

2020 - 2022 School Year

Science & Environmental Education *Community Connections, Impacts & Actions*

A comprehensive K-12 science and environmental education curriculum developed collaboratively between Waukesha County, School District of Waukesha, and Carroll University.



www.WaukeshaCounty.gov/EnvironmentalEd

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Waukesha County, School District of Waukesha, 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.



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PURPOSE OF ENVIRONMENTAL EDUCATION



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.

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

CURRICULUM OVERVIEW

This curriculum is organized by K-5, 6-8, and 9-12 grade bands. All grade bands are aligned directly to the Next Generation Science Standards (NGSS) and the Wisconsin Standards for Environmental Literacy and Sustainability (WSELS). The 6-8 and 9-12 curriculums serve as a way to infuse the WSELS into the secondary science classroom without sacrificing time or content. The K-5 curriculum is written as two-week integrated units designed for teachers and students to engage in an interdisciplinary study of science and the environment through literacy and math lessons. The lessons and activities are not meant to be done in isolation, but in support of and during literacy and math time.

All lessons have a structure with room for teachers to infuse more interactive play, academic discussions, or videos as well as adjust pacing as makes sense for their class. The assessments are designed to assess the NGSS, with several formative checks along the way for Common Core State Standards (CCSS) and WSELS, used as the teacher sees fit. The purpose of this curriculum is to serve as a support to help schools, teachers, and the community better educate our students on key issues at a local and global scale. The curriculum can be viewed and downloaded in PDF or iBook form at <https://www.waukeshacounty.gov/envedu/schools/curriculum>.

All programs within this Community Connections, Impacts & Actions Collaborative Curriculum can be requested online at www.waukeshacounty.gov/envedu and are noted with an asterisk within each grade level listed under "Schools."



FIELD TRIP SITES & FEES



Waukesha County
Retzer Environmental Learning Center
 S14 W28167 Madison St., Waukesha, WI 53188



Retzer Nature Center is over 450 acres of prairie, forest, wildlife habitat, nature trails and environmental learning facilities in Waukesha County.

It also is home to the Horwitz-DeRemer Planetarium, which is owned and operated by the School District of Waukesha.

One teacher or chaperone is required per 10 students for all programs.



Waukesha Department of Parks and Land Use Fees:

Retzer Environmental Learning Center Programs:

(At Retzer- based per student, minimum charge for 10 students; free for teachers and chaperones.)	(At-School- based per naturalist, maximum of 30 students per class.)
1-hour\$3.00	1 hr. or 1.5 hr. program base fee.....\$125.00
1.5 hours.....\$4.00	
2 hours.....\$5.00	

Recycling, Water Resources & Environmental Health Programs:

Programs are free for qualified schools in Waukesha County.
 Fees may apply in accordance with Retzer Nature Center fees as listed above.
 (For select Recycling programs, free tour and bus funding may be available.)

Waukesha School District Fees: (for non-district schools only)

Planetarium Programs: (based per attendee, minimum charge for 12 seats)
 Full-length Show Base Fee.....\$42.00
 Then per person thereafter\$3.50
 One teacher or chaperone is admitted free per 25 students. Maximum seating of 90 seats.

UW-Extension Programs At-School Fees:

\$75 for 1-hour includes mileage charge.
 Maximum of 30 students.

Retzer Nature Center & Horwitz-DeRemer Planetarium Cancellation Policy:

If payment is not received at least 21 days in advance, the program will be cancelled. If a program is cancelled within 21 days of the program date, the program fee may be forfeited or a credit issued instead of a refund. Credit must be redeemed within the same calendar year unless otherwise noted. All programs are held rain or shine. An indoor program may replace hikes in inclement weather.

FIELD TRIP SITES & FEES



School District of Waukesha
E.B. Shurts Environmental Education Center
 810 W College Ave., Waukesha, WI 53186

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.

School Group Fees:

(For all non-district, K-12 recognized institutions.)
 Base Fee\$50.00

Base fee starts at \$50 and rates vary based on class size, length of program, and whether visiting teachers and/or volunteers would like to have teaching responsibilities during the program for a reduced rate. Please contact E.B. Shurts for specific program fees and to learn about additional education offerings not listed in this guide.



