Wisconsin Standards for Environmental Literacy and Sustainability

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WISCONSIN
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INSTRUCTION

What is environmental literacy and sustainability?

Environmental literacy and sustainability stem from a person's relationship with their place. Environmental literacy is demonstrated when individuals have the knowledge, skills, and dispositions to engage, individually and collectively, to support sustainable natural and cultural systems.

Sustainability refers to a community's ability to "satisfy its needs and aspirations without diminishing the chances of future generations" (Stone & Barlow, 2005, p. xiii). Developing environmental literacy is foundational to achieving this goal.

Wisconsin's Vision for Environmental Literacy and Sustainability

Conservation is a state of harmony between men and land...conservation still proceeds at a snail's pace... The usual answer to this dilemma is 'more conservation education.' No one will debate this, but is it certain that only the volume *of education needs stepping up? Is something lacking in the* content *as well?*

- Aldo Leopold, *A Sand County Almanac*

Wisconsin Standards for Environmental Literacy and Sustainability (ELS) strive to address this dilemma by outlining seven standards to help students **connect**, **explore**, and **engage** in the world around them.

Connect

1. *Students develop and connect with their sense of place and well-being through observation and questioning.*

Explore

2. *Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems.*

3. *Students assess how diversity influences health and resilience of natural and cultural systems.*

4. *Students examine the interactions and outcomes of cycles and flows in natural and cultural systems.*

5. *Students investigate and analyze how change and adaptation impact natural and cultural systems.*

Engage

6. *Students analyze the dynamic balance between natural and cultural systems.*

7. *Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.*

Our world is ever-changing, and as educators, we are preparing students for a future that we cannot yet imagine. By focusing on interactions and patterns within and among systems and embedding critical systems thinking into environmental literacy, students develop skills to deepen understanding in any content area and are prepared to be effectively engaged as citizens to foster sustainability.

This document outlines content standards and performance indicators intended to be integrated into a variety of curricular areas and support careers and postsecondary education in many fields, while helping students develop a sense of self, and understand their role in local and global communities.

The "environment" is the world in which we live, including both natural and built features. Humans are a part of, not apart from, the environment. This requires us to look at natural and human-created systems. Earth's natural systems are most often included in environmental education. These standards require examining cultural systems, including social, political, and economic systems, in tandem with natural systems. For example, when exploring sustainability of food systems, it is impossible to separate the natural and cultural aspects. Understanding the interconnectedness of natural and cultural systems is critical to environmental literacy and sustainability.

Environmental Literacy and Sustainability at the Local Level

While the content standards and performance indicators in this document outline the core ingredients for environmental literacy and sustainability, they do not prescribe how to teach at the local level. Some schools use their place (e.g., the school grounds, the local environment, the community) as a context for learning in all subject areas, thereby fostering enthusiasm for other disciplines. Others integrate school gardens or service-learning opportunities to foster environmental stewardship. Infusing environmental education throughout the K-12 curriculum increases classroom learning for all students in science, social studies, math, and language arts (Liebermann & Hoody, 1998). Educators, community members, and parents will continue to develop curricula appropriate for their student population and location using the standards as guidelines against which they can monitor the quality of education experiences that develop environmental literacy and sustainability.

Choosing a pedagogical approach that allows for local and relevant learning also encourages culturally relevant teaching, a term coined by Wisconsin scholar Gloria Ladson-Billings (1994) to describe "a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes" (p.20). Just as biodiversity is important to the health of an

ecosystem, the diversity of our cultural approaches to ELS is critical. When the concept of environmental education was first being defined over 50 years ago, the shift of our nation from predominantly rural to urban had already begun. Urban educators have much to offer the field of environmental education, as they have been working to empower marginalized populations in meaningful ways for decades (Anyon, 1980; Freire, 1970; Ladson-Billings, 1994; Stapp, 1969; Ye, Valrelas & Guajardo, 2011). It is important that we consider all populations, urban and rural, and engage in real-world, relevant learning experiences that offer authentic, sustainable solutions for communities.

Wisconsin's Environmental Education Legacy

Wisconsin's historical commitment to education advancing environmental literacy and sustainability is well known. The Great Law of the Iroquois Confederacy, of which the Oneida Nation of Wisconsin is a part, says, "In our every deliberation, we must consider the impact of our decisions on the next seven generations." The Menominee Forest on the Menominee Reservation in northeastern Wisconsin has been noted as "one of the most historically significant working forests in the world" (Johnson & Johnson, 2012, para. 1). Legislation for conservation education has been in the state since 1935 and teacher preparation programs must include environmental education. In 1985, Wisconsin adopted a requirement for every school district to develop and implement a kindergarten through grade 12 sequential curriculum plan (PI 8.01(2)(k)2.a), with implementation

intended as an interdisciplinary approach, stating that "environmental education objectives and activities shall be integrated into K-12 curriculum plans, with the greatest emphasis in art, health, science and social studies education" (PI 8.01(2)(k)6.b). This interdisciplinary approach was also reflected in the department's *Curriculum Planning Guide for Environmental Education* (1985).

This leadership in environmental education continued with the groundbreaking "Wisconsin Model Academic Standards for Environmental Education" in 1998, and Wisconsin remains one of few states to have adopted academic standards in this area.

Wisconsin's Plan to Advance Education for Environmental Literacy and Sustainability in PK-12 Schools (2011) outlined three goals to:

1. Prepare students to understand, analyze, and address the major environmental and sustainability challenges facing Wisconsin, the United States, and the planet;

2. Provide field experiences as part of the regular school curriculum and create programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition; and

3. Create opportunities for enhanced preparation and ongoing professional development for teachers and school leaders by improving environmental and sustainability subject matter knowledge and pedagogical skills in teaching about environmental and sustainability issues, including the use of interdisciplinary, field-based,

and research-based learning; effective assessment practices; and innovative technology in the classroom.

