

Ecology:

It is the branch of biology that deals with surrounding of the living organisms. It is the branch where we deal non living components with respect to living organisms. The ecology term has been derived from two words oikos and logos where oikos means house or a place where we live and logos means to study. Hence, the literal meaning of ecology is a branch of biology which deals about natural habitat of the living organisms. The term ecology was first proposed by H. Reiter in 1868. Earnest Haeckel was first person who define ecology as “the study of reciprocal relationship between living organisms and their environments.” The widely accepted definition of ecology was given by EP Odum (Eugene Pleasants Odum) in 1969 as “the study of structure and functions of ecosystems.”

Types of Ecology:

It is of two types. They are as follows

- a) **Autecology:** It is the ecology which deals about interrelationship between an individual organism or species with its environment.
- b) **Synecology:** It is the ecology which deals about interrelationship between a community and its surroundings.

Ecosystem: It is the complex relationship of living organisms with non-living components as well as other living organisms present in common environment. It is an ecological unit where living and non-living components interact with each other sharing common environment. The term ecosystem was first proposed by AG Tansley (Sir Arthur George Tansley) in 1935. EP Odum (1969) defined ecosystem as “the basic functional unit of organisms and their environment interacting with each other and with their own components.”

An ecosystem shows structural as well as functional organizations.

Structure of ecosystem: The parts which directly involve in ecosystem are called structure of ecosystem. It comprises two different types of components.

1. **Abiotic component:** It comprises all non-living components of ecosystem. It does not have life but directly influence the life of living organisms. Some of the non-living components are as follows:
 - a. **Water:** It is important abiotic factor. The life is very difficult on earth without water. It is generally found in liquid state but may found in all three different states. It is one of the components of photosynthesis where food prepared by plants for them as well as other living organisms on earth. Not only this, it is universal solvent which dissolve almost all components on earth. It helps to flow minerals from one to another. Apart from these, there are various other uses also.
 - b. **Air:** It is another important abiotic factor. It is the homogenous mixture of different kinds of gases. The gases around the earth is called atmosphere. There is independent existence of gases in atmosphere. There is found different kinds of gases in different amount. Some of important gases found in atmosphere are carbon dioxide, oxygen, nitrogen, hydrogen, nitrogen oxides, water vapour etc.
 - c. **Soil:** It is another abiotic factor where living organisms survive. In other words, it is defined as habitat of all of living organisms. All organisms make their home on soil or inside soil. Not only this, it is the chief place for different kinds of minerals and ions. There are found different kinds of soil on earth where different kinds of animals and plants found.

- d. **Light:** It is another important abiotic factor. It is very essential for growth and development of living organisms. Not only this, it is also important for photosynthesis which prepare food for living organisms. It also makes visible any things around us. It also stabilizes the temperature around us.
- e. **Precipitation:** Falling of water on earth surface in the form of rainfall, dew, hails and snow is called precipitation. It is the chief source of soil water which is used by plants and animals. Rainfall is the process of distribution of water in large area in equal proportion. It promotes growth of many plants.
- f. **Temperature:** The degree of hotness or coldness is called temperature. It is another abiotic factor. It helps the growth of organisms as well as metabolism. Optimum temperature is suitable for living organisms whereas upper and lower than optimum temperature decrease the rate of metabolism.
- g. **Humidity:** The total amount of water in atmosphere is called humidity. It is in the form of water vapour. It is another abiotic factor. It greatly influences the organisms. The greater value of humidity indicates higher amount of water in atmosphere whereas lower value of humidity shows least amount of water in atmosphere.
- h. **pH:** Hydrogen ion concentration of any substances is called pH of that substances. It indicates the acidity or alkalinity of the substances. It is measured by special devices called pH meter. The neutral pH value is 7. pH value above 7 indicates alkalinity and lower than 7 indicates acidity. Neutral pH value is suitable for almost all the organisms whereas lower and higher suits some of the organisms.
- i. **Fire:** It is another abiotic factor. Natural fire is caused by lightening and volcanic activities. Most of the fire is caused by human activity. Uncontrolled fire caused various damages where controlled fire is beneficial for living organisms. It helps to supply sulphur and phosphorus in soil naturally which is very important for the growth and development of plants.

