I. The Niche

A niche is the **range of physical and biological conditions** in which a species lives and the way the species obtains what it needs to survive and reproduce.

A. Tolerance

a. Every species has its own range of **tolerance**, the ability to survive and reproduce under a range of environmental circumstances.

b. Organisms have an **upper and lower limit of tolerance** for every environmental factor. Beyond those limits, the organism **cannot survive**.

c. A species’ tolerance for environmental conditions, then, helps determine its **habitat**—the general place where an organism lives.

B. Defining the Niche

a. An organism’s **niche** describes not only the environment where it lives, but **how it interacts** with biotic and abiotic factors in the environment.

b. The term **resource** is any necessity needed for survival
   
i. **Physical Aspects of the Niche** - Part of an organism’s niche involves the **abiotic factors** it requires for survival; (water, weather, etc)

   ii. **Biological Aspects of the Niche** - Biological aspects of an organism’s niche involve the **biotic factors** it requires for survival, such as when and how it reproduces, the **food** it eats, and the way in which it obtains that food.

II. Competition

- How does competition shape communities?

By causing species to divide resources, competition helps **determine the number and kinds of species** in a community and the niche each species occupies.

A. The Competitive Exclusion Principle

a. Direct competition between different species almost always produces a **winner** and a **loser**—and the losing species **dies out**.

b. The **competitive exclusion principle** states that **no two species can occupy** exactly the same niche in exactly the same habitat at exactly the same time.

c. If two species attempt to occupy the same niche, **one species will be better at competing for limited resources and will eventually exclude the other species**.

B. Dividing Resources
a. Instead of competing for similar resources, species usually divide them.
b. The resources utilized by these species are similar yet different. Therefore, each species has its own niche and competition is minimized.
c. By causing species to divide resources, competition helps determine the number and kinds of species in a community and the niche each species occupies.

III. Predation, Herbivory, and Keystone Species - How do these shape communities?

A. Predator-Prey Relationships
   a. Predation - An interaction in which one animal (the predator) captures and feeds on another animal (the prey).
   b. Predators can affect the size of prey populations in a community and determine the places prey can live and feed.

B. Herbivore-Plant Relationships
   a. Herbivory - An interaction in which one animal (the herbivore) feeds on producers (such as plants)
   b. Herbivores, like a ring-tailed lemur, can affect both the size and distribution of plant populations in a community and determine the places that certain plants can survive and grow.

C. Keystone Species
   a. Sometimes changes in the population of a single species, often called a keystone species, can cause dramatic changes in the structure of a community.
   b. Example of sea otters: Without otters as predators, the sea urchin population skyrocketed, and armies of urchins devoured kelp down to bare rock. Without kelp to provide habitat, many other animals, including seabirds, disappeared. Otters were a keystone species in this community.

IV. Symbioses - What are the three primary ways that organisms depend on each other?

   Any relationship in which two species live closely together is called symbiosis, which means “living together.”

   A. Mutualism - the kind of relationship between species in which both benefit. Example – clown fish and sea anemone

   B. Parasitism - relationships in which one organism lives inside or on another organism and harms it. Example - Tapeworms live in the intestines of mammals, fleas, ticks, live on the bodies of mammals

   C. Commensalism - a relationship in which one organism benefits and the other is neither helped nor harmed; Example: Barnacles often attach themselves to a whale’s skin.