

OREGON ENVIRONMENTAL LITERACY PROGRAM

STANDARDS INTEGRATION

A Framework for Incorporating NGSS, Social Sciences and
Environmental Literacy into Classroom Curriculum



OREGON ENVIRONMENTAL LITERACY PROGRAM

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The Oregon Environmental Literacy Program believes pre-K-12 education can empower students to mature into Oregonians who can discover and treasure the places that provide us countless recreation opportunities, drive our state's economy and shape our heritage. Preparing Oregon's children to protect and sustain our state's natural resources is challenged by the fact that many are disconnected from the environment. Students also often lack the knowledge, skills, perspectives and values needed to consider whole systems, develop a sense of place, or pursue responsibility to shared resources and each other.

Standards Integration

A Framework for Incorporating NGSS, Social Sciences and Environmental Literacy into Classroom Curriculum was designed by a team of Oregon educators to:

1. Support K-12 educators as they prepare the next generation of Oregonians to experience and protect our state's resources;
2. Define what an environmentally literate student looks like at each grade level (K-5) or band (middle and high school) (**Table 1**);
3. Integrate the Oregon Environmental Literacy Strands (**Table 2**) into the Next Generation Science Standards and Oregon Social Sciences Standards through the use of guiding questions; and Provide a list of suggested activities K-12 educators can implement in their classroom to promote environmental literacy.

This framework uses the Next Generation Science Standards (NGSS) (adopted 2014), Oregon Social Sciences Standards (adopted 2010) and the Oregon Environmental Literacy Strands (adopted 2011) to develop suggested guiding questions for grades K-12. A guiding question is the "fundamental query that directs the search for understanding. Everything in the curriculum is studied for the purpose of answering it." Guiding questions help provide focus and coherence for units of study¹.

TABLE 1: Identifies what an environmentally literate student at each grade level or band should demonstrate

Grade Level Progression for Environmentally Literate K - 12 Students			
This table identifies what an environmentally literate student should know at each grade level.			
KINDERGARTEN Know they have influence on their environment and community by the way that they care for themselves, others and places.	FIRST GRADE Know how to take care of themselves, others and places. Is beginning to identify how problems arise when environments change, and can work with their peers to solve problems and answer questions.	SECOND GRADE Understand, value and promote diversity among plants, animals, and their environment.	THIRD GRADE Understand there are relationships between plants, animals, humans, and their environment within their region; are beginning to identify how these have changed over time.
FOURTH GRADE Have knowledge of and are a responsible steward of their local environment and natural resources. They are competent at investigating their questions and formulating solutions to problems.	FIFTH GRADE Have knowledge of their local environment, and understand the impacts of technology and how it can be used to solve problems.	MIDDLE SCHOOL Are gaining a sense of self in their natural and human community, including their impact on others in those systems. They are able to discuss issues, take in multiple perspectives, back up personal opinions with evidence and distinguish between opinion and fact.	HIGH SCHOOL Are inspired to be life-long learners, stewards, and enthusiasts of the natural world. They are prepared to make informed decisions that consider the economic, social, and environmental impacts of issues using credible evidence.

¹ Travers, R. (March, 1998). What is a good guiding question? Education Leadership, p. 70-73.

About Oregon Environmental Literacy Program

Oregon State University (OSU) Extension Service created the Oregon Environmental Literacy Program (OELP) in 2014 to promote Environmental Literacy throughout Oregon by creating thoughtful connections with the natural world through education and engagement of young people. OELP works closely with organizations, stakeholders and educators across the state to support teachers in collaboration with non-formal educators to foster environmental literacy of Kindergarten through 12th grade students by engaging them in activities that:

- ▶ Increase their awareness, understanding, and knowledge of the environment and their relationship to it
- ▶ Allow participation as community members in the stewardship of the environment
- ▶ Prepare them to participate in ensuring a sustainable future
- ▶ Contribute to establishing healthy lifestyles.

This work is guided by the Oregon Environmental Literacy Plan created and signed into law in 2011.

