

ENVIRONMENTAL LITERACY INFUSION IN SCIENCE & SOCIAL STUDIES CURRICULA

Standard 4: Populations, Communities and Ecosystems

The student will use physical, chemical, biological, and ecological concepts to analyze and explain the interdependence of humans and organisms in populations, communities and ecosystems.

A. CYCLING OF MATTER AND ENERGY				
1. Explain how organisms are linked by the transfer and transformation of matter and energy at the ecosystem level.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Develop an awareness of the relationship of features of living things and their ability to satisfy basic needs that support their growth and survival. SCI 3(K)E1 Describe some of the ways in which animals depend on plants and on each other. SCI 3(1)E1 	<ul style="list-style-type: none"> Recognize that materials continue to exist even though they change from one form to another. SCI 3(3)E1 Recognize food as the source of materials that all living things need to grow and survive. SCI 3(4)E1 Recognize that some source of energy is needed for all organisms to grow and survive. SCI 3(5)E1 	<ul style="list-style-type: none"> Explain that the transfer and transformation of matter and energy links organisms to one another and to their physical setting. SCI 3(7)E1 	<ul style="list-style-type: none"> The student will be able to compare the transfer and use of matter and energy in photosynthetic and non-photosynthetic organisms. SCI CLG 3.1.3 The student will analyze the interrelationships and interdependencies among different organisms and explain how these relationships contribute to the stability of the ecosystem. ACI CLG 3.5.2 The student will demonstrate that matter cycles through and between living systems and the physical environment constantly being recombined in different ways. SCI CLG 6.1.1 The student will explain how organisms are linked by the transfer and transformation of matter and energy at the ecosystem level. SCI CLG 6.2.1 The student will explain why interrelationships & interdependencies of organisms contribute to the dynamics of ecosystems. SCI CLG 6.2.2 The student will evaluate the 	<p>English Language Arts RI.K-2.3,10 RI.3-5.3,7,10 W.3.2,7 W.4.2,7,9 W.5.2,7,9 RST.6-8. 4,5,7,8,9,10 W.6-8.1,2,7,8,9 RST.9-12 4,5,7,8,9,10 W.9-12 1,2,7,8,9</p> <p>Mathematics SMP1-8 PK-2MD 3-5MD 6-8SP S-IC S-ID</p> <p>Health 6(3)D1a 6(3)I1a 6(4)D1a 6(6)I1a,b 6(7)D1a 6(7)I1a,b</p>

Science: PK-8: 6(5)B2a-c = Standard,(Grade),Topic, Indicator, Objectives
 CLG: 1.1.1 = Goal, Expectation, Indicator
 Math: SMP3 = Standards for Mathematical Practice, Standard
 3.NBT = Grade, Content Domain, Standard
 CTE: GTT(3.1)2-3 = Course Lesson Concepts