The plan also identified the need to define what environmentally and sustainability literate graduates should know and be able to do, provide guidance to integrate Wisconsin standards and education for environmental literacy and sustainability, and include grade-level specificity. *Wisconsin Standards for Environmental Literacy and Sustainability* were written to support these goals.

Wisconsin's natural resources are the foundation of our economy, our life support systems, and a source of great pride for the people of our state. Wisconsinites have proven again and again that we are committed to ensuring our rich resource heritage and the high quality of life it provides us is sustained for future generations. *Wisconsin Standards for Environmental Literacy and Sustainability* support continuation of this legacy as students connect, explore, and engage in their local communities.

An Interdisciplinary Approach to Environmental Literacy and Sustainability

"When we try to pick out anything by itself, we find it hitched to everything else in the Universe." - John Muir

Wisconsin Standards for Environmental Literacy and Sustainability are intended to be integrated across subject areas from kindergarten through grade 12. Developing environmental literacy and the skills needed to support sustainable communities is a shared responsibility.

Environmental literacy and sustainability is often associated with science. While environmental science is a key component for ecological understanding, environmental literacy and sustainability is about optimizing the health of natural and cultural systems, and requires knowledge and skills in a number of areas, including, but not limited to, science, social studies, English language arts, mathematics, art, health, and career and technical education. In these

disciplines, students learn related concepts and skills that are needed to make decisions for a sustainable future. While other disciplines have environmental content, the discipline-specific content standards of these areas do not fully capture the interdisciplinary nature of environmental literacy and sustainability.

The standards support this interdisciplinary nature by focusing on "big ideas" that cross content boundaries: networks, nested systems, and interdependence; diversity and resilience; cycles and flows; change and adaptation; and dynamic balance (Stone & Barlow, 2005, p. 23) which are arranged in three interconnected content areas (sometimes referred to as "strands"):

1. [Connect](#)
2. [Explore](#)
3. [Engage](#)

Connect integrates the big ideas of systems and interdependence to provide a foundation for environmental literacy and sustainability by helping students develop and connect with their a sense of place. By asking questions about themselves and the world around them, students are mindful of how they affect their place and how their place affects them.

Explore draws upon skills and knowledge from many fields, including science and social studies. By developing understanding of natural and cultural systems through networks, nested systems, and interdependence; diversity and resilience; cycles and flows; change and adaptation, students can begin to optimize health and find balance among systems to preserve, utilize, and sustain our environment for seven generations and beyond.

Engage standards focus on dynamic balance and have students examine individual and collective rights and responsibilities related to models of sustainability and apply learning as stewards of their community.

Systems-thinking skills are integrated throughout all the standards. The ability to examine and respond to new information is critical to prepare students to understand, analyze, and address the major environmental and sustainability challenges facing Wisconsin, the United States, and the planet.

Numerous existing sets of standards and standards-related documents have been used in developing the *Wisconsin*

Standards for Environmental Literacy and Sustainability,
including:

- Center for Ecoliteracy's Ecological Principles (Stone & Barlow, 2005, p. 23)
- Education for a Sustainable Future Benchmarks: For Individual and Social Learning (Cloud, 2017)
- Guidelines for Excellence: K-12 Learning (NAAEE, 2010)
- Oregon Environmental Literacy Plan: Toward a Sustainable Future (OELTF, 2013)
- Washington State Learning Standards: K-12 Integrated Environmental and Sustainability (SPI, 2014)
- Wisconsin Standards for Science (WDPI, 2017)
- Wisconsin Standards for Social Studies (WDPI, under review)
- Wisconsin Standards for Information and Technology Literacy (WDPI, 2017)

Standards Structure

Discipline: Environmental Literacy and Sustainability
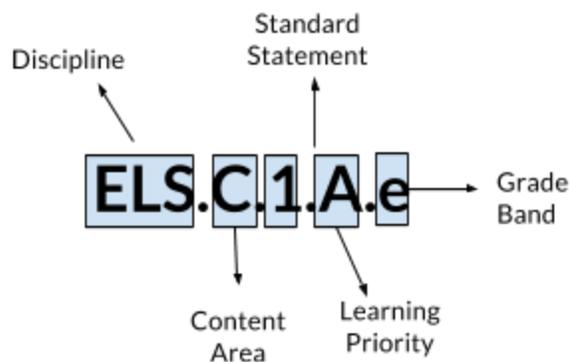
    Content Area: Connect (1)

        Standard: Broad statement that tells what students are expected to know or be able to do

            Learning Priority: Breaks down the broad statement into manageable learning pieces

            Performance Indicator by Grade Band: Measurable degree to which a standard has been developed and/or met

Discipline: Environmental Literacy and Sustainability (ELS)				
Content Area: Connect (C)				
ELS.C1: Students develop and connect with their sense of place and well-being through observation and questioning.				
Learning Priority	**Performance Indicators**			
	K-2 (e)	**3-5 (i)**	**6-8 (m)**	**9-12 (h)**
C1.A. Mental Models	ELS.C1.A.e Identify personal understandings, views, and beliefs, about how natural and cultural systems work within their community.	ELS.C1.A.i Explain how one's understanding of how the world works is developed from experience, and identify personal experiences that have shaped one's own mental models.	ELS.C1.A.m Integrate new perspectives into a mental model, and explain how new ways of thinking can lead to changing attitudes and behaviors.	ELS.C1.A.h Evaluate personal mental models of well-being, equity, social and environmental welfare, economic health, and concern for living beings.
C1.B: Sense of Place	ELS.C1.B.e Identify the natural and cultural parts that make up one's community (e.g., natural and built environments, habitats, family, school, cultural diversity), identify relationships between parts, and the role and impact of humans in those systems.	ELS.C1.B.i Describe natural and cultural histories of a locality, explain the relationship between the two from a variety of perspectives, and identify how that create a sense of place. Examine how meeting one's needs for food, water, and	ELS.C1.C.m Identify the relationship between parts of natural and cultural systems in connecting communities into regional systems (e.g watershed areas, political jurisdictions, ethnic communities). Understand the relationships between the environment and	ELS.C1.B.h Analyze relationships between parts of local and global natural and cultural systems. Compare and contrast historical and current resource use, and analyze the effects on local, regional, and global natural and cultural systems.