Acknowledgments

The Standards Integration for the Oregon Environmental Literacy Program is the result of the collaboration of many different partners and educators whose commitment to environmental literacy in K-12 settings profoundly impacts students and communities throughout Oregon. The Oregon Environmental Literacy Program is grateful to the many individuals and organizations that have contributed to the development of this document.

The guiding questions at each grade level have an environmental literacy focus that allows for easy integration of NGSS and Oregon Social Sciences Standards. Questions are open-ended and non-judgmental; encourage a focused query of a locally appropriate topic; and require high-level cognitive work to be answered. While Common Core is not explicitly called out at each grade level, these standards can easily be integrated into any unit of study.

Guiding questions for grades K through 5 are listed individually for each and consider NGSS, Oregon Social Sciences Standards and Oregon Environmental Literacy Strands. Middle (6-8) and high school (9-12) are each considered as separate grade bands. For each grade band, there is one of four main topics: Geography, Social Science Analysis, Life Science and Earth Science. For each of these topics relevant standards from NGSS, Oregon Social Sciences Standards and Oregon Environmental Literacy Strands are listed. Each grade level or grade level band also includes a list of activities that support integrating of environmental literacy.

An exhaustive list of the opportunities to integrate environmental literacy into the classroom has not been provided in this document. Countless other examples exist depending on how the NGSS, Oregon Social Sciences Standards and Environmental Literacy Strands are grouped.

Additional Resources

Teachers can learn more about environmental literacy in Oregon by visiting the Oregon Environmental Literacy Program website at <http://oelp.oregonstate.edu>

TABLE 2: Abbreviated Environmental Literacy Strands

OREGON ENVIRONMENTAL LITERACY STRANDS
<p>STRAND 1: SYSTEMS THINKING Students study systems and issues holistically, striving to understand the relationships and interactions between each system's parts. They use the knowledge gained to assess the effects of human choices on economic, ecological and social systems, and to optimize outcomes for all three systems.</p>
<p>STRAND 2: PHYSICAL, LIVING, AND HUMAN SYSTEMS Students understand the characteristics of Earth's physical, living and human systems.</p>
<p>STRAND 3: INTERCONNECTEDNESS OF PEOPLE AND THE ENVIRONMENT Students understand the interdependence of humans and the environment, and appreciate the interconnectedness of environment quality and human well-being.</p>
<p>STRAND 4: PERSONAL AND CIVIC RESPONSIBILITY Students understand the rights, roles, responsibilities and actions associated with leading or participating in the creation of healthy environments and sustainable communities.</p>
<p>STRAND 5: INVESTIGATE, PLAN AND CREATE A SUSTAINABLE FUTURE Students apply civic action skills that are essential to healthy, sustainable environments and communities.</p>

KINDERGARTEN

Description: Environmentally literate kindergarten students know they have influence on their environment and community by the way they choose to care for themselves, others and places.

Essential and Guiding Questions

- ▶ How do we take care of the plants and animals in nature?
- ▶ What do plants and animals (including humans) need to live in their environment?
- ▶ What happens to the plants and animals (including humans) when we change the land, water, and air?
- ▶ What rules do we have that help us treat the plants and animals in the environment with care?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

EARTH AND SPACE SCIENCE

K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Oregon Social Sciences Standards

HISTORICAL THINKING

K.4. Compare and contrast the student's own environment with the past.

GEOGRAPHY

K.10. Explain how people can care for the environment.

K.12. Explain why rules are needed and how rules reduce conflict and promote fairness.

EXAMPLE ACTIVITIES

- Draw a picture that diagrams relationships between the plants and animals (humans) in the school environment. **EL Strand 1.**
- Make observations of plants and animals in the schoolyard (or of living organisms in the classroom) and use observations to discuss the needs of plants and animals. **EL Strand 2.**
- Visit a natural setting and list the various ways humans have changed the environment. Compare and contrast the school yard to the natural setting visited during the year. **EL Strand 3.**
- Make rules about how humans interact with the environment and draw pictures to represent these rules. Create a class rule book. **EL Strand 4.**
- Recycle, compost, and/or re-purpose materials within the classroom and discuss or diagram how these actions can reduce the impact on the environment. **EL Strand 5.**

HIGH SCHOOL: LIFE SCIENCE

Description: Environmentally literate high-school students are inspired to be life-long learners, stewards and enthusiasts of the natural world. They are prepared to make informed decisions that consider the economic, social and environmental impacts of issues, using credible evidence.

