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Introduction

Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards guide the study of the natural and human-made world through inquiry, problem-solving, critical thinking, and authentic exploration. This document displays a curriculum framework for Environmental Literacy & Sustainability. It is designed to focus curriculum and teaching, provide guidance for multiple approaches to curriculum development, encourage less reliance on textbooks as curriculum, and avoid activity-oriented teaching without focus/purpose

Environmental Literacy And Sustainability Long Term Transfer Goals

Long Term Transfer Goals (LTTG) provide the overarching practices that serve as a foundation for a robust curriculum. All curricula should relate to one or more of the LTTGs detailed below – as they highlight the effective uses of understanding, knowledge, and skill that we seek in the long run (i.e., what we want students to be able to do when they confront new challenges – both in and outside of school.)

Students will be able to independently use their learning to:

- Engage in informed consumer practices and choices that take into account the impact on agricultural and environmental systems.
- Categorize, analyze, and interpret how humans and environmental systems relate and affect one another.
- Evaluate and engage in discussion surrounding local and global issues that relate to resource use and management.
- Examine, analyze, interpret, and apply how an individual and community impacts the use and management of natural resources.
- Examine, develop, analyze, and interpret how watersheds function as a system and are impacted by external factors.
- Engage in informed use of land and water to contribute to a positive impact on local watersheds and wetlands.
- Understand how complex human and natural systems interact with each other and use empathy and data- informed evidence to make choices for the well-being of other species, including humans and the environment.
- Integrate scientific practices to research and investigate complex issues, problems, and phenomena.
- Understand, describe, and communicate the interconnected nature of local, regional, national, and global scales of environmental issues.
- Evaluate cost-benefit analysis in addressing solutions to environmental impacts.
- Carry out an investigation and collect data in an authentic environmental setting.
- Explain how the natural and designed worlds are interrelated and the application of scientific knowledge, technology, and engineering can have beneficial or harmful consequences, some of which may be unintended.
- Make informed decisions and identify solutions to environmental challenges.
- Recognize environmental injustices and take actions to mitigate them at various scales.

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3.4 Environmental Literacy and Sustainability

Sub-domain: Agricultural and Environmental Systems and Resources

Strand: Agricultural Systems

Long Term Transfer Goals
across all grades

Students will be able to independently use their learning to:

Engage in informed consumer practices and choices that take into account the impact on agricultural and environmental systems.
Categorize, analyze, and interpret how humans and environmental systems relate and affect one another.

Big Idea

Living things, including humans, utilize natural resources in ways that impact agricultural and environmental systems.

Essential Questions
may be used or modified across grade bands

How do living things utilize natural resources in ways that impact agricultural and environmental systems?
How do agricultural systems interact with environmental systems?

Component	K-2	3-5	6-8	9-12
Performance Expectation (Standard)	**3.4 K-2.A** Categorize ways people harvest, re-distribute, and use natural resources.	**3.4 3-5.A** Analyze how living organisms, including humans, affect the environment in which they live, and how their environment affects them.	**3.4.6-8.A** Develop a model to describe how agricultural and food systems function, including the sustainable use of natural resources and the production, processing, and management of food, fiber, and energy.	**3.4.9-12.A** Analyze and interpret how issues, trends, technologies, and policies impact agricultural, food, and environmental systems and resources.
Clarifying Statement	Examples could include that trees provide food, fiber, and building materials. Trees are logged, transported, and processed into different products, such as fiber, furniture, and buildings. Fruits and nuts from trees are picked, transported, and processed.	Emphasis is on how plants and animals impact their environment and how their environment impacts them. Examples include how pollinators impact food, plants prevent erosion, and sidewalks/roads change water flow.	Emphasis is on models that use inputs and outputs to highlight the lifecycle of food and fiber products.	Emphasis is on the cause and effect relationship whether it be positive or negative.

