

TEACHER BACKGROUND INFORMATION

BIOMES AND ECOSYSTEMS

CHAPTER'S BIG IDEAS:

- Living organisms are adapted to survive in the presence of all other living and non-living things in their ecosystems.
 - Organisms develop different types of adaptations which allow them to compete over limited resources.
 - The size of populations of organisms is affected by both biotic and abiotic factors.
 - Altering any part of an ecosystem will positively or negatively affect the survival of living things within that ecosystem.
- Nutrients (matter) are recycled in an ecosystem.
 - Nitrogen cycle
 - Carbon cycle
 - Phosphorous cycle
 - Water cycle
- Solar energy is captured by producers, such as plants, and then transferred to consumers and decomposers (energy is neither created nor destroyed, just changed from one form to another).
- Energy, in the form of heat, is lost to the atmosphere as it is used by organisms for biological processes.
 - Energy pyramids

ECOSYSTEMS

In 1866, the German biologist Ernst Haeckel gave a name to the study of how organisms fit into their environment. He called the study **ecology** (eco= house; logy= study of). Ecology is the study of the interactions of living organisms with one another and with their physical environment (soil, water, climate, and so on). The place where a particular population of species lives is its **habitat** (address).

All organisms, including humans, interact continuously with their environments. Humans breathe air, exchanging gases with the atmosphere. Humans eat other organisms, taking in secondhand energy that entered plants as sunlight. Humans also add urea and other wastes to water and soil. They absorb and radiate heat. Humans and all the other living organisms are inextricably connected to the outside world.

This outside world, the environment, can be divided into two major components. The **abiotic** (a= not; bio= life) component consists of nonliving chemical and physical factors, such as temperature, light, water, minerals, soil, and air. The **biotic** (bio= life) component includes the living factors – all the other organisms that are part of an individual's environment. Other organisms may compete with an individual for food and other resources, prey upon it, or change its physical and chemical environment.

The science of ecology provides a basic understanding of how natural processes and organisms interact; giving us the tools we need to manage the planet's limited resources over the long term.

ABIOTIC FACTORS OF THE BIOSPHERE:

- The biosphere is patchy on several levels. There are striking regional patterns in the distribution of terrestrial and aquatic life. These patterns mainly reflect regional differences in climate and other abiotic factors. Climate influences the processes that shape the landscape of a region and the type of soils that form there. Climate also determines what type of plants and animals live in that region.

The activities of life, ranging from the flight of the eagle to active transport of molecules through a cell membrane, are powered by the energy of sunlight. The molecules of life are built from atoms and molecules that are obtained as nutrients from the environment. Solar energy is constantly being input on Earth where the energy is used and transformed in the chemical reactions that power life, and is ultimately converted back to heat that radiates back into space. In contrast, nutrients (matter) remain constant on Earth. While they may change in form and distribution, and

even be transported among different ecosystems, nutrients do not leave Earth and are constantly recycled. Thus, two basic laws thus underlie ecosystem functions: (1) Energy moves through communities within ecosystems in a continuous one-way flow. Energy needs constant replenishment from an outside source, the sun. (2) Nutrients constantly cycle and recycle within and among ecosystems. These laws shape the complex interactions among populations within ecosystems, and between communities and their abiotic environment.