

# Science & Environmental Education: Community Connections, Impacts & Actions

*6th - 8th Grade Curriculum*

*Field Experiences &  
Classroom Lessons*



Environmental education is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions.

*Purpose of*

ENVIRONMENTAL EDUCATION



*By these actions, environmentally literate citizens will help ensure an ecologically and economically sustainable environment.*

## CURRICULUM OVERVIEW



The Middle School Community Connections, Impacts & Actions Curriculum helps students connect classroom learning to field experiences and actions they can take in their lives to have a positive impact on the environment. The base of the curriculum is a series of 11 purposeful field experiences with pre- and post-experience classroom lessons. Organized by Next Generation Science Standard, any of these experiences can be added to your existing curriculum unit to further engage students in field learning and personal action. Each field experience takes place at one or more of the partner sites: Waukesha School District's E.B. Shurts Environmental Learning Center, Waukesha County Parks and Land Use Department's Retzer Nature Center, or Carroll University's Prairie Springs Environmental Education Center.

There are funding sources available to help pay for buses for field trips. One source is the [GO OUTSIDE FUND](#) through the Natural Resources Foundation. Additional funding opportunities for classrooms can be found at [EEinWisconsin](#). Be sure to check applications for deadlines.

To further support classroom learning, three of the field experiences have been developed into a full 3-week multidisciplinary curriculum where students learn about a science issue, analyze data from the field, and then develop and promote a solution to that issue. While any of the field experiences could be adapted to fit in the curriculum, complete lesson plans exist for Survival of the Prairie, Water Comparisons, and Recycling, and can be downloaded as separate curriculum books.

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**ESSENTIAL QUESTION:  
How can we reduce the impact  
of our consumer waste on the  
environment?**

## **Recycling**

**This field experience has a full curriculum unit available.**

**NGSS Performance Expectations:** [MS-PS-1-3](#)

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

**Wisconsin Environmental Education Standard:** [ELS.EX5](#)

**Pre-Field Experience Activity:** Explore the difference between natural and synthetic products by watching a video that shows plastic being made, researching a synthetic product to identify the natural resources used in its production, and the impacts of that product on society. Finally, explore a statewide database to find out how these materials can be recycled.


**Field Experience:** Students will tour the joint Milwaukee-Waukesha County Materials Recycling Facility (MRF) and observe the fascinating combination of physics, technology, and people sorting and baling mixed recyclables before heading to market. Students will learn what can be recycled, why some things cannot be recycled, and what recyclables become. This field experience can be done in coordination with an additional stop at Milwaukee Metropolitan Sewerage District to also learn about wastewater and then can accommodate up to 120 students.

**Post-Field Experience Activity:** Utilizing MRF statistics, calculate the impact of recycling mistakes. As a class discuss the importance of recycling properly and brainstorm ways to engage the community in better recycling habits.

**Call to Action:** Improve the current recycling program at your school.

Materials Recycling Facility  
**Recycling Facility Tour**  
[\*\*Request This Program!\*\*](#)

Pre, Post Activities  
and Call to Action  
[\*\*Lesson Plan\*\*](#)



**ESSENTIAL QUESTION:**  
**How can we utilize environmentally-friendly materials in our winter sporting and daily activities?**

## *The Big Melt*

**NGSS Performance Expectations:** [MS-PS-1-4](#)

Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

**Wisconsin Environmental Education Standard:** [ELS.C1](#)

**Pre-Field Experience Activity:** Students will engage in a jigsaw activity to build collective knowledge around how local communities keep roadways safe during the winter as well as the implications of these methods.


**Field Experience:** Students will build awareness and appreciation of the local environment in the winter, as well as an opportunity to investigate how we can be aware of our environment while solving a common winter issue: ice. This field experience can accommodate up to 150 students.

**Post-Field Experience Activity:** Sidewalk Solutions: Using the data and conclusions collected during the field experience, students will work in groups to propose more environmentally friendly solutions to their school to help reduce ice on the sidewalks. Students should use their own data as well as research articles from various sources to help build an evidence-based argument for their solution.

**Call to Action:** Propose more environmentally friendly solutions to reduce ice on sidewalks.

E.B. Shurts  
The Big Melt  
[\*Request This Program!\*](#)

Pre, Post Activities  
and Call to Action  
[\*Lesson Plan\*](#)



**ESSENTIAL QUESTION:**  
**How can we minimize negative environmental impact using alternative forms of energy?**

## *Amazing Renewable Energy*

**NGSS Performance Expectations:** [MS-PS-3-3](#). Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

**Wisconsin Environmental Education Standard:** [ELS.EX5](#)

**Pre-Field Experience Activity:** Students will explore thermal energy transfer as they construct and test solar cooker devices to maximize the transfer of thermal energy from the sun to food.