Carroll University
Prairie Springs Environmental Education Center
 W307 S4706 Hwy. 83, Genesee Depot, WI 53149

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 new facility for teaching and research-- as well as 75 acres of natural springs, wetlands, woodlands, and grasslands along Genesee Creek.

School Group Fees:

(For all K-12 groups from recognized institutions.)
 1-hour \$1.00 per student, \$50.00 minimum charge.
 One chaperone required per 10 students, no charge to chaperones.
 Pricing for multiple visits per year can be arranged and determined on a case-by-case basis.



Prairie Springs Environmental Education Center Cancellation Policy:

A program may be cancelled if the contract with payment agreement is not received at least 10 business days before the schedule date. A \$50 cancellation fee may be charged for any cancellations made within 10 business days of the scheduled program date. An additional materials fee may be charged if specialized materials/equipment was purchased for the program. In case of inclement weather, the center will try to reschedule the program when given advance notice.

KINDERGARTEN

This unit connects to the specific literacy theme of “Community.” Connections are made between people serve as community helpers through their jobs and how students serve the community through their actions as environmental stewards.

STEM CONNECTIONS

Students will work as a class to reduce waste in their school. They will sort, count, and chart the total class waste and engineer a solution for their building based on the data they collect.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELS.EX2 - Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.
- ELS.EX4 - Students analyze the interactions and outcomes of cycles and flows in natural and cultural systems.
- ELS.EN6 - Students analyze the dynamic balance between natural and cultural systems.
- ELS.EN7 - Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

This integrated unit uses NGSS and CCSS as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE MATH
KL-ESS3 Communicate solutions that will reduce the impact on humans on the land, water, air, and/or other living things in the local environment.	Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.	Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.	Events have causes that generate observable patterns.	CCSS.MATH.CONTENT.1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	CCSS.MATH.CONTENT.K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/ “less of” the attribute, and describe the difference

How Can We Reduce Our Negative Impact On Our Community?



Recycling: Your Actions Matter

Retzer Environmental Learning Center

Also available at your school as an all-school assembly for K-5.

1 hour

Students will:

- Learn about the three Rs, what to recycle, and what recyclables become.
- Close the loop at our new Retzer Nature Center interactive exhibit area!
- Visit the eco-house, load the recycling truck, operate the mini-recycling facility and deliver recyclables to remanufacturers to become new products ready for the store shelves.
- Learn how your actions matter!

*Bus funding may be available, e-mail: recycling@waukeshacounty.gov.



Community Helpers

E.B. Shurts Environmental Education Center

2 hours

Students will:

- Participate in hands-on activities to learn about what it means to be a community helper.
- Meet live animals, investigate a picnic scene, take a nature walk and create a turtle craft.

Activities will take place indoors and outdoors.



GRADE 1

This unit connects to the specific literacy theme of “Investigation.” Students will be studying biomimicry, which is the investigation of how we can use animals and plants as models for human technologies.

STEM CONNECTIONS

Students will work collaboratively to engineer a habitat to help their animal survive in a variety of scenarios. Students will ask, imagine, plan, create, and improve their creation as a team.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELX.EX5 - Students investigate and analyze how change and adaptation impact natural and cultural systems.

This integrated unit uses NGSS and CCSS as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE MATH
1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.	Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.	Use materials to design a device that solves a specific problem or a solution to a specific problem.	Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.	CCSS.ELA-LITERACY.RI.1.8 Identify the reasons an author gives to support points in a text. CCSS.ELA-LITERACY.RI.1.9 Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures). CCSS.ELA-LITERACY.RI.1.10 With prompting and support, read informational texts appropriately complex for grade 1. CCSS.ELA-LITERACY.W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.	CCSS.MATH.CONTENT.1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

How Do Animals Use Their Adaptations to Survive in Their Environment?



Animal Adaptations

Retzer Environmental Learning Center
Also available at your school.

1 hour to 1.5 hours

Students will:

- Enjoy a visit from the Retzer teaching animals!
- See how an animal's physical and behavioral traits can help it to survive as we explore the concepts of habitat and adaptation.
- For an extended program (1.5 hours), add on the Create a Critter activity where students will create a critter with unique traits to illustrate how their critter will function and survive in its habitat or the Adaptation hike where students will explore how animals use their adaptations to survive in the wild. (Additional fees apply.)



