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/at ors
• 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
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