Unit #3 Ecology

Content Area: **Science**
Course(s):
Time Period:
Length: **28 days**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Ecology

Learning Objectives

- Objective 1 - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- Objective 10 - Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
- Objective 11 - Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.* [
- Objective 2 - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- Objective 3 - Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
- Objective 4 - Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- Objective 5 - Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- Objective 6 - Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- Objective 7 - Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
- Objective 8 - Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
- Objective 9 - Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

Essential Skills

- Essential Skill 1 - Reflect on and revise observations as new evidence emerges
- Essential Skill 10 - Describe how human activities affect soil and land, water resources, and air resources.
- Essential Skill 11 - Define biodiversity and explain its value.
- Essential Skill 12 - Identify current threats to biodiversity.
- Essential Skill 13 - Describe how biodiversity can be preserved.
- Essential Skill 14 - Explain the concept of ecological footprint.
- Essential Skill 15 - Identify the role of ecology in a sustainable future.
- Essential Skill 16 -
- Essential Skill 17 -
- Essential Skill 2 - Apply data representations and new models to revise predictions and explanations
- Essential Skill 3 - Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observation and experiences.
- Essential Skill 4 - Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
- Essential Skill 5 - Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.
- Essential Skill 6 - Predict what would happen to an ecosystem if an energy source was removed.
- Essential Skill 7 - Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations.
- Essential Skill 8 - Describe human activities that can affect the biosphere
- Essential Skill 9 - Describe the relationship between resource use and sustainable development.

Standards

SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
SCI.HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
SCI.HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
SCI.HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
SCI.HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
SCI.HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3)

	competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
SCI.HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
SCI.HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
SCI.HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Instructional Tasks/Activities

- "Musical Chairs" – in-class activity: students demonstrate relationship between population size and resources available in an ecosystem
- "Oh Deer" Lab (outdoors): students enact predator-prey relationships and population dynamics
- Analyzing symbiotic relationships lab
- Biome color map of US: Students color each different biome found in the United States a different color.
- Biome Persuasive Presentations: Students use research and brochures to attempt to persuade other students that their biome is the most important to save
- Biome Research Project: students identify a major problem and solution in that area of the world. Create a persuasive brochure/ poster/ presentation to convince others that your biome is worth saving.
- Demography Internet Activity: students collect cemetery data and interpret change in human population growth over time
- Foldables – organization of material (biotic vs. abiotic, types of succession, weather vs. climate, major biome types)
- Food chains and food webs color coded pyramid: students color, label, define, and draw an example of each type of organism in ecological pyramids using vocabulary. Then assemble pyramids into pyramid shape
- Group Discussion
- Human population growth Worksheet: students compare different countries and limiting factors; identify stage of growth for each country
- Identify biotic and abiotic factors in pictures of various biomes
- Inquiry based Human Population Research Project: students research the population growth of the country of their choice then identify type of human population growth according to current population characteristics. Explain why that population is growing in that way
- Planet Earth & Blue Planet: students describe factors & identify relationships in each
- Population Biology Virtual Lab: students observe and interpret the simulation of varied population growth in bacteria under different conditions using laboratory procedures
- PowerPoint presentation of material
- Predator-Prey Card game: students use cards with various organisms in an ecosystem to show relationships between predators, prey, decomposers, and producers.
- Review Games

- Succession Scenarios: students listen to or read various scenarios of damage to an ecosystem (volcanic eruption, clear cutting a forest, etc.) then attempt explain how different ecosystems will recover after various levels of disturbance
- Think, pair, share (read assigned section of text individually, discuss with a partner, present material in pairs to class – use PowerPoint as a reference)
- Water Carbon, Nitrogen, Phosphorous Cycles Diagrams: Students draw, label, color diagrams using examples of their own for each stage
- Who eats Whom? (kit): students enact predator-prey relationships using manipulatives

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Appropriate Content Specific Online Resource
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs

- Google Slides
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only

- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1
- Resource 2
- Resource 3
- Resource 4
- Resource 5