**Ecosystems**

An ecosystem can be simply defined as a community of living beings in concurrence with nonliving components in which they will interact. It is a chain of interaction between organisms and its environment.

An ecosystem can vary in size; it can either be as small as an oasis or 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 a 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 (grasshoppers) which are primary consumers, carnivores (snakes) which are secondary consumers and then it continues with the tertiary.
- Decomposers include saprophytes (fungi and bacteria), that convert the dead matter into nitrogen and carbon dioxide. They are essential for recycling of nutrients to be used again by the producers.

**Abiotic Components**

They are the nonliving component of an ecosystem such as light, air, soil, and nutrients.

Below figure demonstrates a simple food chain:

As the mentioned earlier sun is a source of energy. This energy is obtained from the plants and photosynthesis takes place. That is energy obtained is converted into chemical energy. This constitutes a trophic level through the food chain. This trophic level consists of living things that make their living in the same manner and they are called as primary producers those feed on plants are primary consumers (that is herbivores), secondary consumers (are carnivores). At all the levels of food chain waste products are produced. The decomposition process is collectively done by decomposers and scavengers but ultimately it is done by microbes. 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 reducers. After gaining the energy, the reducers liberate molecules to the environment in the form of chemicals that are utilized again by the producers.

**Ecological Pyramids**

The biomass, number, and energy of organisms lower 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 of ecological pyramid in the year 1927.

The producer forms the base and consumer holds the apex in an ecological pyramid.

The number of individuals decreases from producer level to the consumer level is way high and the number of herbivores is lower than the producers. Similarly, the number of carnivores is less than herbivores.

For example, the crops are high in number in a cropland. The grasshoppers are in less in number feeding on crop plants. The frogs that feed on grasshopper are still few in number and the snakes that feed on frogs are again few in number.

**Nutrient Cycling**

**Carbon Cycle**

The cycle of carbon between abiotic and biotic systems is known as carbon cycle which is a gaseous cycle.

Carbon dioxide is found both in the air and in water and it 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 system in three forms.

**Photosynthesis**

The green plants utilize carbon dioxide (CO2) in photosynthesis and utilize carbon in glucose. The glucose is used in the synthesis of different kinds of lipids, carbohydrates, and proteins. These compounds are stored in plant tissues. The carbon is delivered to the herbivorous animals when plants are eaten up through the food chain. The carbon goes into the body of carnivores when herbivores are eaten up by them.

\[ \text{6CO}_2 + \text{6H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{6O}_2 \]

**Formation of shell**

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

\[ \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3 \ (\text{Carbonic acid}) \]

\[ \text{H}_2\text{CO}_3 \rightarrow \text{H}^+ + \text{HCO}_3^- \ (\text{Bicarbonate}) \]

\[ \text{HCO}_3^- + \text{Ca}^{++} \rightarrow \text{H}^+ + \text{CaCO}_3 \ (\text{Calcium carbonate}) \]

**Coal**

A particular portion of carbon is deposited in the form of coal from plants. The carbon returns to air from coal in the form of CO2 through weathering and combustion.