Population Interactions

POPULATION INTERACTIONS

Five Major Ways of Interactions:

Population interactions have critical effects on resource use and controls population sizes of the species in an ecosystem. These interactions influence the abilities of interacting species to survive and reproduce. Following five types of population interactions are based on sharing of limited resources such as food, shelter and space.

I. **Commensalism** – Interaction that benefits one species and the other is either not harmed or may have minor effects.

- For example, in tropical and subtropical forests certain epiphytes of orchids and bromeliads attach themselves to the trunks and branches of the large trees (Figure 1).
- Roots of these epiphytes remain on the trunk of a tree, rather than in soil, without penetrating or harming the tree. In this interaction, the epiphyte gains access to water, other nutrient debris, and sunlight, while the tree apparently remains unharmed.

Figure 1. Bromeliad an epiphyte.

II. **Interspecific Competition** - The most common interaction between species is competition for limited resources. While fighting for resources does occur, most competition involves the ability of one species to become more efficient than another species in acquiring the essential resources.

- Since, each species plays a unique role in its ecological niche. Some species are generalists with broad niches and some are specialists with narrow niches. When two species compete with one another for the same resources such as food, light, or space, their niches overlap. Although different species may share some aspects of their niches but no two species can occupy exactly the same ecological niche for very long. The concept is known as the competitive exclusion principle.
- When there is intense competition between two species for the same resources, both species suffer harm by having reduced access to important resources. If one species can take over the largest share of one or more key resources, the other competing species must migrate to another area (if possible), shift its feeding habits or behaviour through natural selection to reduce or alter its niche, suffer a sharp population decline, or become extinct in that area.

<u>Resource partitioning</u> – Over a period of time long enough for natural selection to occur, populations of some species competing for the same resources develop adaptations through natural selection that allow them to reduce or avoid competition.

- Species evolve to reduce niche overlap by means of resource partitioning. It occurs when species competing for similar limited resources evolve specialized traits that allow them to use shared resources at different times, in different ways, or in different places.
- For example, through natural selection, the fairly broad and overlapping niches of two competing species can reduce their niche overlap by becoming more specialized (Figure 2).

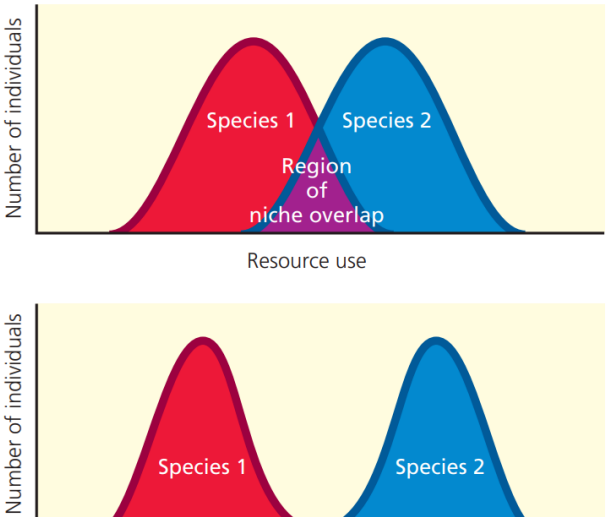

Figure 2. Competing species may reduce niche overlap by resource partitioning

III. **Mutualism** - In mutualism, two species behave in ways that benefit both by providing each with food, shelter, or some other resource.

- For example, birds that ride on the backs of large animals like African buffalo, elephants, and rhinoceroses.
- The birds remove and eat parasites and pests (such as ticks and flies) from the animal's body and often make noises warning the larger animals when predators approach (Figure 3).
- The clownfish species, which live within sea anemones, whose tentacles sting and paralyze most fish that touch them.
- The clownfish, which are not harmed by the tentacles, gain protection from predators and feed on the detritus left from the anemones' meals. The sea anemones benefit because the clownfish protect them from some of their predators (Figure 3).

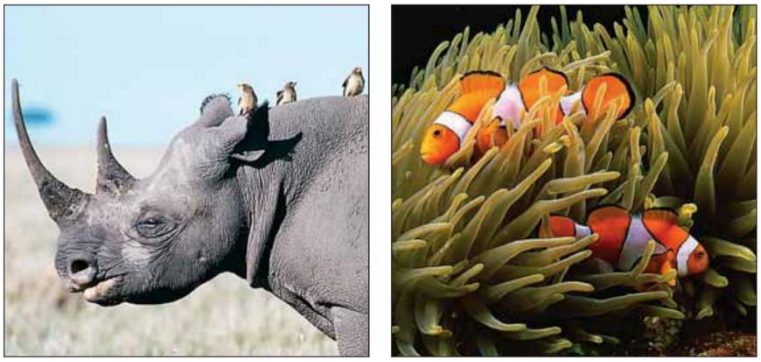

Figure 3. Oxpeckers on rhinoceros and clownfish between tentacles of sea anemone

IV. **Parasitism** - When one species (the parasite) feeds on the body of, or the energy used by, another organism (the host), usually by living on or in the host, the species interaction is parasitism. In this relationship, the parasite benefits and the host is harmed but not immediately killed.

- Unlike the typical predator, a parasite usually is much smaller than its host and rarely kills its host. Also, most parasites remain closely associated with their hosts, draw nourishment from them, and may gradually weaken them over time.
- Some parasites live inside their hosts such as mistletoe plants. Other parasites attach themselves to the outsides of their hosts, for example, sea lampreys, which use their sucker-like mouths to attach themselves to fish and feed on their blood (Figure 4).

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Figure 4. Mistletoe infested tree (right-side tree) and sea lampreys

V. **Predation** - In predation, a member of one species (the predator) feeds directly on all or part of a living organism of another plant or animal species (the prey) as part of a food web. Two different species, such as lions (the predator or hunter) and zebras (the prey or hunted) together form a predator–prey relationship.

- Herbivores can simply walk, swim, or fly up to the plants they feed on. For example, sea urchins can move along the ocean bottom to feed on the base of giant kelp plants. Carnivores feeding on mobile prey have two main options: pursuit and ambush. Some catch prey by running fast such as the cheetah; others can fly and have keen eyesight such as the American bald eagle; still others cooperate in capturing their prey by hunting in packs such as wolves and African lions.
- Herbivores, carnivores, and omnivores are predators. However, detritus feeders and decomposers are not considered predators because they do not feed on live organisms.

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