

## Core Idea LS2

### **Ecosystems: Interactions, Energy, and Dynamics**

*How and why do organisms interact with their environment and what are the effects of these interactions?*

- Ecosystems
- interactive systems
- biological communities
- biotic components
- abiotic components
- organism
- hierarchal structure
- same organisms (species)
- populations
- communities
- ecosystem
- biosphere
- growth
- reproduction
- interdependent relationships
- physical environment
- resources and those who consume them
- biotic and abiotic characteristics of the environment
- continuous flow of energy
- recycling of matter and nutrients within the system
- ecosystems are dynamic
- change over time
- system stability
- system resilience

#### **LS2.A: INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS**

*How do organisms interact with the living and nonliving environments to obtain matter and energy?*

- ecosystems
- interdependence of organisms
- species
- nonliving (physical) elements of the environment
- matter and energy resources

- complex feeding hierarchies of producers, consumers, and decomposers
- food web
- interactions between organisms
- predatory
- competitive
- mutually beneficial
- Ecosystem carrying capacities
- population
- survival
- predation
- disease
- availability of resources
- parameters of the physical environment
- physical factors (such as light, temperature, water, soil, and space for shelter and reproduction)
- physical environments (e.g., deserts, grasslands, rain forests, and coral reefs)
- biotic interactions between organisms (e.g., competition, predation, and various types of facilitation, such as pollination)
- food
- shelter
- favorable temperature
- specialized animal body parts
- Plants depend on air, water, minerals (in the soil), and light to grow.
- mobility
- pollination/ators
- consumers
- fungi
- bacteria
- decomposers
- decomposition
- recycle
- soil
- ecosystem balance/stability
- environmental interactions
- living things
- nonliving factors
- limited resources
- mutually beneficial interactions
- competitive, predatory, and mutually beneficial interactions

## LS2.B: CYCLES OF MATTER AND ENERGY TRANSFER IN ECOSYSTEMS

*How do matter and energy move through an ecosystem?*

- cycling of matter
- flow of energy
- energy-releasing chemical reactions
- plant matter
- animals acquire matter from food
- chemical elements make up molecules
- food web
- only a small fraction of the matter consumed at one level is captured by the next level up
- matter cycles
- energy flows
- conservation of matter and energy
- carbon cycle
- photosynthesis
- digestion
- respiration
- decomposition
- biosphere
- atmosphere
- oceans
- geosphere
- biogeochemical and physical processes
- air
- soil
- microbes
- waste matter (gas, liquid, or solid)
- producers (generally plants and other organisms that engage in photosynthesis),
- consumers
- decomposers
- terrestrial environment
- aquatic environment
- atoms

Ecosystems are sustained by the continuous flow of energy, originating primarily from the sun, and the recycling of matter and nutrients within the system.

- living and nonliving parts of the ecosystem

- Photosynthesis
- cellular respiration (including anaerobic processes)
- chemical elements
- molecules
- competition
- biosphere
- atmosphere
- hydrosphere
- geosphere

## LS2.C: ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE

*What happens to ecosystems when the environment changes?*

- Ecosystem
- dynamic
- change over time
- environment
- population
- ecosystem disruption
- physical and biological components of an ecosystem
- extinction of species
- migration of species into or out of the region
- speciation, the formation of new species
- tree canopy
- forest
- cataclysmic events, such as volcanic eruptions
- human activity
- resource extraction
- adverse land use patterns
- pollution
- introduction of nonnative species
- global climate change
- evolution
- behavioral and physiological patterns
- survival
- biodiversity
- terrestrial ecosystems
- oceanic ecosystems
- The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.
- ecosystem resilience
- resources

- habitat
- anthropogenic changes (induced by human activity) in the environment
- habitat destruction
- introduction of invasive species
- overexploitation
- climate change

## LS2.D: SOCIAL INTERACTIONS AND GROUP BEHAVIOR

*How do organisms interact in groups so as to benefit individuals?*

- unicellular
- slime molds
- social affiliation
- genetic relatedness
- physical proximity
- recognition mechanisms (which may be species specific)
- Group behavior
- Stable groups
- Fluid groups
- dominant
- key members
- group inter-dependence
- physiology
- isolation
- collections of equal individuals
- hierarchies with dominant members
- small families
- groups of single or mixed gender
- groups composed of individuals similar in age

Group behaviors are found in organisms ranging from unicellular slime molds to ants to primates, including humans.

- key members are removed from the group through death, predation, or exclusion by other members
- drive for social affiliation with members of their own species
- some will suffer (behaviorally as well as physiologically) if reared in isolation
- physical needs
- bonds between offspring and parents
- group membership
- genetic relatives