How to read the standards codes for a performance indicator:

"Content areas" in this code structure include:
- C - Connect
- EX - Explore
- EN - Engage

Content Standards

The seven standards outlined in this document are written to be accessible for any educator. Educators just getting started with environmental literacy and sustainability might integrate the standards by more explicitly making connections with the big ideas through existing units and lessons. Others might dig a little deeper to integrate the performance indicators specifically or use the big ideas to design new units of study to bridge multiple subject areas.

Grade Band Performance Indicators

Grade bands of K-2, 3-5, 6-8, and 9-12 align to typical elementary, middle, and high school levels.

- Grade band K-2 and 3-5 performance indicators represent knowledge and skills that should be integrated throughout the elementary curriculum with a focus on students' local natural and built environments, including school grounds, neighborhood, and community. Helping students connect locally develops a strong connection to place which can help them better understand the relativity of "local" when taking on different perspectives, such as comparing local engagement by youth in other places.

- Grade band 6-8 performance indicators represent knowledge and skills that should be integrated throughout the middle school curriculum when students can engage in more abstract thinking and expand perspectives, looking at regional and world environmental and sustainability issues. Allowing students to study and engage in meaningful ways that connect to their lives and make a difference deepen the learning experience.

- Environmental literacy and sustainability at the high school level builds upon skills in earlier grade levels and expands the focus to earth systems-level thinking, including community, national and global networks, impact, and responsibilities. As students in grades 9-12 strive to develop independence, allowing them the opportunities to lead engagement and be part of the solution to issues they are passionate about, creates powerful learning experiences.

It is important to note that there are no performance indicators outlined for 4K. Educators can use the *Wisconsin Model Early Learning Standards* to guide their work as they take advantage of the natural connections to environmental literacy and sustainability that come up every day in an effective 4K experience. Early childhood educators can also use the North American Association for Environmental Education's *Guidelines for Excellence: Early Childhood Programs* to help develop authentic exploration experiences that allow young children to figure things out and develop their own sense of wonder as they interact with their world.

Key Terms

Term	Use
"i.e" and "e.g."	The use of "i.e." and "e.g." in the indicators is in the manner of the original Latin. The abbreviation "i.e.", from the Latin id est, means "that is", and is used as a definition (required information). The abbreviation "e.g." is from the Latin exempli gratia, and means "for example" (suggested information).
Change and Adaptation	Change and adaptation is one of the "big ideas" framing the standards which comes from the ecological principles outlined by Fritjof Capra in Ecological Literacy. Understanding that "all life — from individual organisms to species to ecosystems — changes over time. Individuals develop and learn, species adapt and evolve, and organisms in ecosystems coevolve" (Stone, 2012) is important for students to understand as they engage in systems thinking to understand the world around them.
Cultural Systems	In several standards, performance indicators are split into a "natural systems emphasis" or "cultural systems emphasis." Cultural systems are human-designed, such as educational, agricultural, economic, social, and political systems.
Cycles and Flows	Cycles and Flows is another "big idea" framing the standards which comes from the ecological principles outlined by Fritjof Capra in Ecological Literacy. Examining how "members of an ecological community depend on the exchange of resources in continual cycles" and "cycles within an ecosystem intersect with larger regional and global cycles" is an important building block for understanding systems. Flow works hand-in-hand with cycles. "Each organism needs a continual flow of energy to stay alive. The constant flow of energy from the sun to Earth sustains life and drives most ecological cycles" (Stone, 2012). Cycles and flows are present in all cultural and natural systems.
Diversity	Diversity is another "big idea" framing the standards. In *Ecological Literacy*, Fritjof Capra writes, "The role of diversity is closely connected with systems' network structures. A diverse ecosystem will be resilient because it contains many species with overlapping ecological functions that can partially replace one another. When a particular species is destroyed by a severe disturbance so that a link in the network is broken, a diverse community will be able to survive and reorganize itself because other links can at least partially fulfill the function of the destroyed species. The more complex the network's patterns of interconnections are, the more resilient it will be" (Stone & Barlow, 2005, p. 25). The standards examine the impact of diversity in both cultural and natural systems.
Dynamic Balance	Dynamic balance is another "big idea" framing the standards. Sustainability in natural or cultural systems is not static. Michael Stone writes, "Ecological communities act as feedback loops so that the community maintains a relatively steady state that also has continual fluctuations. This dynamic balance provides resiliency in the face of ecosystem change" (Stone, 2012). By engaging in systems thinking, students will analyze how system structures, change and adaptation, diversity, and cycles and flows impact the dynamic balance and sustainability of systems.

