

BSCS Biology An Ecological Approach

Chapter 3: Communities and Ecosystems

All Earth's critters got a place in the choir.

Some sing low and some sing higher.

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Introduction

In the complex web of life, no organisms live alone and there are many interdependent connections. As John Muir said, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

Life in Communities

Populations of plants and animals interact with one another in complex ways. All of these interactions in one place during a specific time form a **community**. Every community consists of the living (biotic) and non-living (abiotic) components. The community and the physical or non-living environment form an **ecosystem**. Each ecosystem consists of many interacting populations. The consumers that eat plants (**herbivores**) and those that eat animals (**carnivores**) as well as those that eat both (**omnivores**), all have different roles in the food web. These roles or "jobs" are known as a **niche** whereas the place where an organism lives is its **habitat**. Different organisms cannot occupy the same niche. Organisms can help or harm one another. The relationships are summarized as follows:

- **predator-prey** - one animal eats another
- **competition** - organisms eating or competing for the same food or space
- **symbiosis** - organisms in direct physical contact in a relationship that benefits both
- **parasitism** - one organism living on or in another organism and while obtaining food from the host
- **scavenger** - organism that eats an animal that it did not kill

Ecosystems

All ecosystems are connected to other ecosystems and form boundaries between them such as the bank of a river and forest. Changes in one ecosystem may impact other ecosystems. Most communities have more producers than consumers. The size of any given community is determined by the amount of plants that can live and produce food for other organisms. The number of producers and consumers and the energy lost at each level up the food chain form an **energy pyramid**. About 10% of the total energy in one level makes it to the next level of a food pyramid.

Humans and Ecosystem Stability

Ecosystems that are stable can recover from damage and changes. As a general rule, a community is more stable if there are many links in the food web. A community with a complex food web is more likely to survive disruptions and damage. Farming creates a very simple ecosystem that is often more susceptible to diseases and pests (insects, worms, etc.). To combat diseases, humans apply chemicals (**biocides**) to kill pests and diseases. Biocides applied in the natural environment can become concentrated as they move through consumers up the food chain causing many problems for top level consumers. Many organisms on earth are disappearing, which results in a decrease in **biodiversity** (the number of different organisms).

Many **species** (a group of similar organisms) are becoming **extinct** (gone forever) due to human activities. Biodiversity is important because:

- diverse populations are less susceptible to diseases and pests.
- homeostasis is less likely to be disrupted.
- valuable medicines and cures can/could be found.

Humans can help conserve biodiversity by:

- preserving habitat
- restoring damaged habitat
- breeding species
- establishing preserves

