

Environment is defined as the physical surrounding of organisms including human beings of which they are a part and on which they are dependent for their activities like physiological functioning, production and consumption. In other words, everything that surrounds or affects an organism during its life time is collectively known as its environment. It is the source of oxygen, food, habitat, energy, water and other needs for all organisms. It comprises of living (biotic) as well as non-living (abiotic) components.

Abiotic Components

Abiotic environment includes inorganic and non-living parts of the world. This part consists of chemicals like oxygen and nitrogen, soil, water, atmosphere, light and energy. The abiotic environment is made-up of many objects and forces that influence one another and the surrounding community of living things. The weather is an important group of abiotic components. Temperature, evaporation of water, humidity, rain, wind and numerous other weather conditions influence both living and nonliving things on the earth. Physical processes like earthquakes, floods, volcanoes, etc. are also part of abiotic parts.

Biotic components

The word 'biotic' means living. Biotic components are those that have life. They include living organisms including plants, animals, microbes, etc. A biotic factor is any living component that includes a number of interrelated populations of different species in a common environment. A biotic factor can be any organism that affects any other organism including animals that consume other organism and food the organism consumes. Biotic factors in an environment require food and energy to survive. They are further classified as per their functional attributes.

I. Autotrophs or Producers:

The word 'autotroph' comes from the root words 'auto' for self and 'troph' for food. Thus, autotrophs are those organisms that can produce their own food. They prepare their food using materials from inorganic sources (abiotic components). However, they feed themselves without the assistance of any other organisms. Autotrophs are also called as 'producers'. They form the base of energy pyramid in an ecosystem and provide food tat all the heterotrophs need to exist.

Types of Autotrophs:

Autotrophs are classified according to the way they obtain their energy: a) Photoautotrophs, and b) Chemoautotrophs.

(a) **Photoautotrophs:** These organisms get the energy from sunlight to make organic materials.

This set of organisms perform a process called photosynthesis in which photons from the Sun are captured and used to perform food. Photoautotrophs include plants, green algae, and bacteria. They make organic compounds and fuels that give support to heterotrophs including human beings. During the process of photosynthesis, these organisms take carbon from the atmosphere, mainly from CO₂, and use it to make sugars and other molecules that store the Sun's energy in their molecular bonds. This process releases molecules of oxygen that is vital for our survival. It is believed that free oxygen was not present in Earth's atmosphere until after photoautotrophs became common in Earth's seas. The release of large amounts of free oxygen into Earth's atmosphere by photoautotrophs paved the way for large animals, like ourselves. Photoautotrophs are also credited for the Earth's Ozone layer as some of the

oxygen produced by them created the ozone layer, which protects life on the planet from the Sun's UV light.

- (b) **Chemoautotrophs:** These are the organisms that obtain energy from inorganic chemical processes. They use volatile chemicals such as molecular hydrogen, hydrogen sulfide, elemental sulfur, ferrous iron, and ammonia as their energy sources. They are most commonly found in deep water environments which receive no sunlight. They are usually bacteria or archaeobacteria as their metabolisms are usually not efficient enough to support multicellularity.

II. Heterotrophs or phagotrophs:

Heterotrophs consists of two words, hetero meaning other and troph for food. Heterotrophs are organisms that obtain their energy by feeding on others (or on organic compounds). These organisms cannot make their own food, so they must eat or absorb it. They depend on organic food derived from autotrophs or other heterotrophs. Heterotrophs are also known as consumers. Any heterotrophic organism that feeds by ingesting organisms or organic particles, which are digested within its body is known as phagotroph (macroconsumer). Herbivores are primary consumers which feed mainly on plants, e.g. deer, cow; whereas, secondary consumers or Carnivores feed on primary consumers, e.g. wolves. There is another set of heterotrophs that consume both plants and animals and is termed as Omnivores. Human Beings fall in this category. Besides macro-consumers or phagotrophs, there are organisms that survive on dead organic substances or detritus of plants and animals. They are mostly decomposers and are called Saprotrophs. They are micro-consumers. Earthworms and other soil organisms like millipedes and woodlice are called detritivores and they play an important role in the cycling of nutrients and are an essential part of most biogeochemical cycles, such as the carbon cycle, nitrogen cycle and the phosphorous cycle.

After knowing the abiotic and biotic components of environment, we should now discuss another important concept and that is Ecology.

Ecology

Ecology is the scientific study of the relations that living organisms have with respect to each other and their natural/physical environment. It deals with the ways in which organisms are shaped by their environment, how they make use of environmental resources. It helps us understand how the world works. It provides useful evidence on the interdependence between people and the natural world and, as well the consequences of human activity on the environment. There are seven specific levels in the ecology that exist, sometimes discretely and sometimes with overlap. These levels are organism, population, community, ecosystem, biome and biosphere. At each level, these units have a specific structure and function.

Organism

They make the basic unit of study in ecology. Organisms are living beings that have the ability to act or function independently, e.g. plant, animal, etc. The organisms of the similar type have the potential for interbreeding, and produce fertile offspring, which are called species. An organism is fully adapted to its environment.

Population

A population is a group of individuals of the same species, inhabiting a geographical area, and functioning as a unit of biotic community. A population's geographic range has limits, or bounds, established by the physical limits that the species can tolerate, such as temperature or aridity, and by the encroachment of other species. Population density is the relation between the number of individuals of a population and the area they occupy.

Community

A community is the set of all populations that inhabit a certain area. It is not a rigid or fixed structure. Communities can have different sizes and boundaries. These are often identified with some difficulty. For example, a forest of trees and undergrowth plants, inhabited by animals and rooted in soil containing bacteria and fungi, constitutes a community.

Ecosystem

Ecosystem is a community of plants and animals interacting with each other in a given area, and also with their non-living environments. An ecosystem is a complex set of relationship among the living resources, habitats and residents of an area. It includes plants, trees, animals, fish, birds, micro-organism, water, soil and people. Ecosystem vary greatly in size and elements that make them but each is a functioning unit of nature. Everything that lives in an ecosystem is dependent on the other species and elements that are also part of that ecological community. If one part of an ecosystem is damaged or disappears, it has an impact on everything else. There are essentially two kinds of ecosystems; Aquatic and Terrestrial. These two can be further divided into various sub-categories like desert ecosystem, forest ecosystem, grassland ecosystem, mountain ecosystem, marine ecosystem, freshwater ecosystem.

Biome

A Biome is a large ecological area on the earth's surface, with flora (plants) and fauna (animals) adapting to their environment. Biomes are often defined by abiotic factors such as temperature, climate, relief, geology, soils and vegetation. A biome, in a way, may look like a massive ecosystem but they are not. A biome may be home to many units of ecosystems. There are some major categories of biomes on earth.