Energy flow in an Ecosystem

B.Sc. Part -I, Paper-I

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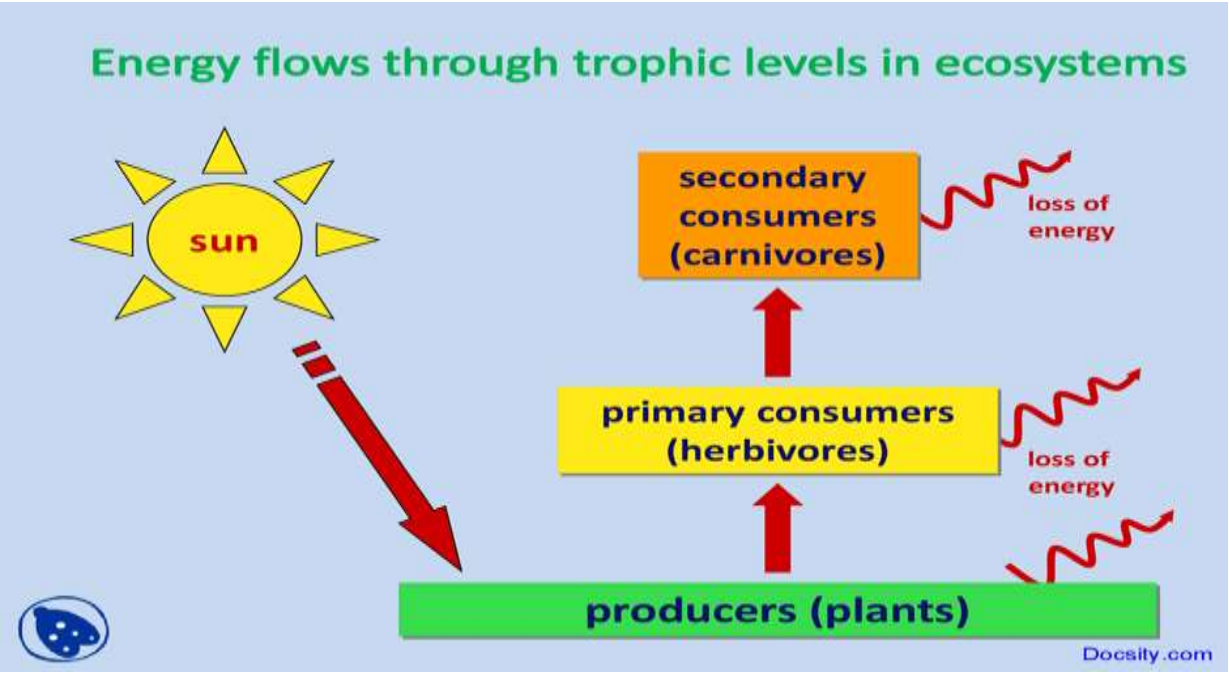
Energy flow is a fundamental process which occurs in all ecosystems. Energy is defined as the capacity to do work. It is the basic force responsible for all metabolic activities. The flow or movement of energy through a series of organisms in an ecosystem is called energy flow. The energy flows from producer to top consumers in unidirectional form.

The study of trophic level interaction in an ecosystem gives an idea about the energy flow through the ecosystem. As all organisms require energy to do work this energy is obtained from the chemical energy of food which they consume. This chemical energy is obtained, by the producers which has the ability to convert solar energy to chemical energy.



Trophic level interaction

Trophic level interaction deals with how the members of an ecosystem are connected on the basis of their nutritional needs.Organisms are either producers or consumers in terms of the energy flow through the ecosystem. Energy flows through the trophic level from producers to subsequent trophic level-

- In the first trophic level Plants acts as producers. They take energy from sunlight and convert it into organic material through the process of photosynthesis. Thus, the plants are primary producers.
- At the second trophic level, the herbivores feeds on plants. This gives them energy. Most of this energy is used up in performing metabolic functions such as breathing, food digestion, the growth of tissues, maintaining body temperature and blood circulation.
- At the next trophic level come carnivores. Carnivores feed on the herbivores and derive energy for their growth and sustenance. Large predators are present in subsequent trophic levels and they derive their energy by consuming smaller carnivores. Some organisms like human beings consume both plants (producers) and animals for their food.

There is loss of some energy in the form of heat at each trophic level and thus in each trophic level the energy level decreases.

Organisms that can fix radiant energy utilizing inorganic substances to produce organic molecules are called autotrophs/producers. Plants are examples of autotrophs.

Heterotrophs are organisms that cannot obtain energy from abiotic sources and rely on energy-rich organic molecules synthesised by autotrophs.

Consumers are those that obtain energy from living organisms and decomposers are those that obtain energy from dead organisms.

At each trophic level (also called feeding level), heat energy is released thereby reducing the amount of energy passing onto each level. That means energy is degraded. The flow of energy is also only unidirectional.

At the last level, all organisms die and become detritus or food for decomposers. Here, the last remnants of energy are extracted and released as heat energy, while the inorganic nutrients are returned to the soil or water only to be taken up again by primary producers. The energy is lost or released while the inorganic nutrients are recycled.

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