Essential and Guiding Questions

- ▶ What is the value of biodiversity?
- ▶ How is biodiversity lost?
- ▶ How does biodiversity loss affect the health of an ecosystem?
- ▶ How can you support biodiversity?

Next Generation Science Standard Performance Expectations

LIFE SCIENCE

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

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-6. Evaluate the 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.

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

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

Oregon Social Sciences Standards

SOCIAL SCIENCE ANALYSIS

HS.61. Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects.

8.28. Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects.

EXAMPLE ACTIVITIES

- Compare the relationships among interdependent ecological factors including boundaries, resources, climate and competition. **EL Strand 1.**
- Investigate and compare the variation of biodiversity around Earth. **EL Strand 2.**
- Research particular places on Earth, or particular species, that demonstrate either protection or loss of biodiversity. Show the causes and effects of these changes from a human perspective. **EL Strand 3.**
- Engage in service-learning or stewardship projects that promote biodiversity. **EL Strand 4.**
- Mitigate human activities such as urbanization, building dams, and dissemination of invasive species. **EL Strand 5.**

HIGH SCHOOL: EARTH SCIENCE

Description: Environmentally literate high school students are inspired to be life-long learners, stewards and enthusiasts of the natural world. They are prepared to make informed decisions that consider the economic, social and environmental impacts of issues, using credible evidence.

Essential and Guiding Questions

- ▶ Why do we need to have discussions about climate change?
- ▶ How might climate change affect Oregon (environment, people)?
- ▶ How might climate change affect you?
- ▶ What can you do about climate change?

Next Generation Science Standards Performance Expectations

EARTH AND SPACE SCIENCE

HS-ESS2-4. Use a model to describe how variation in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere and biosphere.

HS-ESS3-1. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

HS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

HS-ESS3-6. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Oregon Social Sciences Standards

SOCIAL SCIENCE ANALYSIS

HS.57. Investigate a response or solution to an issue or problem and support or oppose, using research.

HS.61. Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects.

HS.62. Propose, compare, and judge multiple responses, alternatives, or solutions to issues or problems; then reach an informed, defensible, supported conclusion.

EXAMPLE ACTIVITIES

- Assess how personal choices can affect climate change positively and negatively. **EL Strand 1.**
- Discover the process of carbon cycling through Earth's systems, and how heat is stored in and around Earth. Further exploration may include inquiry projects to demonstrate the greenhouse effect. **EL Strand 2.**
- Research how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and in ocean acidification, with resulting impacts on sea organism health and marine populations. **EL Strand 3.**
- Explore and assess individual, regional and national efforts to mitigate the impact or reduce the progress of climate change. **EL Strand 4.**
- Do a social media outreach campaign on a simple action peers can adopt to reduce carbon emissions or energy consumption. **EL Strand 5.**

FIRST GRADE

Description: Environmentally literate first grade students know how to care for themselves, others and places, and are beginning to identify how problems arise when environments change. They can work with their peers to solve problems and answer questions.

Essential and Guiding Questions

- ▶ When the environment changes, what happens to the plants and animals (including humans)?
- ▶ What parts of plants and animals allow them to live in different environments?
- ▶ How do we use the plants and animals in our environment?
- ▶ What happens to the plants and animals when we change our environment?
- ▶ How do people use the environment today compared with people in the past?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

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.

