

Important Concepts	Alaska Science Content Standard <b>C3</b> Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.
Interdependence	
9-12 Level	

#### Grade Level Expectations:

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by:

**[9] SC3.1** describing the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going (L)

**[9] SC3.3** identifying dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size

**[10] SC3.1** relating the carbon cycle to global climate change

**[10] SC3. 2** exploring ecological relationships (e.g., competition, niche, feeding relationships, symbiosis)(L)

**[11] SC3.1** relating the carbon cycle to global climate change

**[11] SC3.2** analyzing the potential impacts of changes (e.g., climate change, habitat loss/gain, cataclysms, human activities) within an ecosystem

According to AAAS's Benchmarks for Science Literacy\*, some of the things that students should know and understand by the end of the twelfth grade are:

Ecosystems can be reasonably stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators.

If a disturbance such as flood, fire, or the addition or loss of species occurs, the affected ecosystem may return to a system similar to the original one, or it may take a new direction, leading to a very different type of ecosystem. Changes in climate can produce very large changes in ecosystems.

Human beings are part of the earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

At times, environmental conditions are such that land and marine organisms reproduce and grow faster than they die and decompose to simple carbon containing molecules that are returned to the environment. Over time, layers of energy-rich organic material inside the earth have been chemically changed into great coal beds and oil pools.

The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways. At each link in a food web, some energy is stored in newly made structures but much is dissipated into the environment. Continual input of energy from sunlight keeps the process going.

\*Project 2061, American Association for the Advancement of Science, Benchmarks for Science Literacy. New York: Oxford University Press, 1993.