2. Biotic components: It comprises living components of ecosystem. On the basis of feeding mechanism it is divided into three groups

- a. Producers:** The organisms which do not depend upon other organisms for food are called producers. They can prepare their food by themselves. Hence, are called autotrophic organism. They can prepare food for them and store food for others in terms of starch. They combine inorganic materials found in nature and made them organic product glucose. They are also known as photosynthetic organisms.
- b. Consumers:** The organisms which cannot prepare their food by themselves and depend on other organisms for food are called consumers. They are heterotrophic in nature.

On the basis of obtaining food, they are divided into three groups.

- i. Primary consumers:** The consumers which depend upon producers for food are called primary consumers. They feed on plants or plant products. These are herbivorous in nature.
- ii. Secondary consumers:** The consumers which depend upon primary consumers are called secondary consumers. They are carnivorous in nature.
- iii. Tertiary consumers:** The consumers which depend upon primary and secondary consumers for their food are called tertiary consumers. They are also carnivorous in nature.

- c. **Decomposers:** Those organisms which activate on death remaining parts of living organisms are known as decomposers. They are saprophytic in nature. These organisms decay the death part and remove it from the environment. It makes environment clean, pollution free as well as supply nutrients on soil for growth and development of different plants. It contains microorganisms the recycle the nutrients.

Function of ecosystem: The parts of ecosystem where energy flow from one organism to another is known as function of ecology. It is indirectly involve in ecosystem. It is of three types.

1. **Food chain:** The transfer of food energy from the producers, through a series of organisms with repeated process of eating and being eaten is known as food chain. There are three types of food chains in nature.
 - a. **Grazing food chain:** It is the simple type of food chain where energy transfer form producer to the consumer. They depend upon solar energy as the primary source of energy. Here, organisms lie on lower trophic level consume on organisms lie on higher trophic level.
 - b. **Parasitic food chain:** The food chain where energy transfer form host to the parasites are known as parasitic food chain. It is minor food chain runs higher to lower organisms.
 - c. **Detritus food chain:** The food chain runs from death part of living organisms. Here, the primary source of energy is death organic matter called detritus.
2. **Food web:** It is a network of different food chains which become interconnected with each other. Here, one organism is consumed by multiple of other organisms. Thus, it forms a number of feeding connections amongst different organisms of a biotic community.
3. **Ecological Pyramid:** It is a graphical representation formed by arrange different trophic levels one above another successively. It is of three different types on the basis of different ecological parameters.
 - a. **Pyramid of Number:** The ecological pyramid in terms of the total number of organisms present in each trophic level is called ecological pyramid of number. It is generally upright in nature.
 - b. **Pyramid of Biomass:** The ecological pyramid in terms of the total biomass of organisms present in each trophic level is called ecological pyramid of biomass. Biomass refers total dry weight per unit area present in each trophic level. It is of different shapes.
 - c. **Pyramid of Energy:** The ecological pyramid in terms of the total energy of organisms present in each trophic level is called ecological pyramid of energy. It is generally upright in nature.

On the basis of occurrence, ecosystem is of two types. They are as follows

1. **Terrestrial ecosystem:** The ecosystem runs on land surfaces are called terrestrial ecosystem. Some of the examples of terrestrial ecosystem are grassland ecosystem, forest ecosystem, mountain ecosystem etc.

Grassland ecosystem: The ecosystem runs on grassland of any area is called grassland ecosystem. It is the commonest example of terrestrial ecosystem.

Grasslands are open lands in which dominant vegetation are grasses and shrubs.

It is studied under following headings.

Structure of ecosystem: The parts which directly involve in ecosystem are called structure of ecosystem. It comprises two different types of components.

A. Abiotic components: It comprises all non-living components of ecosystem. It does not have life but directly influence the life of living organisms. Some of the non-living components are as follows:

- a. Water:
- b. Air
- c. Soil
- d. Light
- e. Precipitation
- f. Temperature
- g. Humidity
- h. pH
- i. Fire

B. Biotic components: It comprises living components of ecosystem. On the basis of feeding mechanism it is divided into three groups

- a. Producers:** The organisms which do not depend upon other organisms for food are called producers. They can prepare their food by themselves. Hence, are called autotrophic organism. They can prepare food for them and store food for others in terms of starch. They combine inorganic materials found in nature and made them organic product glucose. They are also known as photosynthetic organisms. eg: grasses, shrubs etc.
- b. Consumers:** The organisms which cannot prepare their food by themselves and depend on other organisms for food are called consumers. They are heterotrophic in nature.

