

Topic: Community interactions

Reading: Chapter 27

Main concepts:

- In an ecological sense, a community is a set of populations that share the same living space. A community makes up the biotic portion of an ecosystem.
- If a habitat is an organism's "address," its niche is its "occupation" within that habitat. Habitat refers to where an organism lives. Niche refers to the kinds of activities an organism does within its particular ecosystem. For example, ospreys (which are commonly seen near rivers in this area) are predators preying on fish in lakes and rivers. An osprey could not survive in a desert where there are not fish to prey on.
- Competition exists when two different species are using the same resource. Competition is almost always detrimental, since one species may outcompete another, but lose population size in doing so. Over time, the two species may reduce competition through a behavioral adaptation called resource partitioning.
- Predator-prey interactions often show complex coevolutionary relationships. In each generation, the most successful predators and the most successful prey are favored by selection, which can lead to changes in both. Camouflage, mimicry, warning coloration, and chemical deterrents, have all emerged from predator-prey and plant-herbivore interactions.
- Symbiosis (literally "living together") involves close relationships between two different species, and can be expressed in three ways:
 - Parasitism: Benefits the parasite, harms the host. However, it is usually in the parasite's best interests not to kill the host immediately. Example: athlete's foot fungus parasitizes humans, but does not kill them.
 - Mutualism: Both species benefit from the interaction. Example: Humans have a wide range of gut bacteria in their large intestines. The bacteria benefit from the protected environment and continuous supply of undigested food, and humans benefit from the vitamins that the bacteria produce.
 - Commensalism: One species benefits, the other is neither helped nor harmed. Example: birds that nest in trees benefit from having nests above the ground and hidden in the foliage, but the tree is neither helped nor harmed by the birds nesting in it.
- A keystone species is one that is critical to a community, such that if it is removed (such as by overhunting), the community collapses. Example: Alligators in the southern U.S. states scour out pits in the bottoms of marshes and ponds, where they may rest. During dry periods, these pits may be the only remaining standing water in the marsh, and are places where fish and other aquatic life may find refuge until the rains return. When alligators were hunted and their populations dropped, alligator pits disappeared, and many aquatic species suffered heavy population losses.
- Succession is a turnover in community types that occupy an area as early pioneer species are replaced by other species, until a self-sustaining climax community is formed. Two types of succession:
 - Primary succession: Begins with bare rock or mineral soil with no organic material. Primary succession may begin on lava flows, or on rock and mineral soil exposed in an excavation for a housing development. Primary succession usually begins with colonization by lichens, followed by mosses, which build a thin layer of soil as they die and decay.
 - Secondary succession: Begins where there is soil in place that has at least some organic component, especially buried seeds. Following a forest fire, or abandonment of a cultivated field, seeds in the soil seed bank or that are blown in from other places germinate and take advantage of the exposed area. Most of these are pioneer species, also known as "weeds."

Common misconceptions:

- Some people look upon succession as a kind of life cycle, and believe that a climax forest (that is, an "old growth" forest) has reached old age and soon all the trees will die. This is used as an argument in favor of clear-cutting, supposing that if the trees aren't harvested, they will die and go to waste. In fact, a climax forest is self-perpetuating. Some trees will undoubtedly die from disease or may be blown down in storms. This opens gaps in the canopy that allows younger trees to grow, creating the unique mixed-canopy architecture of old-growth forests. Some harvesting plans are designed to mimic this architecture.
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- Students often confuse predator-prey interactions with competition. In predator-prey interactions, one organism is consuming another. In competition, both species are using the same resource.
- In Western culture, we often look upon competition as a good thing. In nature (and even in human interactions) competition is usually wasteful. Selection tends to favor behaviors that allow organisms to avoid competition, and thereby spend more energy on finding food and producing offspring.

Reading notes:

- Define “habitat” and “niche” according to the definitions in the book.
- Describe interspecific competition, why organisms are benefitted by avoiding competition, and how resource partitioning helps reduce competition.
- Distinguish between competition and predation.
- Describe what intraspecific competition is, and some of its effects (we will revisit this when we look at population ecology).
- Describe adaptations that have been shaped by predator/prey interactions, including camouflage, warning coloration, mimicry, chemical defenses.
- How do invasive species affect communities? Give some examples.
- List the three types of symbiosis, and give examples of each.
- Define “keystone species,” and list examples.
- Distinguish between primary and secondary succession. What types of organisms are considered pioneer species in each?
- Define “climax community.”

Useful websites:

- “[Succession Animation](http://www.wiley.com/college/strahler/0471480533/animations/ch23_animations/animation1.html)” (http://www.wiley.com/college/strahler/0471480533/animations/ch23_animations/animation1.html) shows succession in a forest, from beaver pond to bog forest.
 - “[Interdependence of Living Things](http://www.bbc.co.uk/schools/gcsebitesize/biology/livingthingsenvironment/0habitatsandpopsrev8.shtml)” (<http://www.bbc.co.uk/schools/gcsebitesize/biology/livingthingsenvironment/0habitatsandpopsrev8.shtml>) has an interactive animation showing predator/prey cycles between ladybird beetles and aphids.
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