Animal Adaptations

E.B. Shurts Environmental Education Center
1.5 hours

Students will:

- Visit the live animal and habitat rooms to explore and observe a variety of animals and their adaptations, including snakes, turtles, salamanders and more.



GRADE 2

This unit connects to the specific literacy theme(s) of “Growth” or “Learning.” This will be culmination of the larger unit around plant and animal growth. Students will focus on understanding how pollination affects our environment and how humans affect pollinators.

STEM CONNECTIONS

As a class, students will decide on and plan a project (building bat houses, installing native bee gardens, etc.) to preserve the native pollinators. Students will work with the leaders of their building and community to identify the need and engineer a solution.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELS.EX2 - Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.
- ELS.EX3 - Students assess how diversity influences health and resilience of natural and cultural systems.
- ELS.EX5 - Students investigate and analyze how change and adaptation impact natural and cultural systems.
- ELS.EN7 - Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

This integrated unit uses **NGSS** and **CCSS** as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE MATH
2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.	Plants depend on animals for pollination or to move their seeds around.	Develop a simple model based on evidence to represent a proposed object or tool.	The shape and stability of structures of natural and designed objects are related to their function(s).	CCSS.ELA-LITERACY.RI.2.3. Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. CCSS.ELA-LITERACY.RI.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).	CCSS.MATH.CONTENT.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

What Can We Learn About Our Negative Impact On Pollinators?



Plants and Pollinators

Retzer Environmental Learning Center
1.5 hours

Students will:

- Investigate the relationship between plants and the animals that contribute to the process of pollination.
- Act out these pollinators’ “jobs” to understand the pollination process.
- Hike the trails looking for what is in bloom to observe the pollinators in action.
- Record the types of pollinators and flowers we find on the trails. After the program, the class can turn their observation into a chart or graph summarizing their findings.



The Importance of Pollinators

E.B. Shurts Environmental Education Center
2.25 hours

Students will:

- Learn about pollination while visiting the native gardens in the Fox River Sanctuary.
- Discover how native pollinators support humans through indoor and outdoor activities.



GRADE 3

This unit connects to the specific literacy theme of “Power.” This will be culmination of the larger unit around weather and climate. Students will focus on understanding how severe weather impacts life, health, property, and environment.

STEM CONNECTIONS

Students will design a solution that reduces the impacts of a flood-related hazards on the Fox River. They will focus on the impacts made before, during, and/or after a flood making sure to note the effects on life, health, environment, and property.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELS.EX4 - Students analyze the interactions and outcomes of cycles and flows in natural and cultural systems.
- ELS.EX5 - Students investigate and analyze how change and adaptation impact natural and cultural systems.

This integrated unit uses NGSS and CCSS as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE MATH
3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.	Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.	Cause and effect relationships are routinely identified, tested, and used to explain change.	CCSS.ELA-LITERACY.RI.3.3 Describe the relationship between a series of historic events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. CCSS.ELA-LITERACY.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.	CCSS.MATH.CONTENT.3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 1 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

What Power Do People Have to Reduce Impacts of Weather Hazards?



Severe Weather

E.B. Shurts Environmental Education Center

5 hours

Students will:

- Learn how severe weather affects the Fox River and other water resources in Waukesha County.
- Observe the river directly by using waders and nets to collect aquatic organisms and measure water quality.
- Investigate how humans impact local water sheds and discuss how we can be part of the solution for protecting our natural resources.



The Weather Machine

Retzer Environmental Learning Center

1.5 hours

Students will:

- Discover the basics of the Earth’s “Weather Machine” - air, water, land and ice.
- Learn how the global weather machine is responsible for Wisconsin’s climate and compare our climate to different regions of the world.
- Head outside to the Retzer trails to measure current weather conditions and make predictions about our weather based on the seasons.



GRADE 4

This unit connects to the specific literacy theme of “Relationships.” This mini-unit is part of a larger Earth and Human Activity Unit where students will learn about how human activity has impacted the Earth by exploring the essential question: What relationship do individual communities have with protecting the Earth’s resources and environment?

