

# Unit 5: Ecology

Content Area: **Template**  
Course(s):  
Time Period:  
Length:  
Status: **Published**

## State Mandated Topics Addressed in this Unit

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N/A	N/A

## Unit 5: Ecology

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### Essential Skills

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- Apply ethical reasoning to resource use, allocation, and protection.
- Compare and contrast density-dependent growth regulation and density-independent growth regulation
- Compare the characteristics of the ocean zones
- Define carrying capacity
- Define exponential and logistic growth patterns
- Describe biodiversity as the equilibrium of naturally fluctuating rates of extinction and speciation
- Describe community structure and succession
- Describe how ecologists measure population size and density
- Describe how organisms acquire energy in a food web and in associated food chains
- Describe the basic types of ecosystems on Earth
- Describe the competitive exclusion principle
- Describe the effects of abiotic factors on the composition of plant and animal communities in aquatic biomes
- Describe the three types of survivorship curves and relate them to specific populations
- Describe three different patterns of population distribution
- Differentiate between food chains and food webs and recognize the importance of each
- Discuss how human population growth can be exponential
- Discuss the biogeochemical cycles of water, carbon, nitrogen, phosphorus, and sulfur and apply ethical reasoning to human activities that have impacted these cycles
- Discuss the long-term implications of unchecked human population growth
- Discuss the predator-prey cycle

- Explain how humans have expanded the carrying capacity of their habitat
- Explain how the efficiency of energy transfers between trophic levels affects ecosystem
- Explain the effects of habitat loss, exotic species, and hunting on biodiversity
- Explain the legislative framework for conservation
- Give examples of defenses against predation and herbivory
- Give examples of symbiotic relationships between species
- Identify benefits of biodiversity to humans
- Identify examples of the effects of habitat restoration
- Identify significant threats to biodiversity
- Identify the early and predicted effects of climate change on biodiversity
- Identify the factors important in conservation preserve design
- Identify the role of zoos in biodiversity conservation
- Identify the two major abiotic factors that determine the type of terrestrial biome in an area
- Recognize distinguishing characteristics of each of the eight major terrestrial biomes
- Relate population growth and age structure to the level of economic development in different countries
- Summarize the characteristics of standing water and flowing water in freshwater biomes
- Use life tables to calculate mortality rates

## Objectives

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- Analyze and describe how the process of photosynthesis provides a vital connection between the sun and the energy needs of living systems
- Calculate the trends in production, use and transfer of energy from one trophic level to another using data
- Explain how food webs are limited and how pyramidal relationships exist
- Explain how plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water into complex, energy rich organic compounds and release oxygen to the environment
- Follow the transfer of matter (molecules) from one organism to another repeatedly and between organisms and their physical environment
- Identify how the total amount of matter in a system remains constant, even though its form and location change
- Identify situations where humans intentionally and unintentionally modify ecosystems as a result of population growth, technology, and consumption
- Predict how direct harvesting, pollution, atmospheric changes, and other factors will affect population dynamics in a given ecosystem based on data and accepted mathematical models
- Predict how natural disasters such as hurricanes, floods, volcanoes will affect population dynamics in a given ecosystem based on data and accepted mathematical models
- Provide evidence of how human destruction of habitats threatens current local and global ecosystem stability
- Recognize that all matter tends toward more disorganized states, and that living systems require a continuous input of energy to maintain their chemical and physical organizations
- Recognize that living systems require a continuous input of energy to maintain their chemical and

physical organizations and also understanding that with death (the cessation of energy input), living systems rapidly disintegrate

- Trace the cycling of atoms and molecules on Earth among the living and nonliving components of the biosphere
- Trace the path that energy entering ecosystems as sunlight follows when being transferred by producers into chemical energy through photosynthesis, and then being passed from organism to organism through food webs

## Standards

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9-12.HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
9-12.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.
9-12.HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
9-12.HS-LS2-6	Evaluate 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.
9-12.HS-LS2-8	Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.
9-12.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.
9-12.HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
9-12.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
9-12.HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

## Instructional Tasks/Activities

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- Artistically represent aspects of Aquatic Biome
- Biome Lab: Students color a world map identifying the locations of different terrestrial biomes according to climate zones.
- Ecological Pyramids Lab: Students create their own ecological pyramid according to specific parameter
- Ecosystem Packet: Reviews ecological terms, trophic levels, food chains and webs, and ecological pyramids
- Essays and Application Question practice in groups
- Expert Groups: Biogeochemical Cycle
- Food Web Activity: Students use given animals to construct a food web
- Human Demography Lab: Students study survivorship and mortality rates based on information collected from an online cemetery database.
- Lion King Lab: Identify various ecological principles evident in the movie

- Oh Deer Lab: Students demonstrate predator prey interactions and population change over time according to habitat and resource availability
- Population Ecology Packet: Questions regarding characteristics of populations, population growth, dependent and independent factors and age structure.
- Random Sampling Lab: Estimates size of a population by collecting data in random samples.
- Review Games
- Symbiosis Packet: Students must identify and label various types of symbiosis based on pictures and descriptions of plants and animals that work together in some way
- Vocabulary

## **Assessment Procedure**

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- Chapter Tests
- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Homework questions
- Journal / Student Reflection
- Kahoot
- Laboratory Quizzes
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Quiz on biodiversity
- Quiz on biomes
- Quiz on conservation
- Quiz on ecosystems
- Quiz on populations
- Quiz on vocabulary
- Rubric
- Teacher Collected Data
- Test
- Worksheet

## **Recommended Technology Activities**

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- Appropriate Content Specific Online Resource
- Chromebook
- 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 Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

## **Accommodations & Modifications & Differentiation**

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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**

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

## **Instruction/Materials**

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- 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**

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- 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**

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## **Resources**

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- Resource 1
- Resource 2
- Resource 3

- Resource 4
- Resource 5