

Unit 2: Ecology

Standards:

- HS-LS2-1: Use data to explain factors that affect ecological carrying capacity at different scales
- HS-LS2-2: Use data to explain factors that affect biodiversity and populations at different scales
- HS-LS2-3: Use data to explain the cycling of matter and flow of energy in aerobic and anaerobic conditions
- HS-LS2-4: Use data to explain the cycling of matter and flow of energy among organisms in an ecosystem
- HS-LS2-5: Make a model of the cycling of carbon through the biosphere, atmosphere, hydrosphere, and geosphere
- HS-LS2-6: Evaluate claims, evidence, and reasoning that ecosystems remain stable until conditions change
- HS-LS2-7: Design, evaluate, and refine a solution to reduce the impact of human activities
- HS-LS4-5: Evaluate evidence supporting claims that changes in environmental conditions may result in increased numbers of some species, emergence of new species, and extinction of others
- HS-LS4-6: Create or revise a simulation to test a solution to reduce negative human impacts on biodiversity
- HS-ETS1-1: Analyze a major global challenge and identify qualitative and quantitative needs and limitations for solutions that also accommodate the needs and wants of society
- HS-ETS1-2: Design a solution to solve a complex problem by breaking it into smaller problems
- HS-ETS1-3: Evaluate the effectiveness and application of solutions, and correct solutions to reduce human impact
- HS-ETS1-4: Use a computer simulation to model the impact of solutions with criteria and constraints on system interactions
- HS-ESS2-4: Use a model to describe how variations in the flow of energy on Earth results in changes in climate
- HS-ESS3-6: Use a model to illustrate the relationships among Earth systems and the impact of human activity

Objectives:

1. Describe why ecology is important
2. Define abiotic and biotic factors
3. Describe the effect of abiotic factors on biotic factors
4. Describe methods used to study ecology
5. Describe the difference between weather and climate
6. Describe the factors that change due to climate change
7. Describe how producers and consumers get energy
8. Describe the flow of energy through ecosystems
9. Explain how ecological pyramids model energy flow in ecosystems
10. Describe the water, nitrogen, and carbon cycle, and their importance
11. Describe which factors affect population growth
12. Compare and contrast exponential and logistic growth of populations
13. Explain how carrying capacity is determined
14. Compare and contrast density dependent and density independent limiting factors
15. Explain the relationship between limiting factors and extinction
16. Describe how human population has changed over time
17. Explain why population growth rates are different in different countries
18. Describe the effect of herbivores and keystone species on an ecosystem
19. Describe the three symbiotic relationships
20. Describe the benefits of biodiversity
21. Describe how communities change over time, and recover from disturbances
22. Describe important ecosystem services

Vocabulary:

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| • Biosphere | • Autotroph | • Food Web | • Carrying Capacity |
| • Ecosystem | • Heterotroph | • Food Chain | • Density-dependent limiting factor |
| • Community | • Chemosynthesis | • Ecological Pyramid | • Density-independent limiting factor |
| • Population | • Photosynthesis | • Trophic Level | • Competitive Exclusion |
| • Species | • Consumer | • Biomass | • Keystone Species |
| • Biome | • Omnivore | • Nitrogen Fixation | • Mutualism |
| • Niche | • Herbivore | • Denitrification | • Commensalism |
| • Weather | • Carnivore | • Population Distribution | • Parasitism |
| • Climate | • Detrivore | • Population Density | • Pioneer Species |
| • Greenhouse Effect | • Decomposer | • Exponential Growth | • Biodiversity |
| • Primary Producer | • Scavenger | • Logistical Growth | • Resilience |