STEM CONNECTIONS

Students will work in groups to identify causes of erosion and describe what methods should be implemented to prevent erosion. They will design an action plan on how best to mitigate the amount of erosion occurring locally.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELS.EX3 - Students assess how diversity influences health and resilience of natural and cultural systems.
- ELS.EX4 - Students analyze the interactions and outcomes of cycles and flows in natural and cultural systems.
- ELS.EN6 - Students analyze the dynamic balance between natural and cultural systems.

This integrated unit uses **NGSS** and **CCSS** as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE ELA
4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Rainfall helps to shape the land and affects the types of living things found in the region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.	Make observations and/or measurements to produce data to serve as a basis for evidence for an explanation of a phenomenon.	Cause and effect relationships are routinely identified, tested, and used to explain change.	CSS.ELA-LITERACY. RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. CCSS.ELA-LITERACY. W4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.	CCSS.MATH. CONTENT.4.MD.A.1 Know the relative sizes of measurement units within one system of units including km, cm, kg, g, lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in larger unit in terms of smaller unit. Record measurement equivalents in a two-column table.

How do Humans Impact Erosion Rates Caused by Water, Wind, Ice or Vegetation?



Healthy Soils through Composting

Retzer Environmental Learning Center
Also available at your school (45 min.)

1 hour

Students will:

- View a real soil profile, understand how soil is formed, and discover the importance of organic matter.
- Conduct an erosion experiment and observe live compost microorganisms.
- Learn how to put food waste to use through the simple act of composting and improve soil health.



What Changes the Land

E.B. Shurts Environmental Education Center
Lapham Peak

5.5 hours

Students will:

- Visit Lapham Peak to study weathering and erosion of landforms in Waukesha County.
- Cycle through activities such as a nature hike, soil investigation, glacier experiments, and more.
- Climbing to the top of the Lapham Peak observation tower is always a highlight of the day!



GRADE 5

This unit connects to the specific literacy theme of “Relationships.” This mini unit is part of a larger Ecosystems Unit where students will learn about how the relationships amongst living things with each other and their environments have impacted the Earth by exploring the essential question: What relationship do individual communities have with protecting the Earth’s resources and environment?

STEM CONNECTIONS

Students will brainstorm and develop an action plan to help protect Earth’s water in their local communities. Students could use various media to enact their action plans. Groups will present on what their action plan is, who it will be presented to, and what is the intended outcome as well as the reason they chose the specific water issue.

- ELS.C1 - Students develop and connect with their sense of place and well-being through observation, exploration and questioning.
- ELS.EX2 - Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.
- ELS.EX3 - Students assess how diversity influences health and resilience of natural and cultural systems.
- ELS.EX4 - Students analyze the interactions and outcomes of cycles and flows in natural and cultural systems.
- ELS.EX5 - Students investigate and analyze how change and adaptation impact natural and cultural systems.
- ELS.EN7 - Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

This integrated unit uses **NGSS** and **CCSS** as the backbone to planning and infusing environmental education standards into the curriculum.

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE ELA
5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.	Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design solution.	A system can be described in terms of its components and their interactions.	CCSS.ELA-LITERACY.RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. CCSS.ELA-LITERACY.W.5.7 Conduct short research projects that can use several sources to build knowledge through investigation of different aspects of a topic.	CCSS.MATH.CONTENT.5.MD.8.2 Make a line plot to display a data set of measurement in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in plots.

How do Individual Communities use Science to Protect Water Resources and the Environment?



Water Resources

Retzer Environmental Learning Center

Also available at your school.

1 hour

Students will:

- Discover the many aspects of water in the interactive power point program.
- Learn where drinking water comes from and where it goes after we are done with it.
- Students will learn what actions they can take to preserve and protect our water resources.



Healthy Watersheds

E.B. Shurts Environmental Education Center

5.5 hours

Students will:

- Engage in active learning as they explore our local water resources.
- Study local watersheds as well as test the quality of our local water resources using both chemical and biological tests.

This is a full day field trip with rotations between several different stations and laboratory investigations.



Wetlands and Water

Prairie Springs Environmental Education Center

3 or 5.5 hours

Students will:

- Experience a more in-depth look at the importance of freshwater on Earth.
- Explore the many beneficial functions of the disappearing wetlands in our watershed and how scientists determine the health of a creek.
- Explain water quality as it relates to biological indicators; describe the lifecycle of freshwater fish and what external factors can affect their survival; and define a wetland and understand its essential functions.