Feedback	Feedback is information taken from a situation or experience. As systems respond to change, the results or effects create feedback in various forms, such as biochemical changes or behavioral responses. In systems thinking, students analyze feedback to consider potential modifications to the system structure to receive different feedback.
Interdependence	Interdependence is another "big idea" framing the standards which comes from the ecological principles outlined by Fritjof Capra in *Ecological Literacy*. In natural systems, "the sustainability of individual populations and the sustainability of the entire ecosystem are interdependent. No individual organism can exist in isolation" (Stone & Barlow, 2005, p. 24). The same is true in cultural systems. Capra writes, "Sustainability always involves a whole community. This is the profound lesson we need to learn from nature" (Stone & Barlow, 2005, p. 24).
Mental Model	A mental model is our understanding of how things work, or the schema we use to try to explain or relay some meaning about our reality. Mental models inform behavior and the results of the action/behavior then further inform our mental model—either by reinforcing the current model by getting the desired result, or by adjusting our model by learning from an undesired result. Understanding and identifying mental models is foundational to systems thinking.
Natural Systems	In several places, performance indicators are split into a "natural systems emphasis" or "cultural systems emphasis." Natural systems refer to all of Earth's systems which are not human designed, including both physical and living systems.
Networks	Networks is another "big idea" within the standards and a concept present in both systems thinking and Capra's ecological principles. Networks in both natural and cultural systems are created through relationship. Michael Stone explains, "All living things in an ecosystem are interconnected through networks of relationship. They depend on this web of life to survive. For example: In a garden, a network of pollinators promotes genetic diversity; plants, in turn, provide nectar and pollen to the pollinators" (Stone, 2012).
Outcome	Throughout the standards, students are asked to examine impact to systems and outcomes. The outcome of a system is determined by the system's structure. To achieve different outcomes, modifications to the system's structure must be made.
Perspective	A perspective is comprised of both a point and a view. Understanding multiple stakeholder perspectives, (including where they are coming from — point — and what they are seeing — view) is a key piece of systems thinking and developing environmental literacy.
Place	Throughout these standards is reference to "place" and developing a "sense of place." Place refers to the defining characteristics of a particular location, including natural features such as landscapes, watersheds, and relative location, and cultural aspects such as architecture, human-environment interaction, and economic activity.
Stakeholders	A stakeholder is any party (human or non-human) with an interest or concern in something.
Systems and	Systems and nested systems are additional "big ideas" within the standards and present in both systems thinking and Capra's

Nested Systems	ecological principles. While Stone writes about it in terms of natural systems, the concept applies to cultural systems as well: "Nature is made up of systems that are nested within systems. Each individual system is an integrated whole and—at the same time — part of larger systems. Changes within a system can affect the sustainability of the systems that are nested within it as well as the larger systems in which it exists" (Stone, 2012).
Systems Thinking	Systems thinking is about examining a system as a whole. Systems thinking is an emergent property (Cabrera & Cabrera, 2015, p. 9) that results from using four simple rules together: 1. Distinctions Rule: Any idea or thing can be distinguished from the other ideas or things it is with; 2. Systems Rule: Any idea or thing can be split into parts or lumped into a whole; 3. Relationships Rule: Any idea or thing can relate to other things or ideas; and 4. Perspectives Rule: Any idea or thing can be the point or the view of a perspective. Through making distinctions, identifying relationships, organizing into parts and wholes, and considering perspectives, students gain the skills needed to understand their own mental models of how the world works, adjust those models based on feedback (learning), and create the desired outcome. Students who are able to address concepts and issues from a systems thinking approach will be able to design a more sustainable future.

At-A-Glance: Wisconsin Standards for Environmental Literacy and Sustainability

Strand 1: Connect

STANDARD 1: **Students develop and connect with their sense of place and well-being through observation and questioning.**

Learning Priorities:
A. Mental Models
B. Sense of Place
C. Curiosity and Wonder
D. Personal Well-being

Strand 2: Explore

STANDARD 2: **Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems.**

Learning Priorities:
A. Systems Thinking
B. Natural Systems Emphasis
C. Cultural Systems Emphasis

STANDARD 3: **Students assess how diversity influences health and resilience of natural and cultural systems.**

Learning Priorities:
A. Multiple Perspectives
B. Natural Systems Emphasis
C. Cultural Systems Emphasis

STANDARD 4: **Students examine the interactions and outcomes of cycles and flows in natural and cultural systems.**

Learning Priorities:
A. Natural Systems Emphasis
B. Cultural Systems Emphasis

STANDARD 5: **Students investigate and analyze how change and adaptation impact natural and cultural systems.**

Learning Priorities:
A. Decision Making
B. Natural Systems Emphasis
C. Cultural Systems Emphasis

Strand 3: Engage

STANDARD 6: **Students analyze the dynamic balance between natural and cultural systems.**

Learning Priorities:
A. System Structure and Outcomes
B. Rights and Responsibilities
C. Models of Sustainability

STANDARD 7: **Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.**

Learning Priorities:
A. Inquiry and Investigation
B. Design and Implementation
C. Evaluation and Reflection

Connect

"It's only after being aware of what's around us that we develop an understanding of what nature is like."

