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**Topic: Structure and function of Ecosystem**  
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### **Structure and Function of Ecosystem:**

An ecosystem is defined as a natural functional ecological unit comprising of living organisms (biotic community) and their non-living (abiotic or physio chemical) environment that interact to form a stable self-supporting system. A pond, lake, desert, grassland, meadow, forest etc. are common examples of ecosystems.

The concept of ecosystem was first put forth by A.G. Tansley (1935). Ecosystem is the major ecological unit. It has both structure and functions. The structure is related to species diversity. The more complex is the structure the greater is the diversity of the species in the ecosystem. The functions of ecosystem are related to the flow of energy and cycling of materials through structural components of the ecosystem.

### **Structure of Ecosystem:**

The structure of an ecosystem is basically a description of the organisms and physical features of environment including the amount and distribution of nutrients in a particular habitat. It also provides information regarding the range of climatic conditions prevailing in the area.

**From the structure point of view, all ecosystems consist of the following basic components:**

1. Abiotic components

## 2. Biotic components

### **1. Abiotic Components:**

Ecological relationships are manifested in physicochemical environment. Abiotic component of ecosystem includes basic inorganic elements and compounds, such as soil, water, oxygen, calcium carbonates, phosphates and a variety of organic compounds (by-products of organic activities or death).

It also includes such physical factors and ingredients as moisture, wind currents and solar radiation. Radiant energy of sun is the only significant energy source for any ecosystem. The amount of non-living components, such as carbon, phosphorus, nitrogen, etc. that are present at any given time is known as standing state or standing quantity.

### **2. Biotic Components:**

The biotic components include all living organisms present in the environmental system.

**From nutrition point of view, the biotic components can be grouped into two basic components:**

- (i) Autotrophic components, and
- (ii) Heterotrophic components

The autotrophic components include all green plants which fix the radiant energy of sun and manufacture food from inorganic substances. The heterotrophic components include non-green plants and all animals which take food from autotrophs.

**So biotic components of an ecosystem can be described under the following three heads:**

- 1. Producers (Autotrophic components),

2. Consumers, and

3. Decomposers or reducers and transformers

The amount of biomass at any time in an ecosystem is known as standing crop which is usually expressed as fresh weight, dry weight or as free energy in terms of calories/metre.

**Producers (Autotrophic elements):**

The producers are the autotrophic elements i.e. green plants. They use radiant energy of sun in photosynthetic process whereby carbon dioxide is assimilated and the light energy is converted into chemical energy. The chemical energy is actually locked up in the energy rich carbon compounds. Oxygen is evolved as by-product in the photosynthesis. This is used in respiration by all living things. Algae and other hydrophytes of a pond, grasses of the field, and trees of the forests are examples of producers.

**Consumers:**

Those living members of ecosystem which consume the food synthesized by producers are called consumers. Under this category are included all kinds of animals that are found in an ecosystem.

**There are different classes or categories of consumers, such as:**

- (a) Consumers of the first order or primary consumers,
- (b) Consumers of the second order or secondary consumers,
- (c) Consumers of the third order or tertiary consumers, and
- (d) Parasites, scavengers and saprobes.

**(a) Primary consumers:**

These are purely herbivorous animals that are dependent for their food on producers or green plants. Insects, rodents, rabbit, deer, cow, buffalo, goat are some of the common herbivores in the terrestrial ecosystem, and small crustaceans, molluscs, etc. in the aquatic habitat.

**(b) Secondary consumers:**

These are carnivores and omnivores. Carnivores are flesh eating animals and the omnivores are the animals that are adapted to consume herbivores as well as plants as their food. Examples of secondary consumers are sparrow, crow, fox, wolves, dogs, cats, snakes, etc.

**(c) Tertiary consumers:**

These are the top carnivores which prey upon other carnivores, omnivores and herbivores. Lions, tigers, hawk, vulture, etc. are considered as tertiary or top consumers.

(d) Besides different classes of consumers, the parasites, scavengers and saprobes are also included in the consumers. The parasitic plants and animals utilize the living tissues of different plants and animals. The scavengers and saprobes utilize dead remains of animals and plants as their food.