NGSS PERFORMANCE EXPECTATION: MS-PS-1-3

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

- ELS.EX5 - Compare and contrast various cultural systems' viewpoints, actions, decisions, and behaviors related to sustainability.



Recycling

Waukesha County Recycling
City of Milwaukee/Waukesha County Materials Recycling Facility
1401 W Mount Vernon Ave., Milwaukee
1.5 hours

“How can we reduce the impact of our consumer waste on the environment?”

Students will:

- Tour the Milwaukee Materials Recycling Facility (MRF) and observe the fascinating combination of physics, technology and people sorting and baling mixed recyclables before heading to mills and then market.
- Learn the details of what can be recycled, why some things cannot, what companies buy each commodity, and what they will become.

Can be combined with other programming/field trip destinations for large groups.



NGSS PERFORMANCE EXPECTATION: 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.

- ELS.C1 - Students will be able to identify, investigate, and evaluate environmental problems and issues.



The Big Melt

E.B. Shurts Environmental Education Center 6 hours
“How can we utilize environmentally-friendly materials in our winter sporting and daily activities?”

Students will:

- Have the opportunity to build awareness and appreciation of the local environment in the winter.
- Investigate how we can be aware of our environment while solving a common winter issue: ice.

This field experience is designed to last a full day with a lunch break included.



NGSS PERFORMANCE EXPECTATION: MS-PS-3

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

- ELS.EX5 - Students will analyze the dynamic balance between natural and cultural systems.



Amazing Renewable Energy

Retzer Environmental Learning Center
2.5 hours



“How can we minimize negative environmental impact using alternative forms of energy?”

Students will:

- Participate in programs with Retzer (1 hr.), Recycling (30 min.) and the Planetarium (1 hr.).
- Discover the differences between renewable and non-renewable energy sources and how we can all minimize negative environmental impact using alternative forms of energy.
- Explore the concept of thermal energy transfer and discover how energy from the earth can be used to help heat and cool building (geothermal energy). Students will collect temperature data from the soil, pond, spring-fed stream, and other surfaces to compare thermal energy transfer from the earth and sun.
- Learn how recycling and consumer choices save energy. Try our energy bike to demonstrate the difference in energy use by types of different light bulbs. (Recycling Saves Energy)
- See the Planetarium show Dynamic Earth. The show explores the inner workings of Earth's climate system, narrated by Liam Neeson. With visualizations based on satellite monitoring data and advanced supercomputer simulations, this cutting-edge production follows a trail of energy that flows from the Sun into the interlocking systems that shape our climate: the atmosphere, oceans, and the biosphere.

NGSS PERFORMANCE EXPECTATION: MS-PS-4; MS-LS-1-4

MS-PS-4. 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.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Colors In Nature

Retzer Environmental Learning Center
2.5 hours



“What creates colors in nature and why are they important?”

Students will:

- Participate in programs with Retzer (1.5 hrs.) and the Planetarium (1 hr.).
- In one rotation, students will observe how light waves interact through natural materials, record how colors may help plants and animals survive and reproduce, and examine how color is perceived differently by different organisms.
- In the other rotation, students will see the show Cosmic Colors: An Adventure Along the Spectrum.



NGSS PERFORMANCE EXPECTATION: MS-LS-1-4

Use 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.

- ELS.EN7 - Students will use credible research methods to investigate environmental questions, revise their personal understanding to accommodate new knowledge and perspectives, and be able to communicate this understanding to others.



Aquatic Survival

E.B. Shurts Environmental Education Center
3 hours

“What specialized structures do aquatic macroinvertebrates have that help them survive and reproduce?”

Students will:

- Actively 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 is designed to last a half day.



NGSS PERFORMANCE EXPECTATION: 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.

- ELS.EN7 - Students will engage in experiences to develop stewardship for the sustainability of natural and cultural systems. Learning Priority.



Water Comparisons

E.B. Shurts Environmental Education Center and
Prairie Springs Environmental Education Center
6 hours

“What environmental factors have affected the growth of macroinvertebrates in the Fox River and Genesee Creek?”

Students will:

- Have the opportunity to test the biological, physical and chemical environments of the Fox River (E.B. Shurts) and Genesee Creek (Prairie Springs) and make inferences as to how those environmental factors affect the macroinvertebrates.