Social Studies: 1(PK-2)A1a,b = Standard, (Grade), Topic, Indicator, Objectives
 Health: 3(5)D1a-c = Standard, (Grade), Topic, Indicator, Objectives
 English Language Arts: W.1.8 = Strand, Grade, Standard
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			interrelationship between humans and energy resources. SCI CLG 6.3.5	
B. POPULATION DYNAMICS				
1. Analyze the growth or decline of populations and identify a variety of responsible factors.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Describe ways that animals and plants interact with each other and with their environment, such as birds nesting in trees, deer eating plants, bees pollinating flowers, spiders eating insects, etc. SCI 3(K)F1 Describe how geographic characteristics determine choices, such as climate guides, decisions about food, clothing, and shelter. SS 3(2)B.1.d 	<ul style="list-style-type: none"> Explain that individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing. SCI 3(4)D1 Explain ways that individuals and groups of organisms interact with each other and their environment. SCI 3(4)F1 Identify and describe the interactions of organisms present in a habitat. SCI 3(4)F1 Explain the idea that in any particular environment, some kinds of plants and animals survive well, some less well, and some cannot survive at all. SCI 3(5)A1 Describe population distribution of places and regions such as rural and urban SS 3(3)B.1.c Identify the reasons for the movement of peoples to, from, and within Maryland and the United States SS 3(4)C.1.e Compare the natural/physical and human characteristics of the three colonial regions (New England, Middle, Southern) SS 3(5)B.1.c 	<ul style="list-style-type: none"> Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available. SCI 3(6)F1 Identify and describe physical characteristics that influenced human settlement SS 3(6-7)B.1.a Analyze how geographic characteristics stimulated regional growth, such as the purchase of the Louisiana Territory SS 3(8)B.1.c Identify why people migrate, such as economic opportunity, climate, political reasons, and government policies SS 3(6-7)C.1.a Explain why Americans migrated west, such as fertile soil, minerals, and economic opportunity, and the impact on that regions SS 3(8)C.1.a 	<ul style="list-style-type: none"> The student will investigate how natural and man-made changes in environmental conditions will affect individual organisms and the dynamics of populations. SCI CLG 3.5.3 The student will conclude that populations grow or decline due to a variety of factors. SCI CLG 6.2.3 The student will evaluate the interrelationship between humans and biological resources. SCI CLG 6.3.4 Compare climate, land use, natural resources, population distribution, demographic and density maps of Maryland and the United States SS 3(G)A.1.a Analyze how population shifts in and between regions affects the formation and implementation of government policy, such as the relocation or loss of industry and urban flight SS 3(G)B.1.b Analyze patterns, trends, and projections of population in regions and how these may affect the environment, society and government policy SS 3(G)C.1.d 	<p>English Language Arts RI.K.3,8,9,10 RI.1.3,8,9,10 RI.2.1,3,8,9,10 RI.3.1,2,3,8,9,10 RI.4.1,2,3,5,7,8,9,10 RI.5.1,2,3,5,7,8,9,10 W.3.2,7 W.4.2,7,9 W.5.2,7,9 RST.6-8.1,5,6,7,8,9,10 W.6-8.1,2,7,8,9 RST.9-12.1,5,6,7,8,9,10 <i>RI.11-12.5</i> W.9-12.1,2,7,8,9</p> <p>Mathematics SMP1-8 PK-2MD 3-5MD 6-8SP S-IC S-ID</p> <p>Career & Technology Education BI(IEHP)P4.1-6 BI(IEHP)P5.1-3</p>

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	<ul style="list-style-type: none"> Describe and analyze population growth, migration, and settlement patterns in Colonial America SS 3(5)C.1 			
C. COMMUNITY AND ECOSYSTEM DYNAMICS 1. Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Describe ways that animals and plants interact with each other and with their environment, such as birds nesting in trees, deer eating plants, bees pollinating flowers, spiders eating insects, etc. SCI 3(K)F1 Describe some of the ways in which animals depend on plants and on each other. SCI 3(1)E1 Explain that organisms can grow and survive in many very different habitats. SCI 3(2)F1 Modifying and Adapting to the Environment SS 3(Pk-2)D 	<ul style="list-style-type: none"> Explain ways that individuals and groups of organisms interact with each other and their environment. SCI 3(4)F1 Modifying and Adapting to the Environment SS 3(3-5)D 	<ul style="list-style-type: none"> Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available. SCI 3(6)F1 Recognize and explain how human activities can accelerate or magnify many naturally occurring changes. SCI 6(8)B1 Modifying and Adapting to the Environment SS 3(6-8)D 	<ul style="list-style-type: none"> The student will analyze the interrelationships and interdependencies among different organisms and explain how these relationships contribute to the stability of the ecosystem. SCI CLG 3.5.2 The student will explain how organisms are linked by the transfer and transformation of matter and energy at the ecosystem level. SCI CLG 6.2.1 The student will conclude that populations grow or decline due to a variety of factors. SCI LG 6.2.3 The student will evaluate the role of government in addressing land use and other environmental issues SCI 3(G)D.1 	<p>English Language Arts RI.K-2.3,10 RI.3-5.3,7,10 W.3.2,7 W.4.2,7,9 W.5.2,7,9 RST.6-8. 4,5,7,8,9,10 W.6-8.1,2,7,8,9 RST.9-12 4,5,7,8,9,10 W.9-12 1,2,7,8,9</p> <p>Mathematics SMP1-8 PK-2MD 3-5MD 6-8SP S-IC S-ID</p>