–Ruth Hine, Wisconsin Conservation Hall of Fame Inductee

Discipline: Environmental Literacy and Sustainability (ELS)				
Content Area: Connect (C)				
ELS.C1: Students develop and connect with their sense of place and well-being through observation and questioning.				
Learning Priority	**Performance Indicators**			
	K-2 (e)	**3-5 (i)**	**6-8 (m)**	**9-12 (h)**
C1.A. Mental Models	ELS.C1.A.e Identify personal understandings, views, and beliefs, about how natural and cultural systems work within their community.	ELS.C1.A.i Explain how one's understanding of how the world works is developed from experience, and identify personal experiences that have shaped one's own mental models.	ELS.C1.A.m Integrate new perspectives into a mental model, and explain how new ways of thinking can lead to changing attitudes and behaviors.	ELS.C1.A.h Evaluate personal mental models of well-being, equity, social and environmental welfare, economic health, and concern for living beings.
C1.B: Sense of Place	ELS.C1.B.e Identify the natural and cultural parts that make up one's community (e.g., natural and built environments, habitats, family, school, cultural diversity), identify relationships between parts, and the role and impact of humans in those systems.	ELS.C1.B.i Describe natural and cultural histories of a locality, explain the relationship between the two from a variety of perspectives, and identify how that create a sense of place. Examine how meeting one's needs for food, water, and	ELS.C1.C.m Identify the relationship between parts of natural and cultural systems in connecting communities into regional systems (e.g watershed areas, political jurisdictions, ethnic communities). Understand the relationships between the environment and	ELS.C1.B.h Analyze relationships between parts of local and global natural and cultural systems. Compare and contrast historical and current resource use, and analyze the effects on local, regional, and global natural and cultural systems.

	Identify where one's food and water come from.	shelter can impact natural and cultural systems.	geography of a locality and its history, culture, and economy. Gather data from primary sources to identify local needs and compare to perceived local, regional, or global needs. Investigate alternatives to meeting one's needs for food, water, and shelter.	
C1.C: Curiosity and Wonder	ELS.C1.C.e Explore outdoors, observing changes over time, and describe and ask questions about patterns in natural and built environments.	ELS.C1.C.i Classify natural and designed objects, formulate questions about the relationship between physical and natural characteristics of the environment (e.g., soil/plants, water/animals),identify patterns, make predictions, and solve problems through sensory observations and active exploration.	ELS.C1.C.m Ask questions about patterns and cause and effect relationships in natural and cultural systems observed in everyday experiences (e.g., spatial and temporal change). Examine how curiosity and wonder help formulate questions to pursue knowledge about everyday experiences.	ELS.C1.C.h Investigate and analyze one's own curiosities about patterns that emerge from natural observations to develop new questions, draw conclusions, or formulate new ideas or solutions. Reflect and share how one's perspectives influence personal curiosity, the pursuit of knowledge, and respect for others and the environment.
C1.D: Personal Well-being	ELS.C1.D.e Recognize emotions relating to daily sensory observations and learning during integrated nature play. Recognize the mental, socio-emotional, and physical benefits of time spent outdoors, and explore strategies for self-regulation (e.g., practicing quiet time,	ELS.C1.D.i Develop goals to promote personal wellness, mindfulness, confidence, and self regulation, and stretch mental and physical limits through activities in and about nature. Compare and contrast creativity, personal wellness,	ELS.C1.D.m Reflect on and critique experiences related to personal wellness, creativity, and academics in indoor and outdoor environments. Create and implement a personal wellness plan that uses nature and outdoor activities to develop personal well-being, mindfulness,	ELS.C1.D.h Analyze the effects of environment and time outdoors on mental, socio-emotional, and physical health. Design and implement a home, school, or community wellness improvement plan that integrates the outdoors to develop mindfulness,

	bringing awareness to the process of breathing, choosing a natural object to focus on over time), gauging self limits, and developing confidence.	and academics in indoor and outdoor environments. Identify areas in the community that promote well-being and explain why.	confidence, and self-regulation, and stretch mental and physical limits; describe how the plan mitigates safety risks inherent in outdoor activities. Compare approaches of areas in the community that promote well-being and explain how personal well-being impacts a society's well-being.	confidence, and self-regulation; evaluate the outcomes, and communicate the results.

Explore

"The decisions we make today will impact seven generations.
 It is a heavy responsibility that our forefathers and foremothers undertook.
 We must keep this in mind as we proceed."

- Ada Deer, Menominee Indian Tribe of Wisconsin

Discipline: Environmental Literacy and Sustainability (ELS)				
Content Area: Explore (EX)				
ELS.EX2: Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems.				
Learning Priority	**Performance Indicators**			
	K-2 (e)	**3-5 (i)**	**6-8 (m)**	**9-12 (h)**
EX2.A: Systems Thinking	ELS.EX2.A.e Recognize parts, wholes, and boundaries of an idea or thing. Identify a familiar natural system, name its parts, and identify relationships among the parts (e.g., the school yard has playground equipment, trees, a garden, and birds; birds use trees for homes and find food in the garden), and compare one's identified system to others' to explore similarities and differences.	ELS.EX2.A.i Analyze a system to break it down into its component parts to understand their interconnectedness in forming the whole system. Identify a familiar system, differentiate and relate ideas, identify nested systems, consider perspectives and alternative boundaries, and name parts of relationships. Describe how perspective (both human and non-human)	ELS.EX2.A.m Create a model of a system, identify hidden relationships and perspectives, and analyze nested systems of its parts and wholes. Reorganize a system though analyzing alternative boundaries, perspectives, and relationships. Compare the relationship between two wholes by comparing the relationships of the parts.	ELS.EX2.A.h Recommend alternative models of systems to address different perspectives, define new boundaries, and achieve new outcomes. Examine nested systems within identified relationships and sub-perspectives of individual and group perspectives.

