

# Instructional Unit Title: Population Ecology

The teacher may provide opportunities to examine and analyze various ecosystem components so students may identify and evaluate ecological concepts such as biotic and abiotic factors, biomes, niche, keystone species, communities, populations, ecosystems, and the biosphere.

The teacher may provide opportunities to examine food webs and analyze the relationships between organisms within the food web so that students may identify and evaluate the interconnected nature of all organisms and the various trophic levels within an ecosystem.

The teacher may provide opportunities to examine interactions between species competing for limited resources (e.g., food, water, shelter) and the population trends that ensue so that students can evaluate the impacts on competing organisms, as well as other organisms within the local food web.

The teacher may provide opportunities to investigate energy as a resource (photosynthesis as a mechanism by which energy enters the biosphere as chemical energy) so that students may evaluate the importance of producers as the foundation of the energy flow pyramid, and the loss of usable energy as it is transformed into mechanical energy and heat at each trophic level.

The teacher may provide students with information on human impacts on ecosystems and natural resources such as air, water, forestry, agricultural (soil), so that students will be able to compare and contrast these impacts as long term or short term and local or global in relation to **cycles**.

The teacher may provide opportunities to examine succession so that students may identify and predict changes in populations of organisms over time.

Teachers may provide information on carrying capacity and competition for resources so that students can discuss the big idea of carrying capacity and how that is affected by biotic and abiotic limiting factors and competition.

Teachers may discuss/present the interaction of biogeochemical cycles and the concepts of dynamic and static equilibrium so that students can understand how biogeochemical cycles are dependent on many factors.

The teacher may present the concepts of the carbon, nitrogen, water and phosphate cycles so that students will be able to describe or illustrate the process of each cycle (e.g., the role of nitrogen fixation in the nitrogen cycle).

The teacher may provide students with information on human impacts on ecosystems and natural resources such as air, water, forestry, agricultural (soil), so that students will be able to compare and contrast these impacts as long term or short term and local or global in relation to **habitats**.

The teacher may provide students with information on human impacts on ecosystems and natural resources such as air, water, forestry, agricultural (soil), so that students will be able to compare and contrast these impacts as long term or short term and local or global in relation to **food webs**.

**PERFORMANCE ASSESSMENT:** You have been asked to create a presentation for a local authority (county commissioner, city council, zoning board, etc.) to present an analysis of the impacts of the eradication of a top level consumer (e.g. coyote removal, etc.) on the interdependence of the ecosystem in your local area. You must include an analysis of carrying capacity, interspecies relationships, limiting factors, ecological impact, and a visual representation (data analysis) of the impact. Your report needs to include a minimum of three scientifically credible references.

*This unit was authored by a team of Colorado educators. The unit is intended to support teachers, schools, and districts as they make their own local decisions around the best instructional plans and practices for all students. To see the entire instructional unit sample with possible learning experiences, resources, differentiation, and assessments visit <http://www.cde.state.co.us/standardsandinstruction/instructionalunitsamples>.*