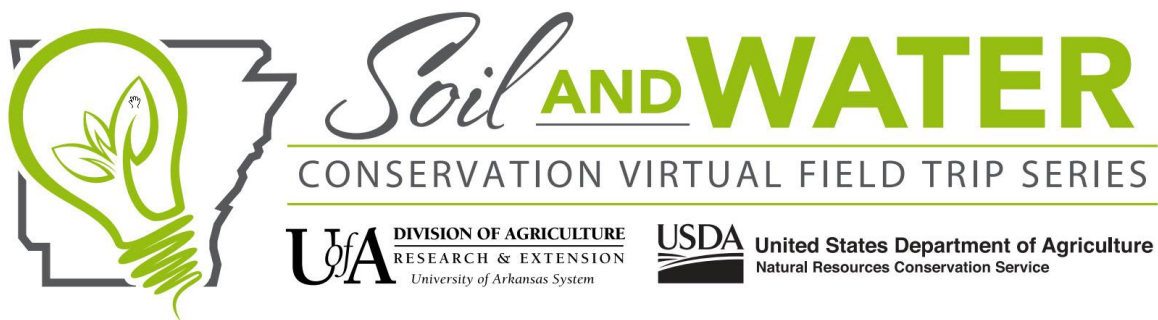




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Prairie Grove Battlefield State Park Soil Restoration Virtual Field Trip

Photo courtesy of Prairie Grove Battlefield State Park

**Grades 9-12 Integrated Biology, Environmental Science, and
Agricultural Science**



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Arkansas NGSS Suggestions:

Integrated Biology:

Topic 6: Life and Earth's Systems

B16-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (B16-ETS1-3)

Connections to Engineering, Technology and Applications of Science: Influence of Science, Engineering and Technology on Society and the Natural World. (B16-ETS1-3)

Disciplinary Core Ideas: ETS1.B: Developing Possible Solutions

Connections to the Arkansas Disciplinary Literacy Standards: RST.11-12.7, 11-12.8, 11-12.9

Connections to the Arkansas Mathematical Standards: MP.2, MP.4

Topic 7: Human Impacts on Earth Systems

BI-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, the occurrence of natural hazards, and changes in climate have influenced human activity.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (BI-ESS3-1)

Crosscutting Concepts: Cause and Effect (BI-ESS3-1)

Disciplinary Core Ideas: ESS3.A: Natural Resources, ESS3.B: Natural Hazards

Connections to the Arkansas Disciplinary Literacy Standards: RST.11-12.1, WHST.9-12.2

Connections to the Arkansas Mathematical Standards: MP.2, HSN.Q.A.1

BI-ESS3-4: Evaluate or refine a technological solution that reduces the impact of human activities on natural systems.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (BI-ESS3-4)

Crosscutting Concepts: Stability and Change (BI-ESS3-4)

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Connections to Engineering, Technology and Applications of Science: Influence of Science, Engineering and Technology on Society and the Natural World (BI-ESS3-4)

Disciplinary Core Ideas: ESS3.C: Human Impacts on Earth Systems, ETS1.B: Developing Possible Solutions

Connections to the Arkansas Disciplinary Literacy Standards: RST.11-12.1, RST.11-12.8

Connections to the Arkansas Mathematical Standards: MP.2, HSN.Q.A.1

B17-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Science and Engineering Practices: Asking Questions and Defining Problems (B17-ETS1-1)

Connections to Engineering, Technology and Applications of Science: Influence of Science, Engineering and Technology on Society and the Natural World (B17-ETS1-1)

Disciplinary Core Ideas: ETS1.A: Defining and Delimiting Engineering Problems

Connections to the Arkansas Disciplinary Literacy Standards: RST.11-12.7-9

Connections to the Arkansas Mathematical Standards: MP.2, MP.4

Environmental Science:

Topic One: Systems

EVS1-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Science and Engineering Practices: Asking Questions and Defining Problems (EVS1-ETS1-1)

Crosscutting Concepts: Influence of Engineering, Technology and Science on Society and the Natural World (EVS1-ETS1-1)

Disciplinary Core Ideas: ETS1.A: Defining and Delimiting Engineering Problems

Connections to the Arkansas Disciplinary Literacy Standards: RST.11-12.7, RST.11-12.8, RST.11-12.9