	is comprised of both a point and a view.		
EX2.B: Natural Systems Emphasis	ELS.EX2.B.e Identify species within an ecosystem and describe how the ecosystem provides resources and services necessary for survival.	ELS.EX2.B.i Explain how living and nonliving things can affect survival of organisms. Recognize ways that organisms depend on other organisms (e.g., plants depend on animals for pollination and seed dispersal) and that each has a role in the function of the ecosystem (e.g., producers, consumers, and decomposers).	ELS.EX2.B.m Analyze the relationships between living (biotic) and non-living (abiotic) parts in an ecosystem and examine the impact of each on the system. Describe how relationships among humans and organisms, species, populations, communities, ecosystems, and biomes affect the sustainability of natural and cultural systems.	ELS.EX2.B.h Compare and contrast the competitive, predatory, and mutually beneficial interactions between different species and ecosystems and evaluate the impacts of each on the system.
EX2.C: Cultural Systems Emphasis	ELS.EX2.C.e Identify ways in which people are dependent on natural resources and how access to resources can lead to conflict and cooperation. Identify rulemakers and why rules are made related to the environment.	ELS.EX2.C.i Investigate how Wisconsin's natural systems have shaped the state's cultural systems. Investigate how access to renewable and nonrenewable natural resources necessary for survival influences human interactions between and within geographic regions. Identify the basic role of the legislative, executive, and judicial branches of government in regard to the environment and sustainability.	ELS.EX2.C.m Analyze the impact of security, resource scarcity, cooperation, competition, and conflict on natural and cultural systems at the local, state, tribal, and national levels. Compare and contrast the roles of government at local, state, tribal, national, and international levels in setting and enforcing environmental policies, and encouraging sustainability.	ELS.EX2.C.h Assess the roles of individuals, government, and special interest groups in setting policies at the local, state, tribal, national, and international level; analyze the cultural and environmental dimensions of the policy; and propose a strategy to address concerns related to the policy. Design a solution for a natural resource scarcity issue using available resources in a different way or developing a new resource, and analyze intended and unintended consequences on sustainability in natural and cultural systems.

ELS.EX3. Students assess how diversity influences health and resilience of natural and cultural systems.

EX3.A: Multiple Perspectives	ELS.EX3.A.e Recognize different perspectives about the environment and identify potential conflicts and collaborations. Review information from multiple perspectives and ask questions about books, photos, artifacts, websites, and other sources used to learn about natural and cultural systems.	ELS.EX3.A.i Compare and contrast the perspectives of people from various cultures who have had an impact on the environment and sustainability. Examine the accuracy, reliability, and biases of sources used to learn about environmental and sustainability-related topics.	ELS.EX3.A.m Evaluate environmental issues from multiple perspectives, including unstated, absent, or under-represented perspectives, and assess how perspectives impact outcomes of the issue. Analyze and evaluate the logic, relevance, and accuracy of others' claims, taking into consideration potential bias and consider how sources influence perspectives and outcomes on environmental issues. Understand the role of cultural and science-based evidence in evaluating sustainability.	ELS.EX3.A.h Compare parallel historical and contemporary environmental issues and articulate the perspectives, including unstated, absent or under-represented perspectives, critique the balance of stakeholder interests in the outcome, and propose alternative solutions. Analyze and weigh relevance of sources through a disciplinary lens to determine how the author, context, audience, and purpose affect the reliability, limitations, and usefulness of a source.
EX3.B: Natural Systems Emphasis	ELS.EX3.B.e Recognize that environments are different based on location and time of year. Identify that producers are the basis of any food chain, and that a variety of producers is necessary to support the overall resilience of ecosystems. Discover that people can design solutions that improve environmental quality.	ELS.EX3.B.i Evaluate how diversity influences the quality of ecosystem functions that provide resources and services necessary for survival and how different roles contribute to diversity (e.g., balance of producers and consumers needed for a healthy, diverse food chain or the impact of soil, water, and air quality on life). Examine new discoveries and technologies that influence the	ELS.EX3.B.m Examine the relationships among resource use, environmental quality, and human health and well-being. Use data to explain how biodiversity can contribute to health and resilience as systems change over time. Assess and consider reasons for similarities and differences of	ELS.EX3.B.h Evaluate the impacts on health and quality of natural systems resulting from resource use at the global level and propose solutions to increase system resiliency. Evaluate and compare the characteristics of two communities and analyze how the diversity, health, and resilience of natural systems impact the quality and health of cultural systems.

		characteristics and quality of natural systems.	characteristics and quality of natural systems in communities locally and bioregions globally. Analyze how new knowledge or technological solutions impact natural resource use, or improve environmental quality.	Design and evaluate solutions that improve environmental quality or implement sustainable practices in areas lacking natural resources.
EX3.C: Cultural Systems Emphasis	ELS.EX3.C.e Discover differences in environments and cultural traditions and practices. Explain the concept of shared natural resources, and identify ways people can work together to maintain health of a common area. Explain the difference between fair and equal.	ELS.EX3.C.i Describe how cultures relate to their environments. Examine different perspectives on shared natural resources, and identify ways to measure health. Describe the importance of creating equitable policies, rules, and laws. Discuss the idea of right and wrong and examine impacts of individual actions.	ELS.EX3.C.m Analyze how one's cultural identity influences perspectives about shared natural resources and their role in maintaining the health and resilience of those resources. Analyze the environmental, social, and economic aspects of of community health and sustainability. Analyze cases where historically marginalized groups have been impacted by environmental decisions. Examine ethics of societal actions and their effect on others.	ELS.EX3.C.h Evaluate, from a variety of cultural perspectives, the concept of shared natural resources and what is needed to maintain its health and accessibility for all. Evaluate how groups have addressed issues of equity in environmental health and sustainability. Analyze the use and distribution of resources worldwide and the impact on populations, including historically marginalized populations. Analyze, compare, and critique the ethics of societal actions and impacts of ethnocentrism.

