

Geography and Ecology at Meadowcroft Rockshelter GigaPan Lesson

A stable, **temperate environment** in a changing landscape

Summary: The **ecology** of the Cross Creek **watershed** has remained relatively stable for the past 16,000 years. Even during the glaciation periods of the Pleistocene, Meadowcroft exhibited a **temperate** Carolinian biome, despite its relatively close geographic proximity to the glacial fronts (80 miles). Evidence from the **excavation** and the presence of nearly all the same **species** today underscores this continuity.

Students will:

- Describe the geographic location of Meadowcroft Rockshelter
- Identify major regional **watersheds** and describe how they inform **archaeology** at Meadowcroft
- Identify major **floral** and **faunal species** and their **habitats**
- Describe a **temperate environment** and give examples of the **species** and conditions one might expect to encounter there
- Describe **ecological** continuity over time in the Cross Creek **watershed**, using evidence from the site

Timing: 40 minutes

Materials:

Writing Instruments
Paper
Internet Access

Optional Reference Materials:

*First Peoples Teachers Guide to
Geography and Ecology*

John Boback, "[The First Western Pennsylvanians](#)" article
Anne Madarasz, "[Chapter 1: A Fertile Land for Development](#)" article
Michael Collins, "[Meadowcroft: Shelter in a Storm](#)" article

Map of Western Pennsylvania
Map of the United States
Maps of the Glacial Fronts

Terms

Climate
Deciduous
Ecology
Geography
Floodplain
Flora
Fauna
Uplands
Lowlands
Precipitation
Species
Springs
Slope
Springs
Temperate
Topography

Concepts

Constant Volume Samples
Dendritic Drainage
Glacial Periods

Identification Significance

Meadowcroft Rockshelter
Ohio River
Monongahela River
Carolinian Biome

Background Information

Meadowcroft Rockshelter is located in northern Washington County, Pennsylvania, roughly 35 miles southwest of Pittsburgh and just over 2 miles from Avella, PA. The site is situated on the north bank of Cross Creek, a small **tributary** of the Ohio River, which lies roughly 7 miles to the west. The site is located in the Pittsburgh Plateaus Section of the Appalachian Plateaus Physiographic Province.

Topographically, the region is maturely dissected. More than 50 percent of the area is in valley **slopes** with **upland** and valley bottom areas in the minority. The stream pattern is **dendritic** with **drainage** running northwestward to westward, crossing the state line into Brooke County, West Virginia and ultimately draining into the Ohio River near Follansbee, WV. This **topography** was generated during the Pleistocene when increased **precipitation** and glacial runoff caused extensive downcutting.

The Rockshelter was available for human occupation by 21,000 years ago. In addition to the potential availability of water from Cross Creek, **springs** are abundant in the immediate vicinity of the shelter. The Cross Creek **floodplain** below, and **bluff** face and bluff top immediately around Meadowcroft Rockshelter, are currently covered with a mixed **deciduous** forest.

The **ecology** of the Cross Creek valley remained relatively stable from the end of the Wisconsinan Glaciation 11,000 years ago until the Historic Period. At one time, forest covered all the **watershed**. Mixed oak forests dominated hill-tops and south-facing **slopes**, mixed Appalachian mesophytic forests on north-facing **slopes** and in headwater coves, and riverine forests on alluvial **floodplains**. Most of the area was cut in the early nineteenth-century when the land was first cleared and prepared for agriculture. Areas which are reforested have been repeatedly logged and represent secondary forests.

Faunal populations remained relatively stable from the Pleistocene until the Historic Period. As late as the beginning of the eighteenth-century, elk, black bear, mountain lion, wild cat, timber wolf, fisher, otter, beaver, wild turkey and passenger pigeon could be found in the hills of western Pennsylvania. Today, white-tailed deer, cottontail rabbit, gray and fox squirrel, ringneck pheasant, bobwhite quail, ruffed grouse, muskrat and mink constitute the principle game **species** of the area. The ruffed grouse,

wild turkey, and the introduced ringneck pheasant comprise the game birds of the area. Terrestrial and riverine reptiles are represented by black snake, garter snake, box turtle and snapping turtle. Amphibians include various salamanders, toads, tree frogs and bull frogs.