On the basis of obtaining food, they are divided into three groups.

- i. Primary consumers:** The consumers which depend upon producers for food are called primary consumers. They feed on plants or plant products. These are herbivorous in nature. eg: deer, rabbit, small birds, insects etc.
 - ii. Secondary consumers:** The consumers which depend upon primary consumers are called secondary consumers. They are carnivorous in nature. eg: fox, jackel, large birds, frog, lizard etc.
 - iii. Tertiary consumers:** The consumers which depend upon primary and secondary consumers for their food are called tertiary consumers. They are also carnivorous in nature. eg: tiger, lion, snake, kite, eagle etc.
- c. Decomposers:** Those organisms which activate on death remaining parts of living organisms are known as decomposers. They are saprophytic in nature. These organisms decay the death part and remove it from the environment. It makes environment clean, pollution free as well as supply nutrients on soil for growth and development of different plants. It contains microorganisms the recycle the nutrients. eg: fungi and bacteria.

Function of ecosystem: The parts of ecosystem where energy flow from one organism to another is known as function of ecology. It is indirectly involve in ecosystem. It is of three types.

A. Food chain: The transfer of food energy from the producers, through a series of organisms with repeated process of eating and being eaten is known as food chain. There are three types of food chains in nature.

Grass -----> Deer -----> Wolf -----> Tiger

Grass -----> Insects -----> Frog -----> Snake -----> Eagle

B. Food web: It is a network of different food chains which become interconnected with each other. Here, one organism is consumed by multiple of other organisms. Thus, it forms a number of feeding connections amongst different organisms of a biotic community.

C. Ecological Pyramid: It is a graphical representation formed by arrange different trophic levels one above another successively. It is of three different types on the basis of different ecological parameters.

a. Pyramid of Number: The ecological pyramid in terms of the total number of organisms present in each trophic level is called ecological pyramid of number. It is upright in nature.

b. Pyramid of Biomass: The ecological pyramid in terms of the total biomass of organisms present in each trophic level is called ecological pyramid of biomass. It is upright in nature.

c. Pyramid of Energy: The ecological pyramid in terms of the total energy of organisms present in each trophic level is called ecological pyramid of energy. It is upright in nature.

2. Aquatic ecosystem: The ecosystem runs on or under the water bodies are called aquatic ecosystem. Some of the examples of aquatic ecosystem are pond ecosystem, lake ecosystem, marine ecosystem etc.

Pond ecosystem: The ecosystem runs on or under pond of any area is called pond ecosystem. It is the commonest example of aquatic ecosystem.

Ponds are small bodies of shallow inland depression filled with freshwater.

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- b. Consumers:** The organisms which cannot prepare their food by themselves and depend on other organisms for food are called consumers. They are heterotrophic in nature.

On the basis of obtaining food, they are divided into three groups.

- i. Primary consumers:** The consumers which depend upon producers for food are called primary consumers. They feed on plants or plant products. These are herbivorous in nature. eg: larvae, zooplanktons, tadpole etc
- ii. Secondary consumers:** The consumers which depend upon primary consumers are called secondary consumers. They are carnivorous in nature. eg: small fishes, frogs etc
- iii. Tertiary consumers:** The consumers which depend upon primary and secondary consumers for their food are called tertiary consumers. They are also carnivorous in nature. eg: large fishes, snake etc
- c. Decomposers:** Those organisms which activate on death remaining parts of living organisms are known as decomposers. They are saprophytic in nature. These organisms decay the death part and remove it from the environment. It makes environment clean, pollution free as well as supply nutrients on soil for growth and development of different plants. It contains microorganisms the recycle the nutrients. eg: fungi and bacteria.

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Aquatic plants-----> Zooplanktons -----> Small fishes -----> Large fishes

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- b. **Pyramid of Biomass:** The ecological pyramid in terms of the total biomass of organisms present in each trophic level is called ecological pyramid of biomass. It is inverted in nature.
- c. **Pyramid of Energy:** The ecological pyramid in terms of the total energy of organisms present in each trophic level is called ecological pyramid of energy. It is upright in nature.