

Energy Flow in the Ecosystems

* Energy is the most essential requirement for all living organisms

* Solar energy is transformed to chemical energy in photosynthesis by the plants

* Though a lot of sunlight falls on the green plants, only 1% of it is utilized for photosynthesis.

* This is the most essential step to provide energy for all other living organisms in the ecosystem.

* Some amount of chemical energy is used by the plants for their growth & the remaining is transferred to consumers by the process of eating.

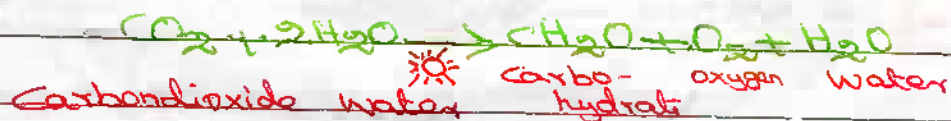
* Thus the energy enters the ecosystem through photosynthesis & passes through the different trophic levels.

Energy flow through atmosphere to an ecosystem

Sun is the ultimate source of energy, its radiations travel through the space in the form of waves & reaches the earth's atmosphere.

The atmosphere absorbs 50% of the radiations and allow the remainings to reach the earth surface.

photosynthetic equation



✓ plants are used by herbivores

✓ Herbivores are used by carnivores as their food.

In this way energy is transferred from one organism to another and so on.

* The conversion of solar energy is governed by law of thermodynamics.

1st Law of thermodynamics

It states that "energy can neither be created nor destroyed, but it can be converted from one form to another".

Solar energy is converted into chemical energy.

Solar energy \rightarrow Chemical energy

2nd Law of thermodynamics

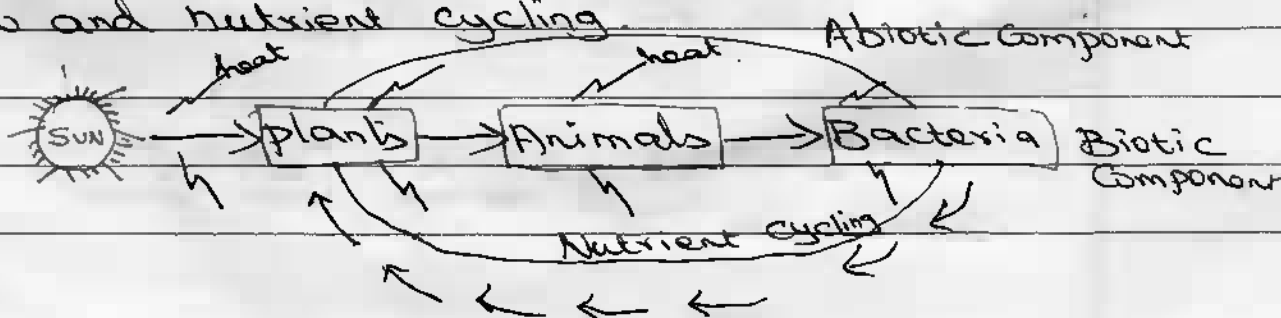
It states that "whenever energy is transformed, there is a loss of energy through the release of heat".

Respiration equation



Relationship between structure \rightarrow function (flow model)

The biotic components and abiotic components are linked together through energy flow and nutrient cycling.



* Nutrient flow (or) Nutrient Cycling (or) Biogeochemical Cycle

The elements which are essential for the survival of both plants and animals are called nutrients.

* Macronutrients → The elements needed in large amount
ex Oxygen, Carbon, Nitrogen
→ Phosphorous

* Micronutrients

↓
The elements needed in small amount are called micronutrients.
ex Boron, Cobalt, Zinc, Copper.

Nutrient Cycles:

The cyclic flow of nutrients between the biotic & abiotic components is known as nutrient cycle (or) biogeochemical cycles.

The major nutrients like C, H, O & N are cycled again and again between biotic & abiotic component of the ecosystem.

Hydrological cycle:

Movement of water in a cyclic manner is known as hydrological cycle.

Carbon Cycle:

Carbon is the basic component in all the organic compounds.

The carbon is present in all biotic components in different forms as food.

Ex: Carbohydrates, proteins, fats

Sources of CO_2 atmosphere.

* During respiration, plants and animals

liberate CO_2 in the atmosphere

* Combustion of fuels also release CO_2

* Volcanic eruptions also release CO_2

Nitrogen cycle:

Nitrogen is present in the atmosphere as N_2 in large amount (78%)

The nitrogen is present in all biotic components in different forms as food.

ex: proteins, vitamins, amino acids.

Nitrification:

The conversion of ammonia into nitrates is termed as nitrification. This is brought about by nitrifying bacteria.

ex: Nitrobacter, Nitrosomonas.

Denitrification:

The conversion of nitrates into nitrogen (N_2) is termed as denitrification. This is brought about by denitrifying bacteria.

ex: Pseudomonas, Fluorescence.

Phosphorous cycle:

Phosphorous is mainly present in the rocks, fossils. The phosphorous is present in all biotic components in different forms.

ex: Bones, teeth,