

## Ecosystem

The term 'ecosystem' was proposed by a British ecologist 'A.G. Tansley' in 1953. The ecosystem represents the basic functional unit of ecology which comprises of the biotic communities mutually related with their non living or abiotic environment.

Thus, a biotic community and its abiotic environment together represent an ecosystem.

Ecosystem, therefore, includes both the living organisms (Biotic community) and the non-living environment (abiotic environment) which are inseparably inter related and interact upon each other.

$$\boxed{\text{Ecosystem} = \text{Biotic Community} + \text{Abiotic Community}}$$

### Definition

According to Odum "The ecosystem is the basic fundamental unit of Ecology of both the organisms and their nonliving environment, each influencing the properties of the other and each is necessary for the maintenance of life."

According to S. Mathavan, "The Ecosystem is the sum total of living organisms, the environment and the processes of interaction between the various units of the system."

## Principal steps and Components of an Ecosystem

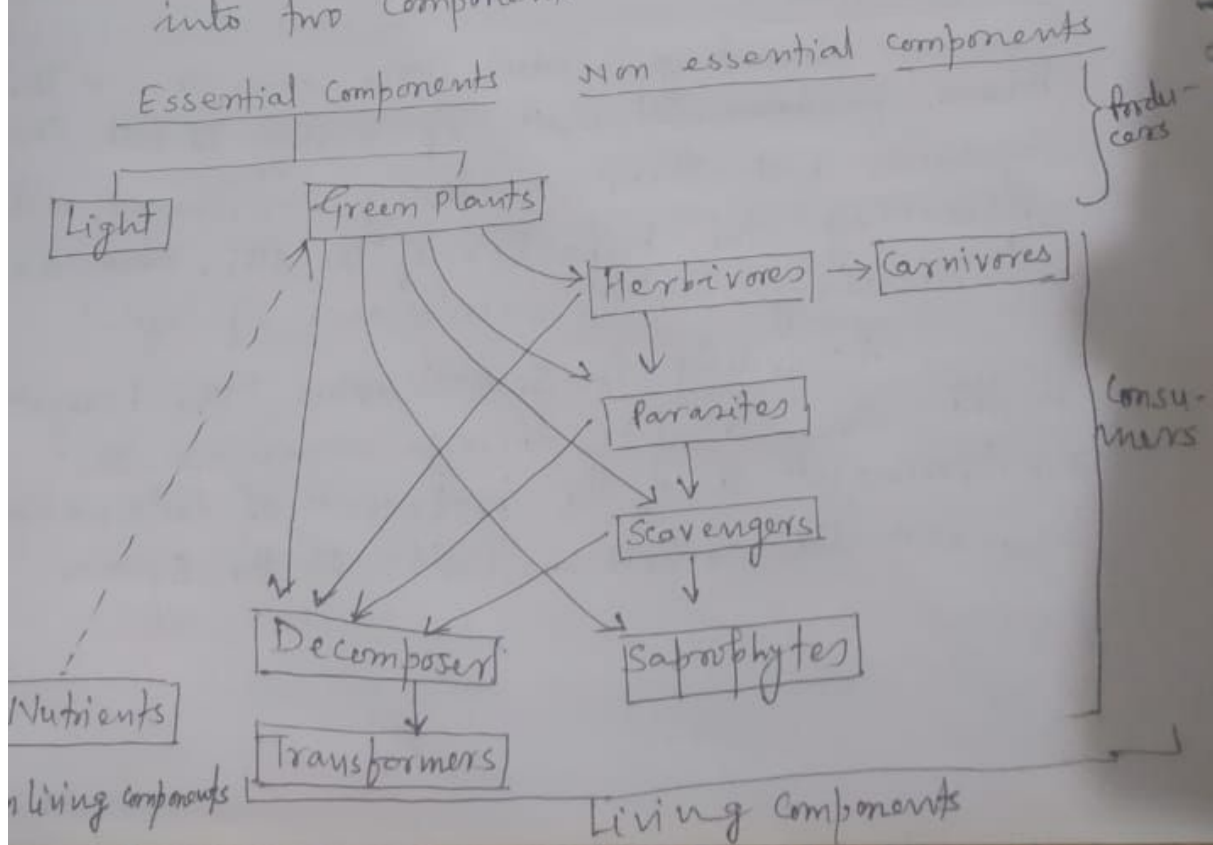
The principal steps in the operation of an ecosystem are -