Connections to the Arkansas Mathematical Standards: MP.2, MP.4

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Topic 2: Energy

EVS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller more manageable problems that could be solved through engineering.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (EVS- ETS1-2)

Disciplinary Core Ideas: ETS1.C: Optimizing the Design Solution

Topic 4: Sustainability

EVS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (EVS- ESS3-1)

Crosscutting Concepts: Cause and Effect (EVS-ESS3-1)

Connections to Engineering, Technology and Applications of Science: Influence of Science, Engineering and Technology on Society and the Natural World (EVS-ESS3-1)

Disciplinary Core Ideas: ESS3.A: Natural Resources. ESS3.B: Natural Hazards ***Connections to***

the Arkansas Disciplinary Literacy Standards: RST.11-12.1, WHST.9-12.2 ***Connections to the***

Arkansas Mathematic Standards: MP.2, HSN.Q.A.1, 2, 3

EVS-ESS3-3: Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

Science and Engineering Practices: Using Mathematics and Computational Thinking (EVS-ESS3-3)

Crosscutting Concepts: Stability and Change (EVS-ESS3-3)

Connections to Engineering, Technology and Applications of Science: Influence of Science, Engineering and Technology on Society and the Natural World (EVS-ESS3-3)

Disciplinary Core Ideas: ESS3.C: Human Impacts on Earth Systems

Connections to the Arkansas Mathematic Standards: MP.2, MP.4

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EVS-LS2-7: Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (EVS-LS2- 7)

Crosscutting Concepts: Stability and Change (EVS-LS2-7)

Disciplinary Core Ideas: LS2.C: Ecosystem Dynamics, Functioning, and Resilience, ESS3.A: Natural Resources, ESS3.C: Human Impacts on Earth Systems, ETS1.B: Developing Possible Solutions

Connections to the Arkansas Disciplinary Literacy Standards: RST.9-10.8, RST.11-12.1, RST.11- 12.8, WHST.9-12.7

Connections to the Arkansas Mathematic Standards: MP.2, HSN.Q.A.1, HSN.Q.A.2, HSN.Q.A.3

EVS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Science and Engineering Practices: Using mathematics and computational thinking (EVS-LS4-6)

Crosscutting Concepts: Cause and Effect (EVS-LS4-6)

Disciplinary Core Ideas: LS4.C Adaptation, LS4.D Biodiversity and Humans

Connections to the Arkansas Disciplinary Literacy Standards: WHST.9-12.5, 9-12.7

Connections to the Arkansas Mathematic Standards: MP.2

EVS4-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Science and Engineering Practices: Constructing Explanations and Designing Solutions (EVS- ESS3-4)

Crosscutting Concepts: Cause and Effect (EVS-ESS3-1)

Disciplinary Core Ideas: ESS3.A: Natural Resources

Connections to the Arkansas Disciplinary Literacy Standards: WHST.9-12.5, 9-12.7

Connections to the Arkansas Mathematic Standards: MP.2, MP.4

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Objective: Students will understand the significance of soil, flora, and fauna restoration in an Arkansas State Park. Students will comprehend the importance of soil sampling, ecological restoration (in several micro-environments), and the reasons why this restoration is necessary in relation to the nearby Illinois River Watershed. Students will realize that not only do battles affect people, but they also affect the environment.

Assessment: Students will write a half-page research paper on how they would go about restoring this area of the park. Encourage the students to be creative but still follow the restoration guidelines.

Key Points: Illinois River Watershed, carbon sequestration, soil sampling and testing, ecological restoration.

Materials:

To watch the live *'Prairie Grove Battleground State Park Soil and Land Restoration VFT* on June 19, go to https://uada.zoom.us/webinar/register/WN_gijOglnqQ2m88EQB-eVatQ, and register. To watch the recorded VFT, go to www.uaex.uada.edu/soywhatsup and click on the 'Virtual Field Trips and Lessons' icon to the left of the webpage.

Paper and writing utensils for students in the classroom.

Preparation: If this is to be done in class, it is highly recommended that the teacher understands the key vocabulary words below.

Time Duration: one and a half class periods.

The video is about 60 minutes long (45 minutes plus 15 minutes question/answer). Assume about 10 minutes for students to look up vocabulary and think of questions to ask the presenters (if live), and 10 minutes to teach essential concepts. Assume 10 minutes for reflection and discussion after the video.

