

## AIM: Populations and Ecosystems Ideas

- a. An organism is any living thing, such as a plant or an animal. Organisms are categorized by how they get their food (e.g., producer, consumer, scavenger, predator, decomposer).**
- b. Individual organisms and species interact and are interdependent in various ways. Some interactions are beneficial; others are detrimental to at least one of the organisms or species involved.**
- Organisms depend on other organisms for food and/or nutrients
    - Consumers depend on producers. For example, plants can provide shelter to animals and are also a source of food.
    - Many producers depend on consumers. For example, plants depend on decomposers to return minerals to the soil, and many plants rely on animals for pollination and seed dispersal.
  - In some interactions, both organisms benefit by interacting and are more likely to survive and reproduce. This is called a mutually beneficial relationship.
  - In some interactions, one organism will benefit by interacting and is more likely to survive and reproduce while the other is harmed and its survival and/or reproduction may be limited.
    - Parasites are organisms that live on or in other organisms (host). Parasites benefit from the relationship, but the host is harmed.
  - Co-evolution occurs when more than one species have existed together long-term, influencing changes in each other.. For example, some species have become so adapted to each other over a long period of time that neither could survive without the other.
  - Food webs illustrate the feeding relationships between producers and consumers and among consumers in an ecosystem.
- c. Organisms can survive only in ecosystems in which their needs are met, and each type of organism (species) has a specific range of ecological conditions (e.g., temperature, moisture, amount of oxygen, nutrient availability, salinity) under which it can survive.**
- d. Sometimes, ecosystems change and no longer provide for the needs of some or all of the organisms that live there. Some organisms will be able to survive and reproduce in the new conditions, some will move to a new ecosystem where their needs are met, and some will not survive.**
- Organisms, including humans, often change the ecosystem in which they live through feeding, leaving waste, and/or competing with other organisms.
  - Non-native organisms introduced into a new area may outcompete, overeat, and/or replace native organisms, resulting in significant ecological changes.
- e. Ecological succession occurs in areas where there have previously been no organisms (e.g., weathered rock) or in areas where prior life has been removed or reduced (e.g., due to volcanoes or fire).**
- Pioneer organisms move into an ecosystem with no other organisms and change it in ways that make it possible for other organisms that could not previously survive in the ecosystem to live there. Both the pioneer and later organisms successively change the ecosystem, making it more suitable for other organisms.
  - Some organisms can change their ecosystem to the extent that their offspring can no longer live there. This area becomes better suited to other organisms.

- f. Organisms have different traits, and natural selection results in the survival and reproduction of organisms with heritable traits that are favorable in a given ecosystem.**
- Organisms have variation in their traits. Natural selection refers to the selection by the ecosystem (selective pressure) of those traits that promote survival and reproduction better than others.
  - Adaptations are heritable physical or behavioral traits that enhance an organism's chances of surviving and reproducing in a given ecosystem. The development of an adaptation does not occur within the lifetime of an organism, but only within populations and across generations. (The interaction of organisms with one another and with their ecosystem sometimes results in temporary physiological or behavioral changes that promote stable conditions within the organism (i.e. homeostasis). This individual short-term physiological or behavioral change is not the same as heritable long-term adaptation.)
- g. The number of organisms and populations an ecosystem can support depends on competition for the available biotic (i.e., living) and abiotic (i.e., non-living) resources (e.g., light, water) and factors (e.g., temperature, soil composition).**
- All populations living together and the physical factors with which they interact compose an ecosystem.
  - A population is a group of organisms of the same species that live and breed together in a particular area.
  - Populations can potentially grow unchecked, but tend to remain the same size because of limited resources.
  - When organisms compete, often only some organisms survive because they are better adapted for acquiring resources in that ecosystem.
  - Population density in an area varies from time to time based on variation in availability of nutrients, weather, and presence of other organisms.
- h. An ecological niche is the role that a type of organism (species) plays in an ecosystem. A niche includes the resources organisms use from the ecosystem and how they acquire and use those resources.**
- No two species can occupy the same niche at the same time (competitive exclusion principle). Competition between two species sometimes leads to increased niche specialization (resource partitioning), thereby permitting coexistence of multiple species.