Disciplinary Core Ideas	**Natural Resources** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.	**Human Impacts on Earth Systems** 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.	**Natural Resources** Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. **Human Impacts on Earth Systems** Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.	**Ecosystem Dynamics, Functioning, and Resilience** A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. **Natural Resources** Resource availability has guided the development of human society. **Human Impacts on Earth Systems** The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.
Crosscutting Concepts	Cause and Effect Systems and System Models	Cause and Effect Structure and Function	Systems and System Models	Cause and Effect
Scientific & Engineering Practices	Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data	Analyzing and Interpreting Data	Developing & Using Models	Analyzing and Interpreting Data

Vocabulary	wood, fruit, wool, garden, compost, energy, fiber, harvest, natural resources, recycle, reuse, reuse, transportation, food-fiber system, agriculture, farm, orchard	adaptation, ecosystem, biomes, producer, consumer, decomposer, food chain/web, harvest, waste chain, renewable, nonrenewable, pollinators, predator or/prey, erosion, dependence, drought	aquaculture, silviculture, arable, domestication, biofuels, by-product, domestication, food/fiber system, animal husbandry, nutrient load, pesticides, irrigation, crop-rotation, seasonal crop, textile	best management practices (BMP), biodiversity, diversity, riparian, buffer zone, carrying capacity, diversity Index, limiting factors, mitigation, nitrogen organism population dynamics, peculation, risk management, succession, sustainability, geospatial technologies, subsidies

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3.4 Environmental Literacy and Sustainability

Sub-domain: Agricultural and Environmental Systems and Resources

Strand: Environment and Society

Long Term Transfer Goals
across all grades

Students will be able to independently use their learning to:

Evaluate and engage in discussion surrounding local and global issues that relate to resource use and management.
Examine, analyze, interpret, and apply how an individual and community impacts the use and management of natural resources.

Big Idea

Human cultures and societies experience and interact with the environment in various ways.

Essential Questions
may be used or modified across grade bands

How do human cultures and societies experience, interact, and value local, regional, and/or global environments?
How do various human cultures express their beliefs about nature and the environment?
How are natural resources managed by people from various cultures and communities?

Component	K-2	3-5	6-8	9-12
Performance Expectation (Standard)	**3.4.K-2.B** Examine how people from different cultures and communities, including one's own, interact and express their beliefs about nature.	**3.4.3-5.B** Make a claim about the environmental and social impacts of design solutions and civic actions, including their own actions.	**3.4.6-8.B** Analyze and interpret data about how different societies (economic and social systems) and cultures use and manage natural resources differently.	**3.4.9-12.B** Apply research and analytical skills to evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nation.
Clarifying Statement	Emphasis is on how students' interactions and beliefs about nature compare to someone living in a different community. Emphasis is not on judging anyone's interactions or beliefs about nature.	Emphasis is on investigating the short and long term consequences or effects of design solutions (i.e., best management practices such as manure management plans, riparian buffers, and wildlife corridors).	Emphasis is on comparing and contrasting data from two or more societies and cultures to draw evidence-based conclusions. Examples could include how different societies and cultures manage agriculture, recycling and waste management, fossil fuels, land development, etc.	Emphasis is on the effects of agriculture and natural resource availability, quality, control, and utilization.

Disciplinary Core Ideas	**Natural Resources** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. **Human Impacts on Earth Systems** 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.	**Human Impacts on Earth Systems** 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. **Natural Resources** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.	**Natural Resources** Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. **Human Impacts on Earth Systems** Human activities have significantly altered the biosphere, sometimes damaging, or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.	**Ecosystem Dynamics, Functioning, and Resilience** A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. **Natural Resources** Resource availability has guided the development of human society. **Human Impacts on Earth Systems** The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.
Crosscutting Concepts	Patterns Cause and Effect	Cause and Effect	Cause and Effect	Connections to Nature of Science Science Addresses Questions About the Natural and Material World
Scientific & Engineering Practices	Obtaining, Evaluating, and Communicating Information	Engaging in Argument From Evidence	Analyzing and Interpreting Data	Obtaining, Evaluating, and Communicating Information