Throughout the **glacial advances**, which came within 80 miles of Meadowcroft Rockshelter, the Cross Creek valley retained a **temperate, Carolinian environment**. The **climate** of the area is characterized by a wide seasonal temperature range with a moderate amount of **precipitation** falling primarily during the warm parts of the year. In Washington County, PA, the yearly temperatures range from -20°F during the winter months to 90°F in July and August. The temperatures tend to be lower in hilly areas than in more level parts of the county, with nighttime temperatures dropping colder than daytime. Meanwhile, daytime temperatures are generally higher in valley bottoms than on hilltops. Approximately 22 inches of rain fall during the 150 frost-free growing season days, with an average total of 40 inches of rain falling annually.

Procedure:

*Note: The GigaPan images are not able to capture the full scope of **geography**, particularly the physical location of the site/ **watershed** as represented on maps. As you lead students through this activity, you may want to use mapping representations to illustrate key points, such as topographical maps of the Ohio and Monongahela **watersheds**, representations of the glacial advances, etc.*

1. Teachers should begin the lesson by offering an introduction; one possible activity suggestion is below. If you have not already done so, provide an introduction to Meadowcroft Rockshelter, identifying the site, explaining its significance, and why you are studying it.
Use Maps or Earth to locate Meadowcroft Rockshelter. Ask students to guess what they would expect the **ecology** of the site to be based on the maps. Now show them a map of the glacial advances. Identify Meadowcroft on this map. What do they think the **environment** was like during the Pleistocene? Use this exercise to launch the following exploration:

Geography and Ecology						
GigaPan Image	Tab	Point #	Title	Content Description	Multimedia/ Visual	Transitions
Exterior	Ecology	1	Cross Creek	Cross Creek provided people with easy access between the Ohio and Monongahela River valleys.	51s video on the geography of the MCRS.	Meadowcroft Rockshelter is part of the marked landscape of the Cross Creek watershed during the prehistoric past and continues to be today. . .
Exterior	Ecology	2	The Rockshelter	The Rockshelter provided shelter for anything, or anyone, that decided to stay.	38 s video about staying at the Rockshelter	Not only did the Rockshelter provide shelter, but the landscape offered habitat for numerous plants and animals. . .
Exterior	Ecology	3	Sycamore	Cross Creek valley is made up of uplands, lowlands, and slopes ; together they are suitable habitat for a wide variety of flora and fauna	***	Ample food sources exist in the valley . . .
Exterior	Ecology	4	Oak Tree	Nut bearing trees were an important reason people stayed at the Rockshelter. There is evidence of walnut, hickory, and acorns being processed and consumed at the site. However, for much of its history hackberries were the most widely used resource.	A table of the nut shell remains found in the Rockshelter by stratum .	Humans also used forest resources to make tools and build fires . . .
Exterior	Ecology	5	Elm Tree	Not only were trees with edible fruit used by occupants, but there is evidence of other woody	A table of tree species recovered in samples during	People and animals also had access to fresh water . . .