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

EX4.A: Natural Systems Emphasis	ELS.EX4.A.e Recognize that animals (including humans) get the nutrients and energy they need to grow and function from the food and water they consume. Identify places where water is found in different forms.	ELS.EX4.A.i Explain how energy can be converted from one form to another form (e.g., animals break down the food they eat to obtain energy and material to build body structures). Identify where water is found on Earth in solid, liquid or gaseous forms, and explain how it cycles between these forms through the water cycle. Illustrate the cycling of matter between living and nonliving systems.	ELS.EX4.A.m Develop and analyze models that describe cycles and flows of Earth's systems, including the cycling of water driven by energy from the sun and the force of gravity; the cycling of carbon dioxide, methane, nitrogen, and oxygen among the hydrosphere, atmosphere, and geosphere; and cycling of matter and energy through photosynthesis and cellular respiration.	ELS.EX4.A.h Apply the laws of conservation of mass and energy to analyze cycles and flows of Earth's systems, including: the cycling of matter and energy among the biotic and abiotic components in the biosphere, atmosphere, geosphere, and hydrosphere; the transfer and loss of energy and mass at each link in an ecosystem; and the roles of photosynthesis, cellular respiration, and carbon sequestration in the global carbon cycle. Create and interpret models to describe how variations in the flow of energy into and out of Earth's systems by human and nonhuman causes can impact climate.
EX4.B: Cultural Systems Emphasis	ELS.EX4.B.e Differentiate between a "want" and a "need." Describe resources that are essential to the health of individuals, families, and communities.	ELS.EX4.B.i Examine the cycle of renewable and nonrenewable natural resources in a local community from resource production, to consumer acquisition and use, to disposal.	ELS.EX4.B.m Analyze how the movement of renewable and nonrenewable natural resources through acquisition, production, consumption, and disposal creates systems of commerce, and examine the influence of	ELS.EX4.B.h Examine the role of renewable and nonrenewable resources in creating sustainable economies. Analyze how the movement of natural resources through acquisition, production, consumption, and disposal

	Differentiate between buyers (consumers) and sellers (producers).	Assess the balance between the environment providing resources, consumer's demand for these resources, and employers who provide jobs and income.	supply and demand on the system. Demonstrate how the demand for natural resources connects businesses and industries in a global economy.	impact sustainability of local, regional, and global systems.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

EX5.A: Decision Making	ELS.EX5.A.e Examine ways one's own beliefs, views, and understanding, influence decision-making and actions. Explain the impact of one's decisions on others. Identify how individuals and groups make choices that individually and collectively impact natural and cultural systems.	ELS.EX5.A.i Explain how one's cultural identity and views can influence decision-making and sustainability in natural and cultural systems. Identify parts, relationships, and perspectives present in a local issue, and examine the impact of individual and group choices on natural and cultural systems.	ELS.EX5.A.m Compare and contrast the environmental viewpoints, actions, decisions, and behaviors of cultural systems. Analyze a sustainability issue by examining individual and group actions, critiquing the decision-making processes, and assessing the impact on natural and cultural systems. Understand the role of cultural and science-based evidence in evaluating sustainability.	ELS.EX5.A.h Argue a perspective regarding a sustainability issue by examining individual and group actions, critiquing the decision-making processes, describing shared and conflicting values and principles, and assessing the impact on natural and cultural systems.
EX5.B: Natural Systems Emphasis	ELS.EX5.B.e Identify ways individuals in ecosystems and communities respond to changes in the environment. Identify how plants and animals are adapted to habitats that provide the food, water, and protection needed for their sustainability.	ELS.EX5.B.i Explain how changes affect how well an organism can survive based on its traits. Observe seasonal weather and compare patterns over time. Recognize the difference between weather and climate and how each affects Earth systems.	ELS.EX5.B.m Explain the concept of carrying capacity of an ecosystem. Investigate historic and projected climate patterns in different regions of the world to determine the natural ranges for climate for given geological time frames.	ELS.EX5.B.h Create a model and predict the carrying capacity of an ecosystem. Explain how disruptions to any part of an ecosystem can lead to shifts in all of its populations, and propose how species adaptations contribute to their sustainability.

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	Observe and identify patterns in local weather and movement of the sun throughout the year.	Observe and measure the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. Create a model to demonstrate how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation and determine regional climates.	Analyze geoscience data to examine how changes on Earth's surface impact systems.
EX5.C: Cultural Systems Emphasis	ELS.EX5.C.e Use primary sources to compare historical and contemporary natural resource use and management (e.g., use historical photographs to compare the school grounds or logging era photographs to discuss tree harvesting and planting).	ELS.EX5.C.i Identify historical or contemporary cultural events that have shaped perceptions about an environmental issue. Identify how humans have shaped and managed natural systems, which have shaped cultural systems, and the impact of change on both systems.	ELS.EX5.C.m Examine contextual elements that shape an environmental issue, and identify historical events or topics or contemporary parallels. Recognize how natural resource distribution has affected human geography, including settlement, economies, and culture and compare the impacts of historical and contemporary use and management globally.	ELS.EX5.C.h Examine contextual elements that shape an environmental issue, identify historical antecedents or contemporary parallels, and predict possible future scenarios. Identify and analyze the way that human use of natural resources impact Earth systems. Analyze how technological advances can create new uses for natural resources and how they impact economic and social systems.

Engage

"Everybody should touch the soil. It really changes how you feel about everything in your life. It's therapeutic."

