



Grades 9–12

3.4.9-12.G Environmental Literacy and Sustainability: Sustainability and Stewardship

Students who demonstrate understanding can *analyze and evaluate how best resource management practices and environmental laws achieve sustainability of natural resources.*

Clarifying Statement: Emphasis is on assessing the outcomes of best management practices (e.g., stormwater, forest, land use, wildlife, and waste management) and environmental laws (i.e., international, federal, state, and local jurisdictions).

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
<p>Engaging in Argument From Evidence</p> <p>Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.</p> <ul style="list-style-type: none"> Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g., economic, societal, environmental, ethical considerations). 	<p>Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. <p>Developing Possible Solutions</p> <ul style="list-style-type: none"> When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. 	<p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

Pennsylvania Context: Examples of Pennsylvania context include but are not limited to Pennsylvania-specific laws, policies, regulations, and agreements, such as the Pennsylvania Environmental Plan, Pennsylvania Environmental Rights Amendment, and Chesapeake Bay Agreement; and Pennsylvania agencies and departments such as the Department of Environmental Protection, Department of Conservation and Natural Resources, Bureau of Forestry, Commission for Agricultural Education, Fish and Boat Commission, and Game Commission.

PA Career Ready Skills: Evaluate consequences from a personal, and civic perspective to inform decision-making.

Connections to Other Standards Content and Practices

Standard Source	Possible Connections to Other Standard(s) or Practice(s)
Agriculture (AFNR)	CS.04.01.02.c: Evaluate sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations.



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
Science, Environmental Literacy and Sustainability (NAAEE)	9-12 Strand 1.G. Drawing conclusions and developing explanations: Learners propose explanations that address their initial environmental questions using quantitative and qualitative data and evidence that has been collected and analyzed.
PA Core Standards: ELA	CC.3.5.9-12.A: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC.3.5.11-12.A: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. CC.3.6.9-12.B: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. CC.3.6.9-12.H: Draw evidence from informational texts to support analysis, reflection, and research.
PA Core Standards and Practices: Math	MP.2: Reason abstractly and quantitatively. MP.4: Model with mathematics. CC.2.1.HS.F.3: Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data display. CC.2.1.HS.F.4: Use units as a way to understand problems and to guide the solution of multistep problems. CC.2.1.HS.F.5: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
PA Standards: Social Studies	6.1.9.B: Identify the origin of resources and analyze the impact on the production of goods and services. Analyze how unlimited wants and limited resources affect decision making.
Educational Technology (ISTE)	1.3. Knowledge Constructor: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
Technology and Engineering (ITEEA)	STEL-4P: Evaluate ways that technology can impact individuals, society, and the environment.