**Decomposers and transformers:**

Decomposers and transformers are the living components of the ecosystem and they are fungi and bacteria. Decomposers attack the dead remains of producers and consumers and degrade the complex organic substances into simpler compounds. The simple organic matters are then attacked by another kind of bacteria, the transformers which change these organic compounds into the inorganic forms that are suitable for reuse by producers or green plants. The decomposers and transformers play very important role in maintaining the dynamic nature of ecosystems.

### **Function of Ecosystem:**

An ecosystem is a discrete structural, functional and life sustaining environmental system. The environmental system consists of biotic and abiotic components in a habitat. Biotic component of the ecosystem includes the living organisms; plants, animals and microbes whereas the abiotic component includes inorganic matter and energy.

Abiotic components provide the matrix for the synthesis and perpetuation of organic components (protoplasm). The synthesis and perpetuation processes involve energy exchange and this energy comes from the sun in the form of light or solar energy.

### **Thus, in any ecosystem we have the following functional components:**

- (i) Inorganic constituents (air, water and mineral salts)
- (ii) Organisms (plants, animals and microbes), and
- (iii) Energy input which enters from outside (the sun).

These three interact and form an environmental system. Inorganic constituents are synthesized into organic structures by the green plants (primary producers) through photosynthesis and the solar energy is utilized in the process. Green plants become the source of energy for renewals (herbivores) which, in turn become source of energy for the flesh eating animals (carnivores). Animals of all types grow and add organic matter to their body weight and their source of energy is complex organic compound taken as food.

They are known as secondary producers. All the living organisms whether plants or animals in an ecosystem have a definite life span after which they die. The dead organic remains of plants and animals provide food for saprophytic microbes, such as bacteria, fungi and many other animals. The saprobes

ultimately decompose the organic structure and break the complex molecules and liberate the inorganic components into their environment.

These organisms are known as decomposers. During the process of decomposition of organic molecules, the energy which kept the inorganic components bound together in the form of organic molecules gets liberated and dissipated into the environment as heat energy. Thus in an ecosystem energy from the sun, the input is fixed by plants and transferred to animal components.

**Thus the principal steps in the operation of ecosystem are as follows:**

- (1) Reception of radiant energy of sun,
- (2) Manufacture of organic materials from inorganic ones by producers,
- (3) Consumption of producers by consumers and further elaboration of consumed materials; and.
- (4) After the death of producers and consumers, complex organic compounds are degraded and finally converted by decomposers and converters into such forms as are suitable for reutilization by producers.

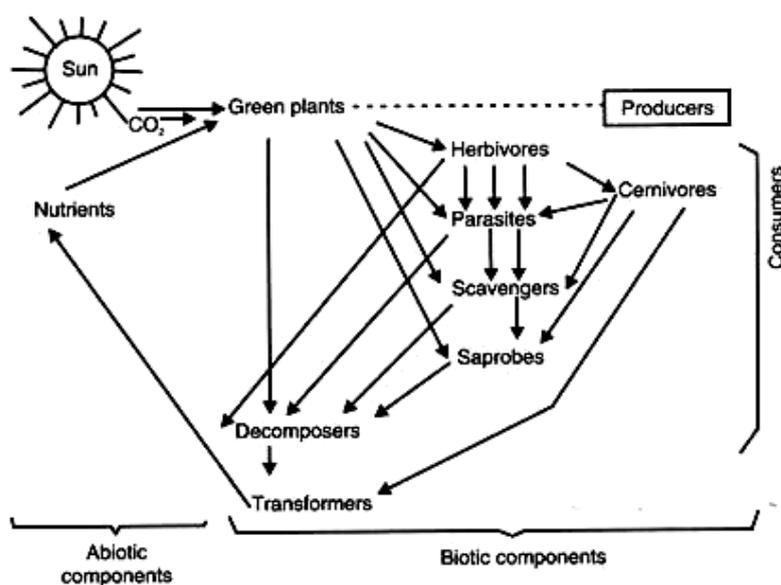


Fig. 3.1. Different components of ecosystem.