- Will Allen, *Growing Power*

Discipline: Environmental Literacy and Sustainability (ELS)				
Content Area: Engage (EN)				
ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.				
Learning Priority	**Performance Indicators**			
	K-2 (e)	**3-5 (i)**	**6-8 (m)**	**9-12 (h)**
EN6.A: System Structure and Outcomes	ELS.EN6.A.e Identify the effects of positive and negative feedback on relationships and behavior (e.g., sharing toys encourages more playing together). Recognize that there are short and long-term consequences of choices.	ELS.EN6.A.i Identify cause and effect relationships and examine how a system's structure or behavior needs to change to achieve intended outcomes. Make connections between parts, systems, relationships, and perspectives in a system to identify how things work.	ELS.EN6.A.m Identify and analyze complexities of decisions on natural and cultural systems now and in the future, and consider possible unintended consequences. Identify positive and negative feedback and leverage points within a system, and modify the structure to achieve an intended purpose.	ELS.EN6.A.h Identify and analyze leverage points and cause and effect relationships within a system. Demonstrate how ideas, parts, relationships, and perspectives change over time, generating patterns and trends. Analyze the role of feedback loops in reinforcing the interconnectedness of parts within a system and the consequences of actions by

				each of those parts on the whole.
EN6.B: Rights & Responsibilities	ELS.EN6.B.e Describe the characteristics of personal responsibility and explain how a person's choices can impact affect the local community and environment.	ELS.EN6.B.i Analyze the role of civic and personal ideals in enhancing natural and cultural systems. Analyze the short and long-term impact of personal choices on the environment and sustainable communities. Investigate how individual and societal rights and responsibilities relate to healthy environments and sustainable communities.	ELS.EN6.B.m Analyze how individual and civic dispositions and different perspectives on personal and collective responsibility, rights, and equity influence decision-making and impact natural and cultural systems. Investigate individual and societal rights to and responsibility for a healthy environment, equity, and a sustainable community and describe tensions that may arise when making decisions for the common good. Explain how the decisions of one generation create opportunities for and impose constraints on future generations.	ELS.EN6.B.h Evaluate and justify one's own civic ideals by providing examples of personal rights and responsibilities related to one's place. Analyze and evaluate impacts of personal and collective responsibility on the environment and community and develop solutions to conflicts that arise to minimize the impact on natural and cultural systems. Analyze environmental laws created for local and global environments.
EN6.C: Models of Sustainability	ELS.EN6.C.e Identify resources, services, and jobs on which people depend that come from the environment. Describe the importance of sustainability and identify characteristics of a sustainable society.	ELS.EN6.C.i Understand the differences between renewable and nonrenewable natural resources and the outcomes of using each type of resource on the environment and people.	ELS.EN6.C.m Investigate the concept of sustainability as a dynamic interconnection and interdependence between ecological, social, and economic systems. Identify and evaluate sustainable and renewable resource solutions such as	ELS.EN6.C.h Identify and propose solutions to sustainability issues through use of concepts such as biomimicry, cradle-to-cradle principles of manufacturing, "Triple Bottom Line" business framework, slow vs. fast economic or food systems, carbon sequestration, mitigation technologies, and carbon markets. Weigh related

| | | | | biomimicry or renewable energy power solutions. | measures of supply, demand, impact, and payback. |

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

EN7.A: Inquiry and Investigation	ELS.EN7.A.e Explore ways people work together to create positive change and how their actions have made a difference. Discuss sustainability issues that need attention in a school or community and explore ways to address the issue.	ELS.EN7.A.i Describe and analyze ways that youth, acting as individuals or members of a group, create beneficial change, meet individual needs, and promote the common good. Investigate environmental issues that need attention in a school or community, and brainstorm potential solutions, considering perspectives of multiple stakeholders.	ELS.EN7.A.m Explain the importance of civic responsibility and their duty to be advocates for change. Identify instances when citizen action and public opinion have influenced change, and evaluate the effect of citizen action on environmental quality and sustainability for the common good. Examine sustainability issues that need attention in the school or community, identify perspectives of various stakeholders, and consider how different perspectives could contribute to solutions.	ELS.EN7.A.h Research issues related to environmental sustainability, critiquing the economic, environmental, and societal aspects of the issue, and examine how citizen action and public opinion can influence outcomes. Evaluate the needs of a local community to identify potential projects related to environmental sustainability. Identify and describe perspectives of stakeholders in the issue.
EN7.B: Design and Implementation	ELS.EN7.B.e Identify steps and engage in an experience to address an environmental issue at school or in the community.	ELS.EN7.B.i Design and implement a plan to address the identified environmental issue, weighing the pros and cons of proposed solutions.	ELS.EN7.B.m Demonstrate ability to work individually and collectively to resolve the identified issue through deliberation to consider alternatives, and balance interests for the sustainability of natural and cultural systems. Design and implement an individual or group experience	ELS.EN7.B.h Form and evaluate personal views, engage in informed deliberation, and use creativity to make previously unrecognized connections. Plan, execute, and evaluate a project that would bring awareness to an environmental

			to develop self-efficacy and address an issue affecting a community's natural and cultural systems. Identify potential partners and evaluate the short- and long-term results.	issue and contribute to creating a sustainable environment. Demonstrate civic leadership skills to make personal and collective decisions resulting in measures that promote healthy and sustainable communities.
EN7.C: Evaluation and Reflection	ELS.EN7.C.e Reflect on a stewardship experience and identify one action experience and related outcome.	ELS.EN7.C.i Reflect on the immediate and potential future outcomes of a stewardship experience, and strategize options that would minimize risks while maximizing outcomes for sustainability of natural and cultural systems.	ELS.EN7.C.m Evaluate and share the outcomes of a stewardship project in meeting goals to improve natural and cultural system health, and offer strategies for improving outcomes that will improve sustainability of natural and cultural systems.	ELS.EN7.C.h Analyze the outcomes of the stewardship experiences with a variety of audiences reflecting different perspectives; evaluate the effectiveness of the project in terms of balancing interests of natural and cultural systems.

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