



## Grades 9–12

### 3.4.9-12.E Environmental Literacy and Sustainability: Environmental Literacy Skills

**Students who demonstrate understanding can** *plan and conduct an investigation utilizing environmental data about a local environmental issue.*

**Clarifying Statement:** Emphasis is on student-collected data from sources such as outdoor field experiences, media coverage, data mining, and so on.

**Assessment Boundary:** N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
<p><b>Planning and Carrying Out Investigations</b></p> <p>Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.</p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<p><b>Ecosystem Dynamics, Functioning, and Resilience</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p><b>Biodiversity and Humans</b></p> <ul style="list-style-type: none"> <li>Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction).</li> <li>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. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.</li> </ul> <p><b>Human Impacts on Earth Systems</b></p> <ul style="list-style-type: none"> <li>The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.</li> </ul>	<p><b>Connections to Nature of Science</b></p> <p><b>Science Is a Way of Knowing</b></p> <ul style="list-style-type: none"> <li>Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge.</li> </ul>

**Pennsylvania Context:** Examples of Pennsylvania context include but are not limited to local colleges and universities, local nature centers, Pennsylvania Conservation Districts, and science museums and centers.

**PA Career Ready Skills:** Advocate for oneself in education, employment, and within the community.



### Connections to Other Standards Content and Practices

Standard Source	Possible Connections to Other Standard(s) or Practice(s)
<b>Agriculture (AFNR)</b>	CS.04.01.01.c: Devise strategies for stewarding natural resources at home and within community.
<b>Science, Environmental Literacy and Sustainability (NAAEE)</b>	9-12 Strand 1.B. Designing investigations: Learners design investigations to explore environmental questions, problems, issues, phenomena, and models. They explain their reasoning.
<b>PA Core Standards: ELA</b>	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.
<b>PA Core Standards and Practices: Math</b>	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.
<b>PA Standards: Social Studies</b>	7.4.12.B: Analyze the global effects of human activity on the physical systems.
<b>Educational Technology (ISTE)</b>	1.4. Innovative Designer: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
<b>Technology and Engineering (ITEEA)</b>	STEL-4P: Evaluate ways that technology can impact individuals, society, and the environment.