



## Grades 9–12

### 3.4.9-12.A Environmental Literacy and Sustainability: Agricultural and Environmental Systems and Resources

**Students who demonstrate understanding can** *analyze and interpret how issues, trends, technologies, and policies impact agricultural, food, and environmental systems and resources.*

**Clarifying Statement:** Emphasis is on the cause-and-effect relationship, whether it be positive or negative.

**Assessment Boundary:** N/A

| Science and Engineering Practices (SEP)  | Disciplinary Core Ideas (DCI)  | Crosscutting Concepts (CCC)   |
|--|--|---|
| <b>Analyzing and Interpreting Data</b><br>Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. <ul style="list-style-type: none"> <li>Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</li> </ul> | <b>Ecosystem Dynamics, Functioning, and Resilience</b> <ul style="list-style-type: none"> <li>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.</li> </ul> <b>Natural Resources</b> <ul style="list-style-type: none"> <li>Resource availability has guided the development of human society.</li> </ul> <b>Human Impacts on Earth Systems</b> <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> | <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>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.</li> </ul> |

**Pennsylvania Context:** Examples of Pennsylvania context include but are not limited to local connections to Pennsylvania agriculture, aquaculture, urban agriculture businesses, manufacturing, recreational businesses, electricity and power, mining, biotechnology, forest products, and transportation industries.

**PA Career Ready Skills:** Evaluate how societal conventions may influence the perspectives of individuals.



### Connections to Other Standards Content and Practices

| Standard Source   | Possible Connections to Other Standard(s) or Practice(s)  |
|---|---|
| <b>Agriculture (AFNR)</b>   | CS.01.03.01.a: Summarize public policies affecting AFNR systems.  |
| <b>Science, Environmental Literacy and Sustainability (NAAEE)</b> | 9-12 Strand 2.2.A. Individuals, groups, and societies: Learners observe and describe ways that individual and group action affects the environment, and how each can work to promote the common good. They analyze differing beliefs and values within the same community and the larger society and explain how sustainable solutions rely on reconciling diverse perspectives.  |
| <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.<br>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.<br>CC.3.6.9-12.B: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.<br>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.<br>MP.4: Model with mathematics.<br>CC.2.1.HS.F.3: Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data display.<br>CC.2.1.HS.F.4: Use units as a way to understand problems and to guide the solution of multistep problems.<br>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>                               | 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.<br>6.3.C.A: Evaluate the costs and benefits of government decisions to provide public goods and services.   |
| <b>Educational Technology (ISTE)</b>                              | 1.5. Computational Thinker: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.   |
| <b>Technology and Engineering (ITEEA)</b>                         | STEL-4P: Evaluate ways that technology can impact individuals, society, and the environment.  |