

Phoenixville Area School District Understanding by Design (UbD) Science Unit Plan

Grade Level &/or HS Subject: **BIOLOGY**

Unit Name: **BIODIVERSITY**

Stage 1 Desired Results		
Overarching NGSS & PA Standards: HS-LS2-2 HS-LS2-7 HS-LS4-6 Which branch(es) of science apply: BIOLOGY	Transfer	
	<i>Students will be able to independently use their learning to...</i> <ul style="list-style-type: none"> Analyze and interpret data using computation thinking Ask questions and/or define problems Construct explanations and design solutions Develop and/or use models 	
	Meaning-Making	
	<i>Students will understand that...</i> <ul style="list-style-type: none"> There are factors affecting biodiversity and populations in ecosystems of different scales. There are solutions for reducing the impacts of human activities on the environment and biodiversity. There are solutions to mitigate adverse impacts of human activity on biodiversity. 	ESSENTIAL QUESTIONS <i>Students will keep considering...</i> <ul style="list-style-type: none"> What happens to ecosystems when the environment changes? What is biodiversity, and do humans affect it, and how does it affect humans.
	Knowledge and Skills Acquisition	
	UNDERSTANDINGS <i>Students will know...</i> <ul style="list-style-type: none"> Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. 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. 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. Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). 	<i>Students will be skilled at...</i> <ul style="list-style-type: none"> Using mathematical representations of phenomena or design solutions to support and revise explanations. Designing, evaluating, and refining solutions to complex real-world problems, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. Creating or revising a simulation of a phenomenon, designed device, process, or system.

	<ul style="list-style-type: none"> • 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. • 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. • 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 • Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. • How ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).* 	
	<p style="text-align: center;">KEY VOCABULARY</p> <p>Anthropogenic, Biodiversity, Carrying capacity, Ecosystem, Extinction, Invasive species, Limiting factor, Overexploitation, Overpopulation, Populations</p>	

Stage 2 – Evidence

Evaluative Criteria	Assessment Evidence	
What criteria will be used in each assessment to evaluate attainment of the desired results?	<p style="text-align: center;">PERFORMANCE TASK(S):</p> <ul style="list-style-type: none"> • Acid Rain Inquiry Lab • Succession Inquiry Simulation/Modeling • Human Impact/Conservation Inquiry Project 	<p style="text-align: center;">Differentiation Considerations:</p> <ul style="list-style-type: none"> • Grouping of students • Split Screen Activities • Scaffolding of Information
What criteria will be used in each assessment to evaluate attainment of the desired results?	<p style="text-align: center;">OTHER EVIDENCE:</p> <ul style="list-style-type: none"> • Quizzes and Unit Exams • Choice of the following: <ul style="list-style-type: none"> ○ Biome/ecosystem research project ○ Local ecosystem survey 	<p style="text-align: center;">Differentiation Considerations:</p> <ul style="list-style-type: none"> • Grouping of students • Split Screen Activities • Scaffolding of Information