EARTH AND SPACE SCIENCE

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Oregon Social Sciences Standards

HISTORICAL KNOWLEDGE

1.2. Compare the ways people lived in the community in the past with the way they live in the present.

GEOGRAPHY

1.12. Give examples of local natural resources and describe how people use them.

SOCIAL SCIENCE ANALYSIS

1.20. Identify cause-and-effect relationships.

1.21. Identify an issue or problem that can be studied.

EXAMPLE ACTIVITIES

- Construct a map of the schoolyard including the plants and animals that live there. Discuss how these organisms affect their environment and vice versa. **EL Strand 1.**
- Observe and draw a species (bird, mammal or plant) and compare it to similar organism with different parts (beaks, size, legs, tail, etc.). Discuss how these differences allow these organisms to live. **EL Strand 2.**
- Identify common items in the classroom and determine which natural resource they were derived from and how these items are used in everyday life. Explore what would happen if these items were removed from the environment. **EL Strand 3.**
- Pick up litter on the playground and come up with a solution for reducing waste at school. Count the amount of waste and graph the numbers over the time of the activity. **EL Strand 5.**

SECOND GRADE

Description: Environmentally literate second grade students understand, value, and promote diversity among plants, animals, humans, and their environment.

Essential and Guiding Questions

- ▶ What is diversity?
- ▶ Why is diversity important in an environment?
- ▶ How can we protect diversity in our environment?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Oregon Social Sciences Standards

GEOGRAPHY

2.9. Describe physical and human characteristics of the community.

CIVICS AND GOVERNMENT

2.16. Identify ways that students can have an impact in their community.

SOCIAL SCIENCE ANALYSIS

2.21. Evaluate information relating to an issue or a problem.

EXAMPLE ACTIVITIES

- Investigate invasive species through identification, study the impact on native species and host a "weed out" day.
EL Strands 2, 3 & 4.
- Participate in a schoolyard or local river study to compare the diversity of plant and animal life in different parts of the environment. **EL Strand 2.**
- Complete a photo study of how the built community and surrounding environment has changed over time.
EL Strands 3 & 4.

HIGH SCHOOL: SOCIAL SCIENCE ANALYSIS

Description: Environmentally literate high school students are inspired to be life-long learners, stewards and enthusiasts of the natural world. They are prepared to make informed decisions that consider the economic, social and environmental impacts of issues, using credible evidence.

Essential and Guiding Questions

- ▶ How do environmental problems and issues affect society?
- ▶ What are the differences between environmental problems and issues?
- ▶ How do conflicting viewpoints about environmental issues affect a society's decisions?
- ▶ What should we do about environmental problems and issues?

Oregon Social Sciences Standards

SOCIAL SCIENCE ANALYSIS

HS.57. Define, research, and explain an event, issue, problem, or phenomenon and its significance to society.

HS.58. Gather, analyze, use, and document information from various sources, distinguishing facts, opinions, inferences, biases, stereotypes, and persuasive appeals.

HS.59. Demonstrate the skills and dispositions needed to be a critical consumer of information.

HS.60. Analyze an event, issue, problem, or phenomenon from varied or opposing perspectives or points of view.

HS.61. Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects.

HS.62. Propose, compare, and judge multiple responses, alternatives, or solutions to issues or problems; then reach an informed, defensible, supported conclusion.

HS.63. Engage in informed and respectful deliberation and discussion of issues, events, and ideas.

EXAMPLE ACTIVITIES

- Investigate the leading causes of biodiversity, methods for conserving biodiversity, and their economic costs. **EL Strand 2.**
- Debate and advocate for different types of land use on nearby natural areas. **EL Strand 3.**
- Research the environmental effects of building code violations (e.g., building on wetlands, toxic materials) and work with the school district to perform an audit of best practices. **EL Strand 4.**
- Organize a rideshare program to curb carbon emissions, diverting stormwater from a school grounds' impervious areas into a rain garden to improve water quality. **EL Strand 5.**

HIGH SCHOOL: GEOGRAPHY

Description: Environmentally literate high school students are inspired to be life-long learners, stewards and enthusiasts of the natural world. They are prepared to make informed decisions that consider the economic, social and environmental impacts of issues, using credible evidence.

Essential and Guiding Questions

- ▶ What influences how we use natural resources, and what are the impacts of their use?
- ▶ How has resource availability influenced human geography, including settlements, patterns of movement, conflict and cooperation?
- ▶ How has human use of natural resources altered Earth's systems?
- ▶ What cultural, historic and personal perspectives affect our use of natural resources and the systems we create?