Elicit:

Do a KWL Chart and inquire about ecological restoration. What is ecological restoration? What are the advantages of practicing ecological restoration, especially in a historical area? What are the types of conservation practices that are involved in a restoration project? Why is restoration important in the local ecosystem? How can this restoration impact those who live in the neighboring towns?

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Engage:

Tell the students that they are going to watch a video titled '*Prairie Grove Battleground State Park Virtual Field Trip*'. Before starting the video, have the students break into groups to define the following words:

Conservation
River Watershed
Ecological restoration
Soil sampling
Carbon sequestration
Prairie
Woodland
Savannah
Soil pH, soil Phosphorus, Soil Nitrogen, Soil total Carbon, Soil Calcium, Magnesium, Iron, Copper, Boron
Soil Bulk Density
Soil Electrical Conductivity

Explain:

BEFORE THE VIDEO, be sure students understand what ecological restoration is, and the science behind the foundation of this endeavor. Also introduce the students to the history of one of the most intact Civil War battlefields in the United States. To know how to proceed, one needs to look behind for guidance. By learning the history of this state park, they will understand the ecological damage that needs repairing.

Biology Teachers: This is a suitable time to review human impact on ecological systems and how population dynamics/agriculture affect the local ecology and economics.

Environmental Science Teachers: This is a suitable time to review human impact on ecological systems and how population dynamics/agriculture affect the local ecology and economics.

AG Teachers: This is a suitable time to review human impact on ecological systems and how population dynamics/agriculture affect the local ecology, and how historical areas, like Prairie Grove, need to be allowed to go back to a natural state.

Prairie Grove Battlefield was the sight of the last major Civil War conflict in Arkansas in December of 1862. The Confederacy wanted to take back Missouri and chose this area to get a foothold in the 'Show-Me' State. Over 20,000 men fought in this battle, with 2700 total being killed, wounded, or missing in action. The battle lasted one day, with the conflict ending in a draw. The Confederate army chose to retreat that night, and Missouri was cemented under Union control.

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Soil **AND** WATER

CONSERVATION VIRTUAL FIELD TRIP SERIES

Prairie Grove Battlefield State Park was started in the 1970's. It is around 1,000 acres with 800 of that under park control, and 200 to be transferred to the state in the future. It is a park that contains three major ecosystems; prairie, woodlands, and savannah. Due to years of agriculture, urbanization, and past damage from the Civil War (there were artillery, cannons, etc. in the battle) Prairie Grove is a shadow of its original condition. Invasive flora and fauna have swept the area, metal pollution in the soil from the battle, grazing from cattle, drainage of water from lowland prairie bottoms, and the encroachment of homes have all taken their toll. This area drains into the million-acre Illinois River Watershed. Water from this area, unfiltered and full of pollution, ends up in the drinking water of those cities who use this watershed.

There are several stakeholders in this restoration project. The goal is to restore the original flora (tall prairie grass like Little and Big Blue Stem, etc.) by cleaning out the current grasses, and reseeding or exposing dormant wild seeds in the soil. Invasive plant management in the woodlands will bring back the native plants, and by allowing the water seepage to feed the lowland prairie bottoms, natural water filtration will occur. By removing the current flora and replacing it with the original, species of fauna that would normally live in these ecosystems will return. Birds, insects, amphibians, etc. will make their way back to the park.

This requires planning and soil testing to determine what needs to be done to restore it before this project can start. This entails several soil sampling sites and soil tests. Once tests have been completed and analyzed, restoration can begin.

Explore:

Show the video '*Prairie Grove Battleground State Park Virtual Field Trip*'.

Elaborate:

After the video, the students break into three groups: the '*Prairie*' group, the '*Woodlands*' group, and the '*Savannah*' group. Each group brainstorms their area of study, explaining why their area of study is important to the health of this park.

Tell the students they need to produce at least six ways to explain why their area of study is important to Prairie Grove, and report this to the class.

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Soil **AND** WATER

CONSERVATION VIRTUAL FIELD TRIP SERIES

Evaluation:

Students will turn in a two-paragraph reflection paper on what they learned and how this project can have long lasting impact on the watershed.

Extend:

End the lesson with how the restoration of an ecologically diverse area can affect people in other states and improve the health of the local landscape.

Assign a brainstorming project that allows students to design and implement their own ecosystem project on the school grounds.

Have an agent from a local company or a local extension agent come to the classroom to explain how ecological restoration is essential for healthy land.



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