Vocabulary	pattern, consumer, local, global, stability, change, environment, community, cause and effect, consequence, natural resources, habitat	habitat, impacts, biodiversity, population, organism consequences, waste disposal, riparian zone, buffering, capacity, wildlife corridor, best management practices, consumer, recycle, land use, treatment	culture, perspectives, resource management, waste stream/management, fossil fuel, land development land use, biotic, abiotic, extraction, atmosphere biosphere, minerals, extinction, renewable nonrenewable, habitat loss, pollution	Best Management Practices (BMP) biogeochemical, biodiversity, culture, desertification, carrying capacity, overharvest, pollution tolerance, diversity index, limiting factors, mitigation, niche, population dynamics. risk management, sustainability

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3.4 Environmental Literacy and Sustainability

Sub-domain: Agricultural and Environmental Systems and Resources

Strand: Watersheds and Wetlands

Long Term Transfer Goals
across all grades

Students will be able to independently use their learning to:

Examine, develop, analyze, and interpret how watersheds function as a system and are impacted by external factors.
Engage in informed use of land and water to contribute to a positive impact on local watersheds and wetlands.

Big Idea

Watersheds and wetlands function as interconnected systems that support, impact, and are influenced by living things.

Essential Questions
may be used or modified across grade bands

How do watersheds and wetlands function as interconnected systems that support, impact, and are influenced by living things?
How do human actions impact the functions of watersheds and wetlands?

Component	K-2	3-5	6-8	9-12
Performance Expectation (Standard)	**Intentionally Blank**	**3.4.3-5.C** Examine ways you influence your local environment and community by collecting and displaying data.	**3.4.6-8.C** Develop a model to describe how watersheds and wetlands function as systems, including the roles and functions they serve.	**3.4.9-12.C** Analyze and interpret how issues, trends, technologies, and policies impact watersheds and water resources.
Clarifying Statement	**Intentionally Blank**	Emphasis is on analyzing individual student behavior. Data can be collected and displayed using multiple digital and analog tools (e.g., computers, calculators, timers) and formats (e.g., graphs, tables, charts).	Examples of models could include pictorial (2D), abstract, concrete (3D), and computer-simulated models.	Emphasis is on the cause-and-effect relationship, whether it be positive or negative.

Disciplinary Core Ideas	**Intentionally Blank**	**Natural Resources** Energy and fuels (that humans use) are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. **Human Impacts on Earth Systems** 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.	**Interdependent Relationships in Ecosystems** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction; 3)Growth of organisms and population increases are limited by access to resources. **Ecosystem Dynamics, Functioning, and Resilience** Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. **The Roles of Water in Earth's Surface Processes** Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.	**Ecosystem Dynamics, Functioning, and Resilience** Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. **Biodiversity and Humans** Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. **Natural Resources** Resource availability has guided the development of human society.
Crosscutting Concepts	**Intentionally Blank**	Cause and Effect	Systems and System Models Structure and Function	Cause and Effect Stability and Change
Scientific & Engineering Practices	**Intentionally Blank**	Obtaining, Evaluating, and Communicating Information Constructing Explanations and Designing Solutions	Developing and Using Models	Analyzing and Interpreting Data

Vocabulary	**Intentionally Blank**	best management practices, contour, consequences, pollution, discharge, buffers, runoff, waste, storm drains, stormwater management, up/downstream, water cycle, nutrient cycle, watershed, wetlands, corridor	erosion, runoff, agriculture, land use,(im-)permeable, riparian zone, filtration, absorption, water column, macroinvertebrates, ecological function, nutrient management, watershed, wetlands, floodplain	regulations, land use, zoning, non-point source, soil conservation, hydrogeologic systems, resilience, stream order, permitting, monitoring