Next Generation Science Standards Performance Expectations

EARTH AND SPACE SCIENCE

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-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Oregon Social Sciences Standards

GEOGRAPHY

HS.16. Analyze the interconnectedness of physical and human regional systems and their interconnectedness to global communities.

HS.19. Evaluate how differing points of view, self-interest, and global distribution of natural resources play a role in conflict over territory.

HS.20. Analyze the impact on physical and human systems of resource development, use, and management, and evaluate the issues of sustainability.

HS.23. Analyze the distribution and characteristics of human settlement patterns.

EXAMPLE ACTIVITIES

- Concept-map the effects of using particular natural resources on economic, ecological and social systems. **EL Strand 1.**
- Analyze water quality along an urban-to-rural gradient. **EL Strand 2.**
- Research the historical trends of settlement based on resource availability and different cultural uses, management of and stewardship of different natural resources. **EL Strand 3.**
- Do a personal reflection of the value of natural resources and how that may affect your consumer choices. **EL Strand 4.**
- Conduct a school-wide or home-scale energy audit and calculation of associated costs (financial and ecological). Propose and enact efficiency measures and calculate the net change of associated costs (financial and ecological). **EL Strand 5.**

THIRD GRADE

Description: Environmentally literate third grade students understand there are relationships between plants, animals, humans and their environment within their region, and are beginning to identify how these have changed over time.

Essential and Guiding Questions

- ▶ How has Oregon's environment changed over time?
- ▶ In what ways have people changed the environment in Oregon?
- ▶ How do changes impact a plant's or animal's ability to survive?
- ▶ What can we do to reduce the effect of environmental changes on people, plants and animals?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there might change.

EARTH AND SPACE SCIENCE

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of weather-related hazards.

Oregon Social Studies Standards

SOCIAL SCIENCE ANALYSIS

3.4. Describe local communities and regions past and present.

3.11. Explain the influence of humans (traders, immigrants, indigenous, current residents) on Oregon's and the Northwest's physical systems.

3.12. Identify and analyze Oregon's natural resources and describe how people in Oregon and other parts of the world use them.

3.13. Identify how people have adapted to and have changed the physical geography of the community.

3.20. Identify how people or other living things might be affected by an event, issue or problem.

EXAMPLE ACTIVITIES

- Complete a study of a landscape following a fire, flood, development, etc. to see how the land, plant and animal communities have changed. **EL Strands 2, 3 & 5.**
- Engineer extreme weather or seismic-resistant structures related to local natural hazards. **EL Strand 3.**
- Follow one of Oregon's natural resources (timber, water, seafood, etc.) from its natural system to harvest, sale and transport, historically and in the present. **EL Strands 2, 3 & 4.**

FOURTH GRADE

Description: Environmentally literate fourth grade students have knowledge of and are responsible stewards of their local environment and natural resources. They are competent at investigating their questions and formulating solutions to problems.

Essential and Guiding Questions

- ▶ How does the use of natural resources affect people and the environment?
- ▶ How and why do people use natural resources?
- ▶ What factors influence how we use our natural resources?
- ▶ In what ways can people use resources sustainably?

Next Generation Science Standards Performance Expectations

EARTH AND SPACE SCIENCE

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

ENGINEERING

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Oregon Social Sciences Standards

GEOGRAPHY

4.11. Identify conflicts involving use of land, natural resources, economy, and competition for scarce resources, different political views, boundary disputes, and cultural differences within Oregon and between different geographical areas.

4.12. Explain how people in Oregon have modified their environment and how the environment has influenced people's lives.

4.13. Describe how technological developments, societal decisions, and personal practices influence Oregon's sustainability (dams, wind turbines, etc.).

ECONOMICS/FINANCIAL LITERACY

4.17. Analyze different buying choices and their opportunity costs while demonstrating the difference between needs and wants.

