

Ecosystems

An ecosystem can be simply defined as a community of living beings in concurrence with non-living components in which they will interact. It is a chain of interaction between organisms and their environment. An ecosystem can vary in size; it can either be small as an oasis or as vast as an ocean encompassing precisely limited spaces. They are usually controlled or influenced by external and internal factors as well. External factors such as climate can be considered as prime material that forms soil and topography that controls the entire configuration of the ecosystem. There are mainly two components in an ecosystem, namely biotic and abiotic components.

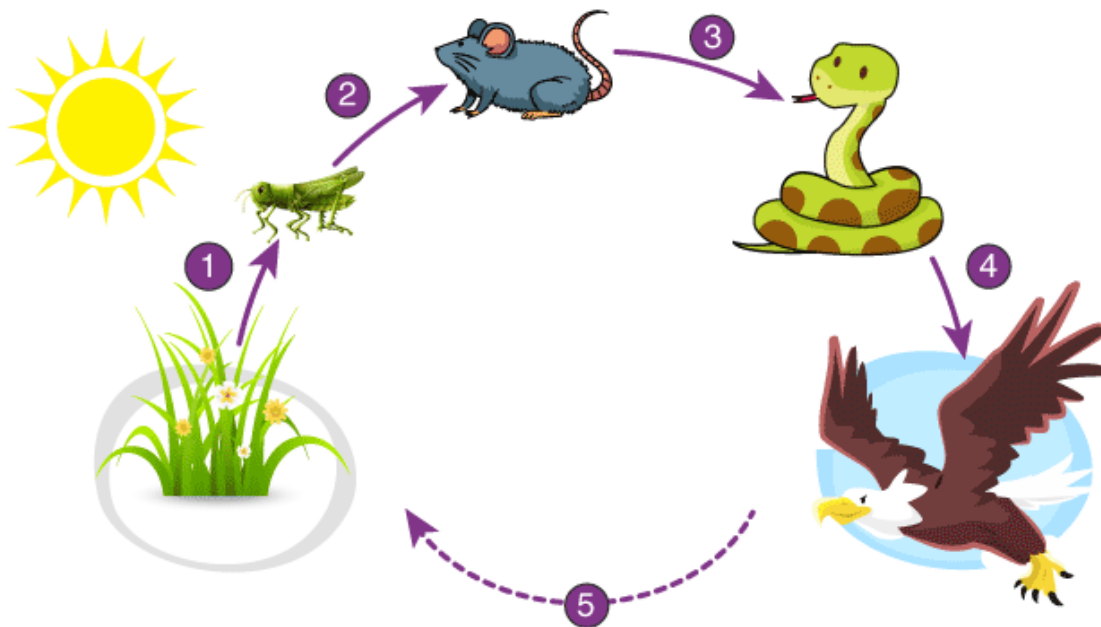
Biotic Components

They are living components of an ecosystem. It includes biotic factors such as producers, consumers and decomposers.

- **Producers** include all autotrophs (plants). They produce their own food by making use of energy that is obtained from the sunlight. All living beings are dependent on plants for oxygen and food.
- **Consumers** include herbivores (known as primary consumers), carnivores (known as secondary consumers) and then it continues with tertiary.
- **Decomposers** include saprophytes (fungi and bacteria) that convert the dead matter into nitrogen and carbon dioxide. They are essential for the recycling of nutrients to be used again by the producers.

Abiotic Components

They are the non-living components of an ecosystem, such as light, air, soil and nutrients. The below figure demonstrates a simple food chain.