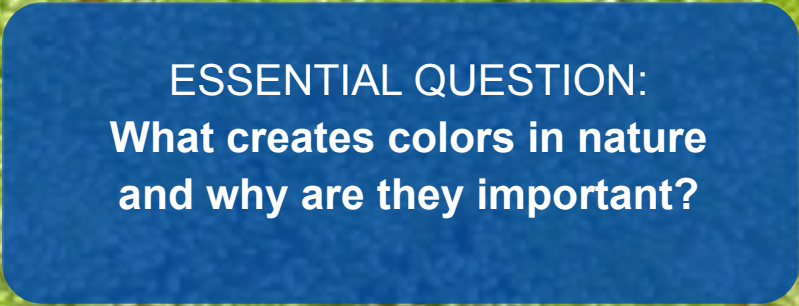
**Field Experience:** This program is about understanding energy sources (renewable and non-renewable) and how we all can minimize negative environmental impact using alternative forms of energy. Students explore the concept of thermal energy transfer and discover how energy from the earth can be used to help heat and cool buildings (geothermal energy). Students collect temperature data from the soil, pond, spring-fed stream, and other surfaces to compare thermal energy transfer from the earth and sun. Explore how recycling and consumer choices save energy and try Retzer's energy bike to demonstrate the amount of energy used by different types of light bulbs. Finally, see the Planetarium show Dynamic Earth that explores the inner workings of Earth's climate system. This field experience can accommodate up to 150 students.

**Post-Field Experience Activity:** Students will work in groups to analyze the data collected during the field experience to compare thermal energy transfer from the earth and sun.

**Call to Action:** Create an Energy Plan to reduce energy use and educate others.

Retzer Nature Center  
**Amazing Renewable Energy**  
[\*\*\*Request This Program!\*\*\*](#)

Pre, Post Activities  
and Call to Action  
[\*\*\*Lesson Plan\*\*\*](#)



**ESSENTIAL QUESTION:**  
**What creates colors in nature  
and why are they important?**

## *Colors In Nature*

**NGSS Performance Expectations:** [MS-PS-4-2](#). Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [MS-LS-1-4](#). Use an argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

**Wisconsin Environmental Education Standard:** [ELS.EX2](#)

**Pre-Field Experience Activity:** Students engage in inquiry activities in small groups to record predictions, observations, and generate questions about different ways we perceive color in nature.

**Field Experience:** This half-day field experience includes two stations for students to investigate how color is perceived and used in the natural world. Students observe how light waves interact through natural materials such as feathers, leaves, furs and flowers and examine how color is perceived differently by different organisms. Students will explore and observe natural materials outside and record how colors help plants and animals survive and reproduce. Students also visit the planetarium to view Cosmic Colors: An Adventure Along the Spectrum. This field experience can accommodate up to 150 students.


**Post-Field Experience Activity:** Using the color data collected on the hike determine which colors are most common in plants and which colors are most common in animals/birds, etc.

**Call to Action:** Plan and plant a pollinator garden or participate in a citizen science larvae monitoring project such as Monarch Larva Monitoring Project ([MLMP](#)).

Retzer Nature Center  
**Colors In Nature**  
[\*\*\*Request This Program!\*\*\*](#)

Pre, Post Activities  
and Call to Action  
[\*\*\*Lesson Plan\*\*\*](#)





**ESSENTIAL QUESTION:**  
What specialized structures do aquatic macroinvertebrates have that help them survive and reproduce?

## *Aquatic Survival*

**NGSS Performance Expectations:** [MS-LS-1-4](#). Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

**Wisconsin Environmental Education Standard:** [ELS.EN7](#)

**Pre-Field Experience Activity:** Students will engage in a 3-2-1 reading around what different organisms need to survive.


**Field Experience:** Students will investigate how the plants and animals of the Fox River respond to different conditions and how they are specifically adapted for survival. This field experience can accommodate up to 100 students.

**Post-Field Experience Activity:** Students will complete a Project WET activity where the work to solve the cholera outbreak as if they were Dr. John Snow.

**Call to Action:** Educate others by marking storm drains in the community.

E.B. Shurts  
Aquatic Survival  
[Request This Program!](#)

Pre, Post Activities  
and Call to Action  
[Lesson Plan](#)

A glass flask containing water is placed on a bed of smooth, light-colored rocks. The background is a blurred natural setting, possibly a riverbank. The flask is the central focus of the left side of the page.