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D. STABILITY IN POPULATIONS, COMMUNITIES AND ECOSYSTEMS				
Indicator 1. Use models and provide examples to show how the interaction and interdependence of populations contribute to the stability of populations, communities and ecosystems.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Examine a variety of physical models and describe what they teach about the real things they are meant to resemble. SCI 1(PK-2)D3 Explain that organisms can grow and survive in many very different habitats. SCI 3(2)F1 	<ul style="list-style-type: none"> Examine and modify models and discuss their limitations. SCI 1(3-5)D3 Explain ways that individuals and groups of organisms interact with each other and their environment. SCI 3(4)F1 	<ul style="list-style-type: none"> Analyze the value and the limitations of different types of models in explaining real things and processes. SCI 1(6-8)D3 Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available. SCI 3(6)F1 	<ul style="list-style-type: none"> The student will use models and computer simulations to extend his/her understanding of scientific concepts. SCI CLG 1.4.8 The student will explain why interrelationships & interdependencies of organisms contribute to the dynamics of ecosystems. SCI CLG 6.2.2 The student will conclude that populations grow or decline due to a variety of factors. SCI CLG 6.2.3 	<p>English Language Arts RI.K.1,3,4,7,8,10 RI.1-2 1,3,4,5,7,8,10 RI.3-5.1-10 W.3-5.2,7,9 RST.6-8.3,9,10 W.6-8.1,2,7,8,9 RST.9-12.3,9,10 W.9-12.1,2,7,8,9</p> <p>Mathematics SMP1-8 PK-2MD 3-5MD 6-8MD 6-8SP SMP1-8 S-ID S-IC S-ID S-IC</p>
Indicator 2. Use models and provide examples to show how species' interactions may generate ecosystems that are stable for hundreds or thousands of years.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Examine a variety of physical models and describe what they teach about the real things they are meant to resemble. SS 1(PK-2)D3 	<ul style="list-style-type: none"> Examine and modify models and discuss their limitations. SCI 1(3-5)D3 Explain ways that individuals and groups of organisms interact with each other and their environment. SCI 3(4)F1 	<ul style="list-style-type: none"> Analyze the value and the limitations of different types of models in explaining real things and processes. SCI 1(6-8)C1 Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available. SCI 3(6)F1 	<ul style="list-style-type: none"> The student will use models and computer simulations to extend his/her understanding of scientific concepts. SCI CLG 1.4.8 The student will explain why interrelationships & interdependencies of organisms contribute to the dynamics of ecosystems. SCI CLG 6.2.2 	<p>English Language Arts RI.K.1,3,4,7,8,10 RI.1-2 1,3,4,5,7,8,10 RI.3-5.1-10 W.3-5.2,7,9 RST.6-8.3,9,10 W.6-8.1,2,7,8,9 RST.9-12.3,9,10 W.9-12.1,2,7,8,9</p> <p>Mathematics</p>

