OpenSciEd Massachusetts Standards Guidance
7th Grade: Ecosystem Dynamics & Biodiversity

This document is to provide guidance to Massachusetts 7th grade teachers who are implementing OpenSciEd. This guidance assumes the OpenSciEd curriculum is being implemented across grades 6-8, following the MA coherent sequence by grade level *(download)*. The following guidance identifies the MA standards addressed in the *Ecosystem Dynamics & Biodiversity* unit, and the most effective use of the OpenSciEd materials for 7th grade teachers.

Scope and Sequence Recommendation

Implement the *Ecosystem Dynamics & Biodiversity* unit in 7th grade after the *Photosynthesis & Matter Cycling* unit, and before the *Natural Resources & Human Impact* unit. *Ecosystem Dynamics & Biodiversity* has significant coherence when building on experiences from the *Photosynthesis & Matter Cycling* unit (recommended for 7th grade in MA). *Ecosystem Dynamics & Biodiversity* addresses eight 7th grade life, earth & space, and tech/engineering standards, and one 6th grade tech/engineering standard. Refer to the MA coherent sequence by grade level *(download)* for the complete scope and sequence recommendation.

7th Grade Standards in *Ecosystem Dynamics & Biodiversity*

Standards in unit	Lessons building towards standards
7.MS-LS2-1. Analyze and interpret data to provide evidence for the effects of periods of abundant and scarce resources on the growth of organisms and the size of populations in an ecosystem.	Lessons 2-3,5,7-13
7.MS-LS2-2. Describe how relationships among and between organisms in an ecosystem can be competitive, predatory, parasitic, and mutually beneficial and that these interactions are found across multiple ecosystems. Clarification Statement: Emphasis is on describing consistent patterns of interactions in different ecosystems in terms of relationships among and between organisms.	Lessons 3,5,8-13
7.MS-LS2-4. Analyze data to provide evidence that disruptions (natural or human-made) to any physical or biological component of an ecosystem can lead to shifts in all its populations. Clarification Statement: Focus should be on ecosystem characteristics varying over time, including disruptions such as hurricanes, floods, wildfires, oil spills, and construction.	Lessons 1-3,5,9-13, 20
7.MS-LS2-5. Evaluate competing design solutions for protecting an ecosystem. Discuss benefits and limitations of each design. Clarification Statements: Examples of design solutions could include water, land, and species protection and the prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.	Lessons 2-4,9,14-16, 20

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7.MS-LS2-6(MA). Explain how changes to the biodiversity of an ecosystem—the variety of species found in the ecosystem—may limit the availability of resources humans use. Clarification Statement: Examples of resources can include food, energy, medicine, and clean water.	Lessons 1,2,10,13,15
7.MS-ESS3-4. **[partial]** Construct an argument supported by evidence that human activities and technologies can mitigate the impact of increases in human population and per capita consumption of natural resources on the environment. Clarification Statements: Arguments should be based on examining historical data such as population graphs, natural resource distribution maps, and water quality studies over time. Examples of negative impacts can include changes to the amount and quality of natural resources such as water, mineral, and energy supplies. • **Why partial?** Students collect evidence that human activities and technologies can mitigate the impact of increases in human population and per capita consumption of natural resources, but do not construct a formal argument that integrates this evidence. Rather, they develop a PSA that incorporates this information. **Recommendations –** this standard is addressed in full in the *Natural Resources & Human Impact* unit. No changes are recommended to address this standard.	Lessons 6,9,14-18
7.MS-ETS1-2. **[partial]** Evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Use a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution. • **Why partial?** Students spend a significant amount of time examining and evaluating competing design solutions, but do not use a decision matrix or develop models of the solutions. **Recommendations –** this standard is addressed in full across several other units, notably *Contact Forces* and *Chemical Reactions & Energy.* No changes are recommended to address this standard.	Lessons 2-4, 6,9,14-18
7.MS-ETS1-4. **[partial]** Generate and analyze data from iterative testing and modification of a proposed object, tool, or process to optimize the object, tool, or process for its intended purpose. • **Why partial?** Students use simulations and indirect evidence to explore how hypothetical changes to design solutions could impact those solutions. They do not conduct intentional iterative testing and modification.	Lessons 2-4,9,14,16-18

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Recommendations – this standard is addressed in full across several other units, notably *Contact Forces* and *Thermal Energy*. No changes are recommended to address this standard.	

Additional Standards in *Ecosystem Dynamics & Biodiversity*

Standards in unit	Lessons building towards standards
6.MS-ETS1-1. **[partial]** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. Include potential impacts on people and the natural environment that may limit possible solutions. • **Why partial?** A "successful solution" is difficult to define in the context of this unit, although students take into consideration impacts on people and the environment. • **Recommendations:** This standard is also addressed in the *Natural Hazards* unit. No changes are recommended to address this standard.	Lessons 1-4, 6,9,14-18

See recommendations below to fully implement this 6th grade standard.

Recommendations for Addressing Standards in *Ecosystem Dynamics & Biodiversity*

Include, and teach 6.MS-ETS1-1 with *Ecosystem Dynamics & Biodiversity* as planned in the unit. This standard is integrated in a way that supports the 7th grade ETS standards embedded in the unit. Depending on your students' prior knowledge of this standard, support for students should be adjusted to increase the rigor of their definitions for criteria and constraints and considerations of possible impacts. **Excluding this standard would require substantial redesign of the unit, which is not recommended.**