1. Reception of Energy
2. Manufacture of organic food by producers
3. Consumption of organic materials by consumers
4. Decomposition into organic compounds and
5. Transformation of these compounds into suitable compounds for the nutrition of the producers.

In the operation of an ecosystem these steps not only involve the production, growth and death of the living components but also influence the non-living environment of the habitat.

### Components

Odum has divided an ecosystem into two components -



### 1. Autotrophic Components

It consists of green plants which bring about the fixation of solar energy (sunlight) and synthesis of organic compounds (carbohydrates from simple inorganic substances).

### 2. Heterotrophic Components

It consists of the decomposers (microorganisms such as bacteria and fungi). It is concerned with the utilization, rearrangement and degradation of complex food substances.

From structural viewpoint, Ecosystem has been classified into 4 components:

#### 1. Abiotic Component substances

These are the non living components of the ecosystem. It includes basic inorganic and organic compounds.

The inorganic compounds are water, carbon dioxide, oxygen, nitrogen, calcium phosphorous etc and their compounds i.e., nitrates, carbonates, phosphates etc.

These occur either free in nature (like  $\text{CO}_2$ , water and  $\text{O}_2$ ) or in the form of compounds, dissolved in water in the soil.

Some of them are derived by the decomposition of dead and decaying bodies of organisms.

#### 2. Producers

These are the autotrophic members of the ecosystem (the green plants). These are capable of synthesizing food from the non-living simple inorganic compounds.

In an ecosystem, the producers may be represented by the small microscopic plants (the phytoplanktons) and algae or the



rooted or large floating plants generally growing in shallow water only. The phytoplanktons are distributed throughout the pond and as deep as light could penetrate the water. These are found in all waters.

But the large-sized plants are of different types in different ecosystems. The grasses are found in the grassland, trees in forests, floating plants in pond water and lakes.

### 3. Consumers

Consumers are the heterotrophic organisms which consume the food produced by the producer. These are chiefly animals of different kinds found in the ecosystem. These consumers constitute different categories.

The herbivores are the primary consumers in the ecosystem. These solely feed upon vegetation or plants. A deer or rabbit is a primary consumer in a forest and rat in the gardens. Protozoans, crustaceans and molluscs are the primary consumers of the ponds or lake or sea and feed upon the floating algae.

Insects, rodents and ruminants are the major herbivores of terrestrial environment. The primary consumers form the food of primary carnivores or secondary consumers.

(a) The primary carnivores or the omnivores animals constitute the category of secondary consumers. These feed upon the herbivores animals. These are wolves, dogs, cats, foxes etc.

(b) The secondary carnivores or the animals which feed upon the carnivores animals are the tertiary consumers. For example, lions which feed upon the ~~foxes~~ Wolves, Cattle, deer etc are the Secondary Carnivores.

The producers and consumers of an ecosystem constitute a food chain in simple form and food web under complex situations when all of the different organisms derive nourishment from one common source.

For example, when a lion kills a zebra, some of the carcasses are left behind. Hyenas feed upon the remains. Vultures also descend and share. Thus, the same food is being shared by more than one group of animals. This is known as food web.

#### 4. Decomposers

This component of ecosystem comprises of microorganisms which feed upon dead and decaying living organisms both plants and animals and break them into simpler compounds. These are released free in the atmosphere and are utilized by the producers for the synthesis of their food materials.

Clarke has recognised a fifth category in the ecosystem which is composed of transformers. These act upon the decomposed substances and transform them into different forms of inorganic and organic substances.

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