				taxa being used for tools and firewood.	excavation.	
Exterior	Ecology	6	Spring	The freshest water available at the site was from the multiple springs located around the Rockshelter.	A close-up of the spring located just west of the Meadowcroft Rockshelter.	The landscape and ecology have not changed much over 16,000 years . . .
Exterior	Ecology	7	Woodpecker damage	Even today the valley has abundant wildlife.	***	The composition of the forest has also remained relatively stable since Paleo-Indian times . . .
Upper	Ecology	1	Pollen Column	The pollen recovered through flotation of the Constant Volume Samples (CVS) shows a forest of mixed hardwoods and pines existed early on. Interestingly, this mixture remained relatively constant throughout the record.	Pollen analysis of the Meadowcroft Rockshelter.	The paleo-botanical and faunal evidence demonstrates a temperate Carolinian biome despite being within 80 miles of the glaciers during the Pleistocene . . .
Upper	Ecology	2	Deer Rib	The faunal evidence found in the Rockshelter is indicative of a Carolinian biome . Coupled with the large hardwood component of the pollen, seed and charcoal assemblage there is good evidence that Cross Creek was much more temperate at the close of the Pleistocene than was once assumed.	Some of the most common vertebrate species recovered from the Rockshelter.	Faunal evidence can also be used to understand the health of the ecosystem in the past . . .

Upper	Ecology	3	Mollusk Shell	Freshwater mussel shells like this are important to the environmental study component of the Rockshelter excavation . It hints to biologists what the water quality was in prehistory here in Cross Creek, as well as the Ohio River.		Even the presence of rodents explains the diversity and food webs of the region. . .
Upper	Ecology	4	Mouse Tag	Some archaeological humor towards the end of a long day after a long season. Burrowing activity remains evidence of a healthy ecosystem.		Although the climate and ecology remained relatively stable, the physical landscape was constantly changing . . .
Upper	Ecology	5	Roof fall	The physical surroundings around the plants and animals using the Rockshelter were constantly changing.		Conclusion: Evidence from Meadowcroft Rockshelter indicates a much more temperate and stable ecology than previously suspected for an area that was close to the glacial fronts.

Conclusion

Revisit the *Exterior Image*. Ask them to imagine away all of the human characteristics of the landscape: the parking area, the stone walls, the staircase, the Rockshelter enclosure. Imagine that the rock overhanging the enclosure was even bigger, so big that the rocks on the **slope** and in the creek, were still attached to the roof. Explain that this is very much what prehistoric people saw and experienced when they first visited the site.

Alternate Delivery Options:

- Use the GigaPoints above to create a worksheet or scavenger hunt for your students. Give them time to explore the images on their own, completing their worksheets as they go.
- Project the *Exterior Image* for one minute. Ask students to make two columns: **Ecology** and **Geography**. Give students one minute to write down everything they observe in the image as it relates to a column heading. As you work through the GigaPoints, ask students to cross off any points that they observed that are explained in the image. Afterwards, address any points that they did not cross off.
- Divide the images into groups that explore the basic needs of food and water, shelter, and space. Assign groups of students to each of the categories and have them explore those points. Afterwards, they should create a summary of the information to share with their classmates. Give each group the opportunity to show their classmates the points and explain why they are significant for their category.
- Give students KWL charts to complete as you view the images. During the introduction have them record everything they **K**now about the image. Then ask them to write what they **W**ant to know. After you view the images, ask them to write what they **L**earned. Address any questions that remain unanswered. What sources can students use to answer these questions?

Post-Activity Enrichment

- Ask students to research some of the **floral** and **faunal species** from the Cross Creek Valley. What is the preferred **habitat** for these organisms? Which food webs are they part of? What other uses might prehistoric people have for these organisms (other than food)?
- **Archaeologists** used flotation and **Constant Volume Samples** to learn about the **Ecology** of the site. Research the methods for collecting and analyzing CVS. How would the data contribute to the study of Meadowcroft Rockshelter?

- Ask students to draw a picture of how they think the natural world around Meadowcroft looked during prehistoric times. Use evidence from the GigaPan images as a guide. Ask students:
 - What kind of plants and trees are present?
 - How big was the roof? How much had fallen? Where did it land?
 - What kind of animals were there? What were they doing there? If human, what season?
- Project the *Exterior Image* of the Rockshelter. Ask students to write a descriptive paragraph about the scene. Alternately, ask them to write a descriptive poem about the image that uses expressive vocabulary to create visual imagery.