This field experience is designed to last a full day with a lunch break included, but can be adjusted.



NGSS PERFORMANCE EXPECTATION: MS-LS-2-2

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Ecosystem Investigations

Prairie Springs Environmental Education Center
3 hours

“How do organisms interact across multiple ecosystems?”

Students will:

- Participate in an investigation hike that will have them exploring three different ecosystems.
- Explore predator prey relationships in the forest 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.

This field experience is designed to last a half day.



NGSS PERFORMANCE EXPECTATION: MS-LS-2-4

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Invasive Species Study

Prairie Springs Environmental Education Center
or E.B. Shurts Environmental Education Center
5.5 hours

“How have invasive species influenced native plant and animal populations?”

Students will:

- Participate in an Invasive Species Pull to help battle invasive species in our community.
- Test water quality to see how biotic and abiotic factors can be affected by invasive species.

This field experience is designed to last a full day with a lunch break included.



NGSS PERFORMANCE EXPECTATION: 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.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Survival in the Prairie

Retzer Environmental Learning Center
2 hours

"How do adaptations help organisms survive in the prairie?"

Students will:

- Have the opportunity to observe the differences between four distinct ecosystems (prairie, field, pine plantation, forest) and make connections to the life cycles and adaptations that have taken place over time.
- 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.



NGSS PERFORMANCE EXPECTATION: 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.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Weather and the River

E.B. Shurts Environmental Education Learning Center
5.5 hours

"How does weather affect the water in the Fox River?"

Students will:

- Rotate through three rotations where they will actively 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 is designed to last a full day with a lunch break included.



NGSS PERFORMANCE EXPECTATION: 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.

- ELS.EX2 - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.



Effects of Water on the Land

E.B. Shurts Environmental Education Learning Center
5.5 hours

"How does water shape the earth?"

Students will:

- Observe how water has shaped our local landscape through glaciers and rivers.
- Measure and map kettles, climb the Laham Tower, and utilize stream tables to make predictions

This field experience is designed to last a full day with a lunch break included.



Dive deeper into concepts with a 14-day integrated unit covering an environmental issue through creating a citizen action project.

Units are available for Recycling, Water Comparisons, and Survival in the Prairie.

Download the full curriculum [here](#).



NGSS PERFORMANCE EXPECTATIONS: HS-LS-2-1; HS-LS2-6

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

- ♦ **ELS.EX2** - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.

Population Dynamics

Prairie Springs Environmental Education Center
6 hours

“Why is biodiversity important for a healthy ecosystem?”

Students will:

- Build evidence for the claim that “biodiversity is important for maintaining healthy ecosystems.”
- Explore how invasive species affect biodiversity in an ecosystem and how differences in biodiversity affect the food webs in an ecosystem.

This field experience is designed to last a full day with a lunch break included. Half-day experiences can be arranged upon request.



NGSS PERFORMANCE EXPECTATIONS: HS-PS1-4; HS-PS3-4

HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics.)

- **ELS.EN7** - Students will use credible research methods to investigate environmental questions, revise their personal understanding to accommodate new knowledge and perspectives, and be able to communicate this understanding to others.

The Chemistry of Climate Change

Prairie Springs Environmental Education Center
6 hours

“How do greenhouse gases in the environment affect climate change?”

Students will:

- Participate in activities that discuss and demonstrate the causes of the greenhouse effect through chemistry and how that relates to climate change.

This field experience is designed to last a full day with a lunch break included. Half-day experiences can be arranged upon request.



NGSS PERFORMANCE EXPECTATION: HS-PS1-5

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature of concentration of the reacting particles on the rate at which a reaction occurs.

- ♦ **ELS.EX2** - Students will demonstrate an understanding of the natural environment and the interrelationships among natural systems.

Water Quality Testing

Prairie Springs Environmental Education Center
6 hours

“How do chemicals in water affect organisms?”

Students will:

- Explore the biological, physical, and chemical properties that affect water quality.
- Have an opportunity to investigate how humans can impact water systems to make both positive and negative changes.

This field experience is designed to last a full day with a lunch break included, but can be adjusted upon request.