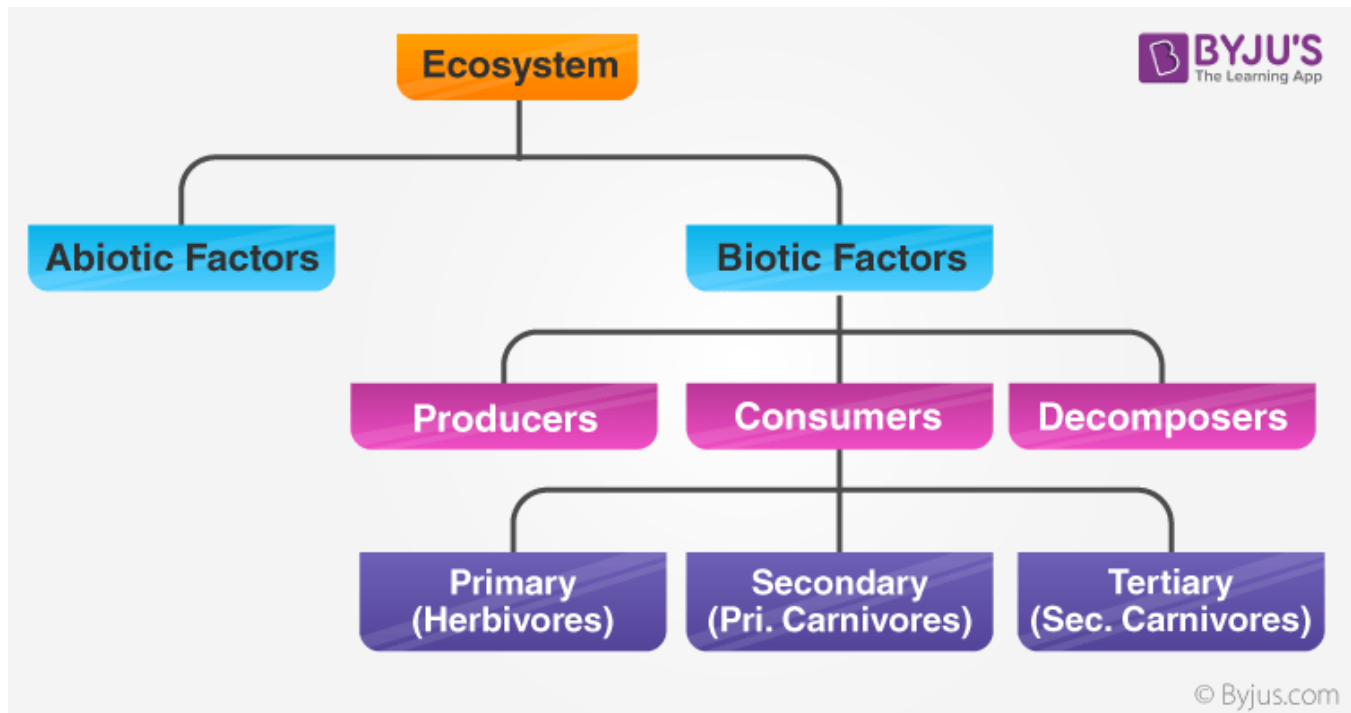
Food Chain

- | | | |
|-----------------------------------|---|----------------------------|
| 1 The grasshopper eats the plants | 2 The mouse eats the grasshopper | 3 The snake eats the mouse |
| 4 The eagle eats the snake | 5 When the eagle dies, fungi break down the body and turn them into nutrients | |

As mentioned earlier, sun is the source of energy. This energy is absorbed by the plants and photosynthesis takes place. Therefore, the light energy obtained is converted into chemical energy. This constitutes a trophic level throughout the food chain. These trophic levels consist of living things that make their living in the same manner and they are called as primary producers. Those that feed on plants are primary consumers (herbivores), and those that feed on primary consumers are secondary consumers (carnivores). At all levels of the food chain, waste products are produced. The decomposition process is collectively done by decomposers and scavengers but ultimately, it is done by microbes. The amount of energy generated by the food chain is insufficient.

Enzymes digest dead organisms and debris into smaller bits and these molecules are then absorbed by the decomposers. After gaining the energy,

the decomposers liberate molecules to the environment in the form of chemicals that are utilised again by the producers.