**ESSENTIAL QUESTION:**  
**What environmental factors have affected the diversity of macroinvertebrates in the Fox River and Genesee Creek?**

## ***Water Comparisons***

**This field experience has a full curriculum unit available.**

**NGSS Performance Expectations:** [\*\*MS-LS-2-1\*\*](#). Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**Wisconsin Environmental Education Standard:** [\*\*ELS.EN7\*\*](#)

**Pre-Field Experience Activity:** Using a database from the Department of Natural Resources (DNR), research the bodies of water you will visit for the field experience.

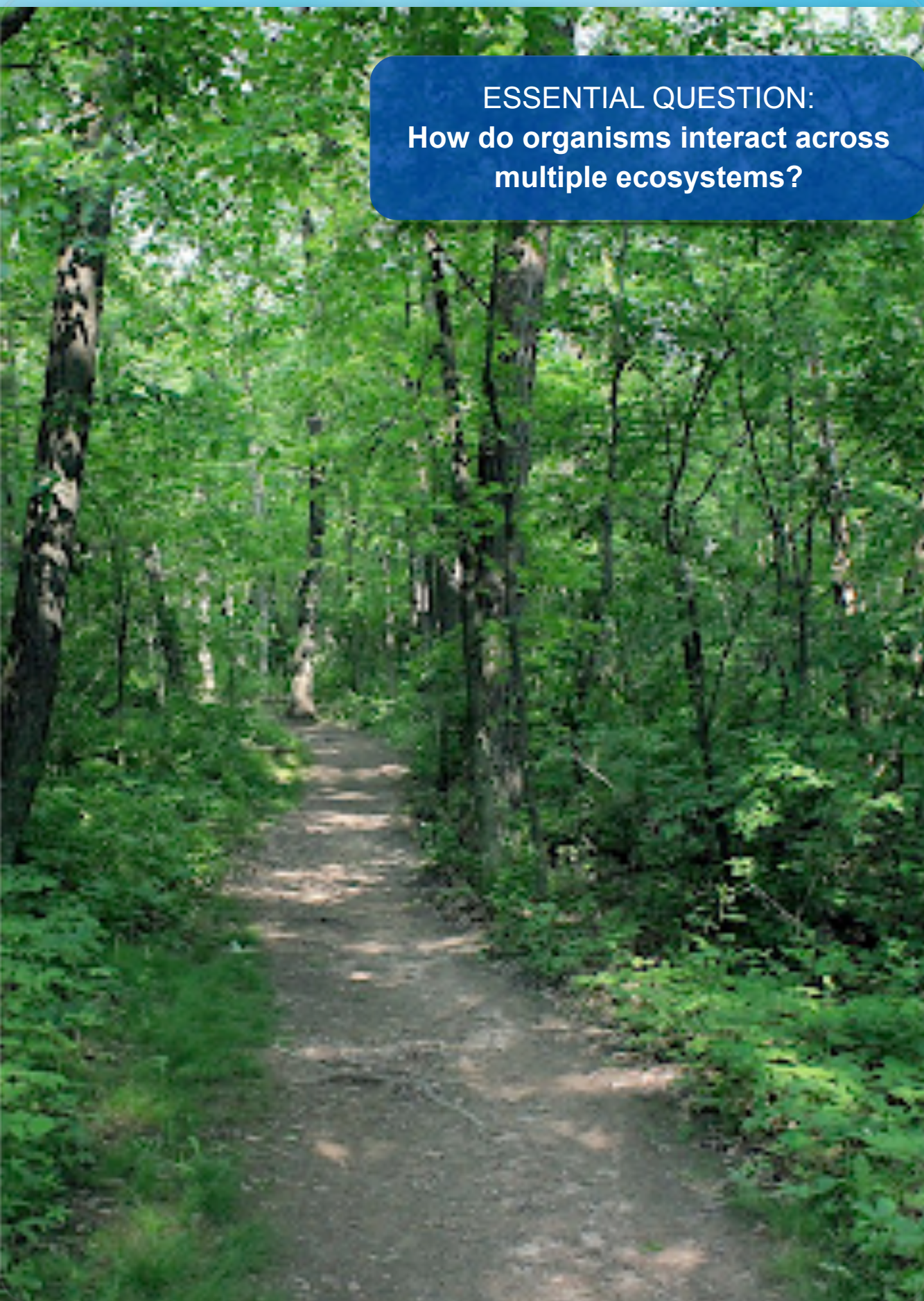
**Field Experience:** Students will have the opportunity to test the biological, physical, and chemical characteristics of the Fox River and Genesee Creek and make comparisons between the Fox River and Genesee Creek. This field experience can accommodate up to 100 students.

