret distribution graphs to infer the possible identity of birds sighted by visitors to the Park Tennessee (6.2.3 6.2.4 8.5.1 8.5.2 8.5.3) North Carolina (6.L.2.3 8.L.3.1 8.L.3.2 8.L.3.3)
Ozone Monitoring	Students use ozone-sensitive paper strips to measure ground-level ozone levels Tennessee (6.2.2 6.2.4 8.5.3 8.5.5) North Carolina (8.P.2.1 8.P.2.2 8.L.3.3)
Ozone Maps	Students look at archived ozone maps of the to learn how they can help improve air quality in their community Tennessee (6.2.3 6.2.4 8.5.3 8.5.4 8.5.5) North Carolina (6.L.2 8.P.2 8.L.3.3)

Bioindicators and Ozone	Students survey their schoolgrounds or a local natural area for evidence of ozone damage on plant leaves or to lichens Tennessee (6.2.2 6.2.3 6.2.4 8.5.3 8.5.4 8.5.5) North Carolina (6.L.2 8.P.2.2 8.L.3.1)
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Materials

Teacher's Guide	Laminated Regional Maps (7)	Raised Relief Maps (7)
Contour Kits (7)	Posters of Five Forest Types (7)	Puppets and Props for Squirrel Puppet Show (2 scrolls and bag)
Laminated Bird Diagrams (6)	Bird Distribution Sheets (33)	<i>Birds of the Smokies Guide</i> (7)
Bird Identifier (1)	Eco Badges Kit (1)	<i>How to ID Ozone Injury</i> (23)

Tennessee Science Curriculum Standards

Sixth Grade:

-Embedded Inquiry

- 6.Inq.1 Design and conduct open-ended scientific investigations
- 6.Inq.2 Use tools and techniques to gather, organize, analyze, and interpret data
- 6.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations
- 6.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration
- 6.Inq.5 Communicate scientific understanding using descriptions, explanations, and models

-Interactions Between Living Things and Their Environment:

Recognize relationships within food chains

- 6.2.1 Classify organisms as producers, consumers, and decomposers
- 6.2.2 Demonstrate interrelationships among organisms in food web

-Diversity and Adaptation Among Living Things

-Understand how organisms are adapted for surviving in particular environments

- 6.2.3 Draw conclusions from data about interactions between the biotic and abiotic elements of a particular environment.
- 6.2.4 Analyze the environments and the interdependence among organisms found in the world's major biomes

Eight Grade:

-Embedded Inquiry

- 8.Inq.1 Design and conduct open-ended scientific investigations
- 8.Inq.2 Use tools and techniques to gather, organize, analyze, and interpret data
- 8.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations
- 8.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration
- 8.Inq.5 Communicate scientific understanding using descriptions, explanations, and models

-Diversity and adaptation among living things

- 8.5.1 Identify various criteria used to classify organisms into groups

-Interactions between living things and their environment

- 8.5.3 Analyze how structural, behavioral, and physiological adaptations within a population enable it to survive in a given environment
- 8.5.4 Explain why variation within a population can enhance chances for group survival

-Earth Resources

- Investigate how human activities affect Earth's land, oceans, and atmosphere
- 8.5.5 Describe importance of maintaining the Earth's biodiversity

North Carolina Essential Standards

Sixth Grade:

-Ecosystem

- 6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.
 - 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers.
 - 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment.
 - 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.

Eight Grade:

-Energy: Conservation and Transfer

- 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources.
 - 8.P.2.1 Explain the environmental consequences of the various methods of obtaining, transforming and distributing energy.
 - 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.

-Ecosystems

- 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment.
 - 8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem.
 - 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the consequences of such interactions including: coexistence, competition, parasitism, and mutualism
 - 8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).