MIDDLE SCHOOL: LIFE SCIENCE

Description: Environmentally literate middle school students are gaining a sense of self in their natural and human community, including their impact on others in those systems. They are able to discuss issues, take in multiple perspectives, back up personal opinions with evidence, and distinguish between opinion and fact.

Essential and Guiding Questions

- ▶ How are living and non-living components of ecosystems interconnected?
- ▶ How do environmental changes affect biodiversity?
- ▶ How can people support biodiversity and ecosystems?
- ▶ What are the values of ecosystems for both humans and other species?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-LS4-4. 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.

Oregon Social Sciences Standards

SOCIAL SCIENCE ANALYSIS

8.27. Examine the various characteristics, causes, and effects of an event, issue, or problem.

8.28. Investigate a response or solution to an issue or problem and support or oppose, using research.

EXAMPLE ACTIVITIES

- Model the components and relationships in selected ecosystems and make predictions about the impact of changes to a part of the ecosystem. **EL Strand 1.**
- Investigate and compare the variation of ecosystems around Earth. **EL Strand 2.**
- Research ecosystem services associated with species of interest. **EL Strand 3.**
- Engage in service-learning or stewardship projects that promote biodiversity. **EL Strand 4.**
- Create a mock conservation plan for a species of interest to be presented to a mock administrative board. **EL Strand 5.**

MIDDLE SCHOOL: EARTH SCIENCE

Description: Environmentally literate middle school students are gaining a sense of self in their natural and human community, including their impact on others in those systems. They are able to discuss issues, take in multiple perspectives, back up personal opinions with evidence, and distinguish between opinion and fact.

Essential and Guiding Questions

- ▶ How can humans affect their environment?
- ▶ How have humans disrupted environmental processes?
- ▶ How can humans limit their impact on the environment?

Next Generation Science Standards Performance Expectations

EARTH AND SPACE SCIENCE

MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MS-ESS3-3. Explain how people have adapted to or changed the physical environment in the Western Hemisphere.

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Oregon Social Sciences Standards

GEOGRAPHY

6.15 Explain how people have adapted to or changed the physical environment in the Western Hemisphere.

SOCIAL SCIENCE ANALYSIS

8.28. Investigate a response or solution to an issue or problem and support or oppose, using research.

EXAMPLE ACTIVITIES

- Create model watersheds with different characteristics (area, vegetation, impervious area) and consider flood or agricultural potential. **EL Strand 1.**
- Restore a natural area, plant native species and measure the impact on the terrestrial invertebrate (i.e., bug) population. **EL Strand 2.**
- Design experiments to test the greenhouse effect. **EL Strand 3.**
- Debate our responsibility to limit humans' impact on the earth, and consider particular issues like fossil fuel usage, overconsumption or nuclear power. **EL Strand 4.**
- Organize a safe routes to school program. **EL Strand 5.**

FIFTH GRADE

Description: Environmentally literate fifth grade students have knowledge of their local environment, and understand the impacts of technology and how it can be used to solve problems.

Essential and Guiding Questions

- ▶ How do human activities change ecosystems over time?
- ▶ What are the factors (human and non-human) that affect an ecosystem and its inhabitants?
- ▶ How have human activities affected the ecosystem and the natural cycles of the land and organisms?
- ▶ What human solutions (scientific, technology, etc.) can be used to address these impacts?

Next Generation Science Standards Performance Expectations

LIFE SCIENCE

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

EARTH AND SPACE SCIENCE

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environments.

ENGINEERING

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of a problem.

Oregon Social Sciences Standards

GEOGRAPHY

5.11. Describe how technological developments, societal decisions, and personal practices influence sustainability in the United States.

SOCIAL SCIENCE ANALYSIS

5.20. Gather, use and document information from multiple sources (e.g., print, electronic, human, primary, secondary) to examine an event, issue, or problem through inquiry and research.