**Post-Field Experience Activity:** Calculate data gathered on the field experience and analyze it in the context of the DNR data. Discuss how Citizen Science is a way for citizens to assist with the collection of field data.

**Call to Action:** Educate others by marking storm drains in the community.

E.B. Shurts & Prairie Springs  
**Water Comparisons**  
**[Request This Program!](#)**

Pre, Post Activities  
and Call to Action  
**[Lesson Plan](#)**



**ESSENTIAL QUESTION:**  
**How do organisms interact across multiple ecosystems?**

## ***Ecosystem Investigations***

**NGSS Performance Expectations:** [\*\*MS-LS-2-2\*\*](#). Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**Wisconsin Environmental Education Standard:** [\*\*ELS.EX2\*\*](#)

**Pre-Field Experience Activity:** Explore a database to compare and contrast local ecosystems. Learn the types of data used to identify unique ecosystems. Consider meeting virtually with a conservationist.

**Field Experience:** This half-day field experience allows students to participate in an investigation hike that will have them exploring three different ecosystems. In the forest, they will explore predator prey relationships through an interactive game. In the meadow, students will take part in a population mapping game that simulates conflicting land needs by stakeholders. In the wetland, students will learn about the functions of wetlands as well as explore the macroinvertebrates in Genesee Creek. Throughout the program students will be comparing and contrasting each ecosystem they encounter. This field experience can accommodate up to 60 students.

**Call to Action:** Local Ecosystem Restoration Projects: Students can work with local organizations and officials to plan a native plant project within their community. They then can be involved in preparing the chosen site(s), planting at the site(s), and caring for the site(s).

Prairie Springs  
**Ecosystem Investigations**  
[\*\*\*Request This Program!\*\*\*](#)

Pre, Post Activities  
and Call to Action  
[\*\*\*Lesson Plan\*\*\*](#)

ESSENTIAL QUESTION:  
How have invasive species  
influenced native plant and  
animal populations?



## *Invasive Species Study*

**NGSS Performance Expectations:** [MS-LS-2-4](#). Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**Wisconsin Environmental Education Standard:** [ELS.EX2](#)

**Pre-Field Experience Activity:** Students participate in an observation investigation of local invasive species and then use a database to research different species to identify if a species is invasive or native. Optionally, a classroom visit from an invasive species specialist can be scheduled.

**Field Experience:** This half-day field experience includes an ecology hike to learn about the relationships between native, non-native, and invasive species, a water exploration of Genesee Creek to test the quality of the water by finding and identifying benthic macroinvertebrates, and an active stewardship activity to remove invasive species. This field experience can accommodate up to 60 students. *\*Waukesha School District Teachers may also book this program through E.B. Shurts.*

**Post-Field Experience Activity:** Students complete a research project on Invasive Species control or a project related to Invasive species.

**Call to Action:** Local Invasive Management: Waukesha County is home to many invasive species (aquatic and land) and as a school you can work to build a plan to help control the spread in your community. Students will work to research species, policies and current management practices and then formulate a management plan for their school, neighborhoods, and homes. <https://dnr.wi.gov/topic/Invasives/>

Prairie Springs  
Invasive Species Study  
[\*\*Request This Program!\*\*](#)

Pre, Post Activities  
and Call to Action  
[\*\*Lesson Plan\*\*](#)

ESSENTIAL QUESTION:  
How do adaptations help  
organisms survive in the prairie?

## *Survival in the Prairie*

This field experience has a full curriculum unit available.

**NGSS Performance Expectations:** [MS-LS-4-4](#). Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

**Wisconsin Environmental Education Standard:** [ELS.EX2](#)

**Pre-Field Experience Activity:** Students will engage in a jigsaw activity to build collective knowledge around animals and their unique adaptations in different ecosystems around the world.

**Field Experience:** Students will have the opportunity to observe the differences between four distinct ecosystems – prairie, field, pine plantation, and forest, and make connections to the life cycles and adaptations that have taken place over time. Students will investigate ecosystem succession, compare biodiversity between different ecosystems, and observe plant and animal adaptations up close to see how organisms' traits help them survive and reproduce. See the Planetarium show *Lucy's Cradle: The Birth of Wonder* that explores the long-term changes that spurred human development and migration. This field experience can accommodate up to 150 students


**Post-Field Experience Activity:** Using data collected in each of the four ecosystems determine which ecosystem has the most biodiversity and discuss reasons why some ecosystems are more diverse than others. Identify adaptations in plants and animals of species observed that aid in these organisms survival and reproduction.