NGSS PERFORMANCE EXPECTATIONS: HS-ESS3-1; HS-ESS3-5

HS-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.
HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

- **ELS.C1** - Students will be able to identify, investigate, and evaluate environmental problems and issues.



Hidden Threats

Retzer Environmental Learning Center and Horwitz-DeRemer Planetarium
 3 hours



“What are some of the hidden threats to the environment and what is their impact? How can these threats be mitigated?”

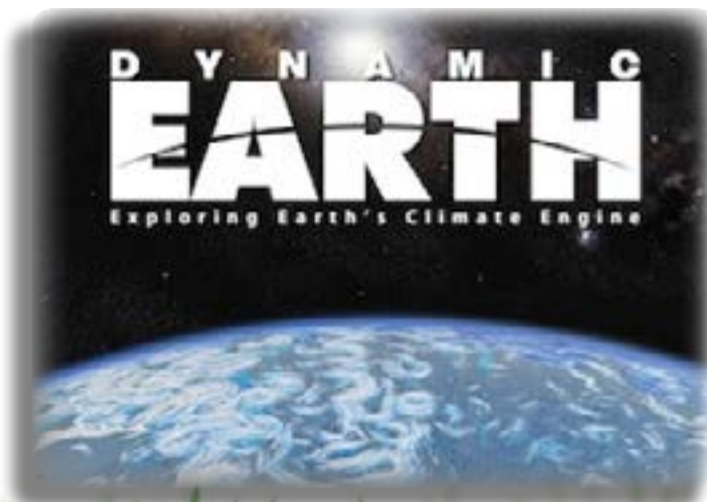
Students will:

- Participate in programs with Retzer (1 hr.), Water Resources (1 hr.) and the Planetarium (1 hr.)
- Explore local threats to the land and water, their impacts and how these threats may be mitigated.
- Investigate invasive species threatening the ecosystems of Southern Wisconsin and specifically the challenges these species present at Retzer Nature Center.
- Use a watershed model to see what threats to water quality are affecting our waters and how they get there.
- See the planetarium show Dynamic Earth that explores the inner workings of Earth's climate system.

This option is designed to be a full-day experience with a lunch break. The three, 1-hour rotations at three stations include: Invasive Species in our Ecosystem, Hidden Threats to our Watershed and the planetarium show Dynamic Earth.

Another option is designed to be a half-day experience with just the planetarium show and completing the Global Threats Activities at school.

- Participate in either Light/Sound Pollution or Green House Effect/Ocean Acidification in class.
- See the Planetarium show **Dynamic Earth**



NGSS PERFORMANCE EXPECTATIONS: HS-ESS2-4; HS-ESS3-1; HS-ESS3-4; HS-ESS3-5

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
HS-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.
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. **HS-ESS3-5.** Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

- **ELS.EX4** - Students will be able to analyze the interactions and outcomes of cycles and flows in natural and cultural systems.



Engineering Alternative Energy for a Changing Climate

Retzer Environmental Learning Center and Horwitz-DeRemer Planetarium
 2.5 hours



“Can alternative energy replace the use of fossil fuels?”

Students will:

- Participate in programs with Retzer (1.5 hrs.) and the Planetarium (1 hr.)
- Explore how energy from the earth can passively heat and cool buildings through geothermal systems, discover how solar energy is captured to create energy, and experience how the earth's interconnected systems shape our climate.
- See the planetarium show Dynamic Earth that explores the inner workings of Earth's climate system.

NGSS PERFORMANCE EXPECTATIONS: HS-ESS3-2; HS-ESS3-3; HS-ESS3-4; HS-ETS1-3

HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. **HS-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.

- **ELS.EX4** - Students will analyze the interactions and outcomes of cycles and flows in natural and cultural systems.



The Engineering of Recycling

Waukesha County Recycling
 City of Milwaukee/Waukesha County Materials Recycling Facility,
 1401 W Mount Vernon Ave., Milwaukee and one other location of your choice. Time varies based on options selected.

“What happens to residential waste once it leaves your home?”

Students will:

- Compare and contrast different aspects of waste management.
- Tour the MRF recycling facility and one other industrial site to compare and contrast waste management techniques. Other site options include: MMSD, the largest wastewater treatment plant in Wisconsin, a local landfill, or a plant nursery and yard waste processing site.