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			<ul style="list-style-type: none"> The student will conclude that populations grow or decline due to a variety of factors. SCI CLG 6.2.3 	SMP1-8 PK-2MD 3-5MD 6-8MD 6-8SP SMP1-8 S-ID S-IC S-ID S-IC
Topic E. DIVERSITY Indicator 1. Provide examples and evidence to show that a greater diversity of genes, species and/or environments increases the chance that at least some living things will survive in the face of large changes in the environment.				
PK-2	3-5	6-8	9-12	Supporting Curriculum
<ul style="list-style-type: none"> Observe a variety of familiar plants and animals to describe how they are alike and how they are different. SCI 3(PK)A1 Observe, describe and compare different kinds of animals and their offspring SCI 3(PK)C1 Observe a variety of familiar animals and plants (perhaps on the school grounds, in the neighborhood, and at home) to discover similarities and differences among them SCI 3(K)A1 Recognize that living things are found almost everywhere in the world and that there are somewhat different kinds of living things in different places. SCI 3(K)D1 Explain that there are differences among individuals in any population. SCI 3(1)C1 	<ul style="list-style-type: none"> Explain that individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing. SCI 3(4)D1 Explain the idea that in any particular environment, some kinds of plants and animals survive well, some less well, and some cannot survive at all. SCI 3(5)A1 	<ul style="list-style-type: none"> Explain that in any particular environment, the growth and survival of organisms and species depend on the physical conditions. SCI 3(6)D1 Recognize and describe that evolutionary change in species over time occurs as a result of natural variation in organisms and environmental changes. SCI 3(8)D1 	<ul style="list-style-type: none"> The student will explain how new traits may result from new combinations of existing genes or from mutations of genes in reproductive cells within a population. SCI CLG 3.4.1 The student will provide examples and evidence showing that natural selection leads to organisms that are well suited for survival in particular environments. SCI CLG 6.2.4 	English Language Arts RI.K.3,8,9,10 RI.1-2 3,5,8,9,10 RI.3-4 1,2,3,5,8,9,10 RI.5.1-10 W.3-5.2,7,9 RST.6-8.3,9 W.6-8.1,2,7,8,9 RST.9-12.3,9 W.9-12.1,2,7,8,9 Mathematics SMP1-8 S-ID S-IC

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<ul style="list-style-type: none"> • Observe and describe examples of variation (differences) among individuals of one kind within a population. SCI 3(2)D1 				
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KEYS

English Language Arts

RST: Reading, Science & Technical Subjects

W: Writing

WHST: Writing in History, Science, & Technical Subjects

CTE

GTT: Gateway To Technology, the middle school program

POE: Principles of Engineering, a foundation course in the high school engineering program

CEA: Civil Engineering and Architecture, a specialty course in the high school engineering program

MI: Medical Interventions, the third course in the biomedical sciences program

BI: Biomedical Innovation, the fourth and capstone course in the biomedical sciences program

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Mathematics

Standards for Mathematical Practices

- 1: Make sense of problems and persevere in solving them.
- 2: Reason abstractly and quantitatively.
- 3: Construct viable arguments and critique the reasoning of others.
- 4: Model with mathematics.
- 5: Use appropriate tools strategically.
- 6: Attend to precision.
- 7: Look for and make use of structure.
- 8: Look for and express regularity in repeated reasoning.

Content Standards

- OA: Operations and Algebraic Thinking (K-5)
NBT: Number and Operations in Base Ten (PK-5)
MD: Measurement and Data (PK-5)
G: Geometry (PK-8)
CC: Counting and Cardinality (PK-K)
NF: Number and Operations-Fractions (3-5)
RP: Ratio and Proportional Relationships (6-7)
NS: The Number System (6-8)
EE: Expressions and Equations (6-8)
SP: Statistics and Probability (6-8)
F: Functions (8)

High School

- N-RN: The Real Number System
N-Q: Quantities
N-CN: The Complex Number System
N-VM: Vector and Matrix Quantities
A-SSE: Seeing Structure in Expressions
A-APR: Arithmetic with Polynomials and Rational Expressions
A-CED: Creating Equations
A-REI: Reasoning with Equations and Inequalities
F-IF: Interpreting Functions
F-BF: Building Functions
F-LE: Linear, Quadratic and Exponential Models
F-TF: Trigonometric Functions
G-MG: Modeling with Geometry
S-ID: Interpreting Categorical and Quantitative Data
S-IC: Making Inferences and Justifying Conclusions

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