**Call to Action:** Organize or participate in a biologic inventory or bioblitz - a communal citizen-science effort to record as many species within a designated location and time period as possible.

Retzer Nature Center  
Survival in the Prairie  
[Request This Program!](#)

Pre, Post Activities  
and Call to Action  
[Lesson Plan](#)





ESSENTIAL QUESTION:  
How does water shape the earth?

## *Effects of Water on the Land*

**NGSS Performance Expectations:** [MS-ESS-2-2](#). Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

**Wisconsin Environmental Education Standard:** [ELS.EX2](#)

**Pre-Field Experience Activity:** Students will familiarize themselves with compasses as well as the Waukesha County GIS system as a way to prepare for kettle mapping and making observations from Lapham Peak Tower.

**Field Experience:** Students will observe how water has shaped our local landscape through glaciers and rivers. They will measure and map kettles, climb the Laham Tower, and utilize stream tables to make predictions. This field experience can accommodate up to 120 students.

**Post-Field Experience Activity:** Students will engage in a Project WET activity or utilize a digital stream flow app to analyze how water can shape our earth.

**Call to Action:** Observe the topography of the area in relation to the local rivers and lakes and determine how the watershed is affected by the local topography.

E.B. Shurts at Lapham Peak  
Effects of Water on the Land  
[Request This Program!](#)

Pre, Post Activities  
and Call to Action  
[Lesson Plan](#)

**ESSENTIAL QUESTION:  
How does weather affect the  
water in the Fox River?**



## ***Weather & the River***

**NGSS Performance Expectations:** [MS-ESS-2-4](#). Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

**Wisconsin Environmental Education Standard:** [ELS.EX2](#)

**Pre-Field Experience Activity:** Explore the path of a water molecule through the water cycle and prepare for the field experience by learning about collecting data at a stream.

**Field Experience:** Students will investigate the effects of weather (specifically precipitation) on the local portion of the Fox River as well as make predictions using stream models. This field experience can accommodate up to 100 students.

**Post-Field Experience Activity:** Students will calculate streamflow and compare streamflow among groups and discuss model limitations as well as compare streamflow to USGS gauge value at Prairie Avenue.

**Call to Action:** Design and install a rain garden for your school.

E.B. Shurts  
**Weather & the River**  
**[Request This Program!](#)**

Pre, Post Activities  
and Call to Action  
**[Lesson Plan](#)**



## ***Full Curriculum Unit Overviews***

Dive deeper into concepts with a 14-day integrated unit. Students investigate an environmental issue and the problems associated with it through engaging classroom learning and a field experience. Students then develop a citizen action project and create storytelling media to share what they have learned and done.

Three different topics are available with lesson plans in this curriculum: Recycling (page [4](#)), Water Comparisons (page [9](#)), and Survival in the Prairie (page [12](#)). However, the unit can be applied to any of the Community Connections, Impacts & Actions Middle School Field Experiences listed in this book with very little modification.

Each lesson has a suggested structure with room for teachers to infuse more discussions, videos, or work time, as well as adjust pacing as makes sense for their class. In addition to science content tied to the Next Generation Science Standards, content connects to the National Council for Social Studies C3 Framework, Wisconsin Environmental Education Standards, and Career Standards. To see the entire integrated unit, download the iBook or pdf [here](#).



Retzer Nature Center is over 450 acres of prairie, forest, wildlife habitat, nature trails and environmental learning facilities in Waukesha County. The state-of-the-art, 90-seat, Digistar-6 planetarium is owned and operated by the School District of Waukesha.



Carroll University's Prairie Springs Environmental Education Center and Greene Field Station are located in the Town of Genesee, about 10 miles from the University's main campus in Waukesha. The site includes a stunning new facility for teaching and research—as well as 75 acres of natural springs, wetlands, woodlands and grasslands along Genesee Creek.



The E.B. Shurts building, located in the Fox River Sanctuary, is home to the environmental education program of the School District of Waukesha. The building is operated through a cooperative agreement between the School District of Waukesha and the City of Waukesha, Park and Recreation Department.



*Waukesha County, Waukesha School District, and Carroll University have collaborated to create a comprehensive, interdisciplinary K-12 science and environmental education curriculum fully integrated with NGSS Science and Literacy standards.*

*The goal of this curriculum is to create more scientifically and environmentally literate citizens with the ability to understand and critically assess current scientific and environmental issues, along with a desire and ability to engage in these issues. This project focuses on improving efficiencies through program coordination among partners as well as building comprehensive approaches.*