5.22. Identify characteristics of an event, issue, or problem, suggesting possible causes and results.

5.23. Propose a response or solution to an issue or problem and support why it makes sense, using support from research.

EXAMPLE ACTIVITIES

- Develop a model of a local habitat, documenting natural factors and how they impact each other. Analyze the impact of one human activity that affects the habitat, gather information about it and communicate results. **EL Strand 1.**
- Identify an activity that mitigates the impact of humans on a local environment and participate in that activity (stream clean-up, restoration). **EL Strand 4.**
- Based upon analysis of an ecosystem, choose a scientific, technological, or other approach to address human impacts, and analyze the "positive" and "negative" impacts of that approach on the ecosystem. **EL Strand 5.**

MIDDLE SCHOOL: GEOGRAPHY

Description: Environmentally literate middle school students are gaining a sense of self in their natural and human community, including their impact on others in those systems. They are able to discuss issues, take in multiple perspectives, back up personal opinions with evidence, and distinguish between opinion and fact.

Essential and Guiding Questions

- ▶ What factors influence sustainability around the world?
- ▶ How have technology, societal decisions and personal practices influenced sustainability?
- ▶ How do sustainable practices vary worldwide?
- ▶ How do sustainable practices affect the environment?

Next Generation Science Standards Performance Expectations

EARTH AND SPACE SCIENCE

MS-ESS3-3. Explain how people have adapted to or changed the physical environment in the Western Hemisphere.

Oregon Social Sciences Standards

GEOGRAPHY

6.15. Explain how people have adapted to or changed the physical environment in the Western Hemisphere.

6.16. Explain how technological developments, societal decisions, and personal practices influence sustainability in the Western Hemisphere.

7.14. Explain how technological developments, societal decisions, and personal practices influence sustainability in the Eastern Hemisphere.

8.13. Explain how current and historical technological developments, societal decisions, and personal practices influence sustainability in the United States.

EXAMPLE ACTIVITIES

- Concept-map the effects of using sustainable versus conventional technologies. **EL Strand 1.**
- Research sustainability efforts of countries worldwide. **EL Strand 2.**
- Research the technology, decisions and practices of indigenous peoples of the Americas. **EL Strand 3.**
- Do regular journaling on the topics of sustainability and responsibility. **EL Strand 4.**
- Do a school-wide or home-scale audit on chemical or water use. Students propose and use non-toxic alternatives and efficiency measures. **EL Strand 5.**

MIDDLE SCHOOL: SOCIAL SCIENCE ANALYSIS

Description: Environmentally literate middle school students are gaining a sense of self in their natural and human community, including their impact on others in those systems. They are able to discuss issues, take in multiple perspectives, back up personal opinions with evidence, and distinguish between opinion and fact.

Essential and Guiding Questions

- ▶ How do environmental problems and issues affect society?
- ▶ What are the differences between environmental problems and issues?
- ▶ How do conflicting viewpoints about environmental issues affect a society's decisions?
- ▶ What should we do about environmental problems and issues?

Oregon Social Sciences Standards

SOCIAL SCIENCE ANALYSIS

6.21. Clarify key aspects of an event, issue, or problem through inquiry and research.

6.22. Gather, interpret, document, and use information from multiple sources, distinguishing facts from opinions and recognizing points of view.

6.23. Interpret documents and data from multiple primary and secondary sources (art, artifacts, eyewitness accounts, letters and diaries, real or simulated historical sites, charts, graphs, diagrams, written texts).

7.25. Analyze evidence from multiple sources including those with conflicting information.

8.26. Examine a controversial event, issue, or problem from more than one perspective.

8.27. Examine the various characteristics, causes, and effects of an event, issue, or problem.

8.28. Investigate a response or solution to an issue or problem and support or oppose, using research.

EXAMPLE ACTIVITIES

- Investigate an endangered species and efforts to protect that species. **EL Strand 2.**
- Contrast two viewpoints on a contentious issue like fracking, off shore drilling or GMOs. **EL Strand 3.**
- Propose creative writing prompts and art projects regarding personal and civic responsibility related to an environmental issue or problem of interest. **EL Strand 4.**
- Restore a section of school yard, amending soil and planting native species to attract sensitive wildlife (e.g., planting milkweed for butterflies). **EL Strand 5.**