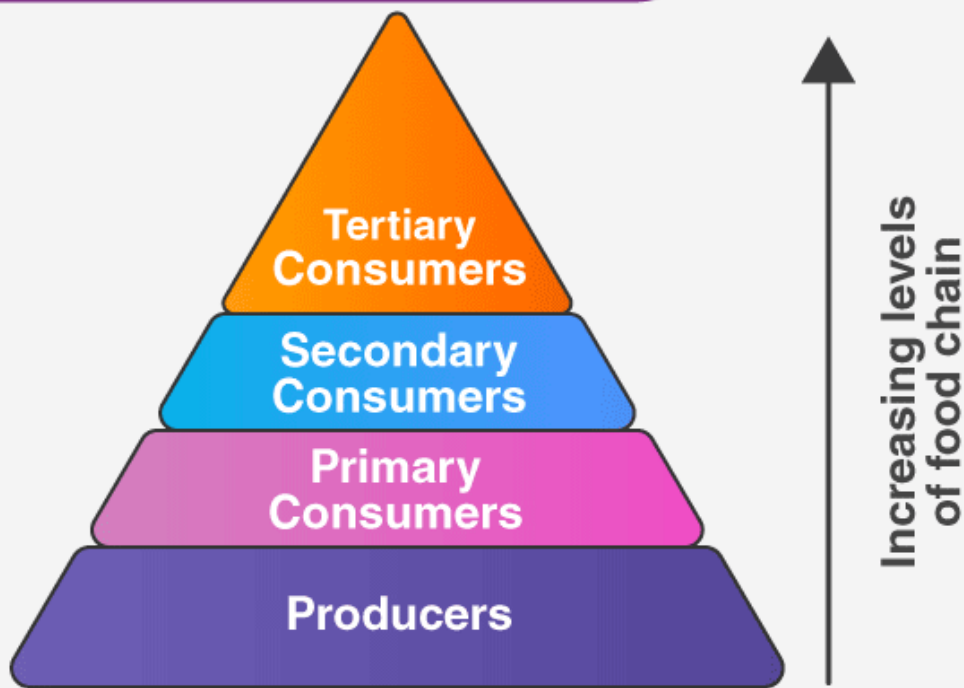


Ecological Pyramid

The biomass, number, and energy of organisms generally decreases from the producer level to the consumer level, which can be described in the form of a pyramid known as the **ecological pyramid**.

An ecological pyramid is the graphical representation of the number, energy and biomass of the successive trophic levels of an ecosystem. Charles Elton described the use ecological pyramid in the year 1972.

ECOLOGICAL PYRAMID



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The producer forms the base and consumers hold the apex in an ecological pyramid. The number of individuals decreases from producer level to consumer level. The number of producers is normally way high compared to the number of herbivores. Similarly, the number of carnivores is less than the number of herbivores. For example, the crops are high in number in a cropland. The grasshoppers are in less number on crop plants. The frogs that feed on the grasshopper are still few in number and the snakes that feed on frogs are again few in number.

Crops ▷ **Grasshopper** ▷ **Frogs** ▷ **Snakes** ▷ **Hawks**

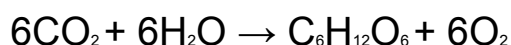
Nutrient Cycling

Carbon Cycle

The cyclic flow of carbon between abiotic and biotic systems is known as the carbon cycle, which is a gaseous cycle. Carbon dioxide is found in both air and water and is the main source of carbon. The content of carbon dioxide in

the air is 0.03% and remains constant. The carbon flows in the biotic systems in 3 forms:

- **Photosynthesis** - The green plants utilise carbon dioxide in photosynthesis and utilise carbon in glucose. Glucose is used in the synthesis of different lipids, proteins and carbohydrates. These compounds are stored in plant tissues. The carbon is delivered to the herbivorous animals when plants are eaten throughout the food chain. The carbon goes into the body of carnivores when herbivores are eaten by them



- **Formation of shell** - Carbon dioxide is dissolved in the sea and consumed by marine animals such as corals, protozoans, molluscs etc., for the formation of the shell. Carbon dioxide is converted into calcium carbonate in these animals, which are utilised in making shells.



- **Coral** - A particular portion of the carbon is deposited in the form of coal from plants. The carbon returns to air from coal in the form of CO_2 through weathering and combustion.