

The total solid material on the earth's surface is called **Lithosphere**. Similarly, the area covered by water mass is called **Hydrosphere** and the air cover around us is known as **Atmosphere**. All these three spheres are natural.

The sphere where life exists over the earth and in the atmosphere around it is called **Biosphere**. A diversified life exists in lithosphere, hydrosphere and atmosphere. It includes man, microorganisms, insects, animals, birds, vegetation etc. All these are collective components of biosphere. According to Huchinson, that part of the earth where life can exist is called Biosphere.

Ecosystem

Lithosphere, hydrosphere, atmosphere and biosphere collectively create the **Eco System** of the earth.

Biosphere is spread up to an altitude of 26 kilometres. Most of the living animals are found up to an altitude of 9 km from sea level. There are many types of fish, shark, whale, octopus, marine vegetation and other aquatic animals. Biosphere is spread up to few km deep below the land surface also.

In nature, few biotic components such as animals, vegetation and micro organisms combine with few abiotic components like water, gases, land, light etc. and form an autonomous system which is called

Ecosystem

There are two major parts of Ecosystem as follows :

(1) Terrestrial Ecosystem, and (2) Aquatic Ecosystem.

Grasslands, arid regions, deserts, islands etc. are included in terrestrial eco system, while pond, lake, watershed, river, river delta, sea etc. are a part of aquatic eco system.

Energy flow in ecosystem

In every ecosystem, there are many interrelated constitutions. Ecosystem is governed by hydrogen cycle, carbon cycle, oxygen cycle, nitrogen cycle, energy cycle etc. However, biotic and abiotic characteristics of every ecosystem is different from one another.

Working of ecosystem is related with the increase of species of vegetation and animals and their reproduction process in one way or other. These interlinked processes can be described as various cycles. All these activities are dependent on the solar energy. Vegetation absorbs carbon dioxide from air through photosynthesis process and releases oxygen in the air. Animals inhale oxygen. Hydrogen cycle depends on water which is inevitable to vegetation as well as animals. Energy cycle mixes humus contents back to the soil on the basis of which the vegetation flourishes. Every living organism is completely connected with the proper capacity of these life cycles.

Bio-geochemical cycle

Vegetation absorbs abiotic or chemical elements through its roots and converts them into biotic elements. These elements are transferred into different living organisms through the food chain. With the death of these living organisms, the biotic element again transforms into abiotic or chemical element.

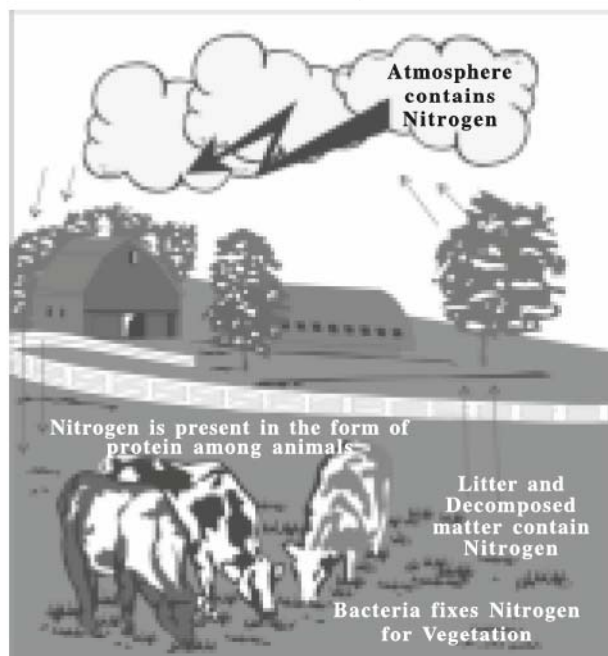
The transformation of abiotic or chemical elements into biotic element and the re-transformation of biotic elements into abiotic forms is called Biogeochemical Cycle. Hydrogen cycle, carbon cycle, oxygen cycle, nitrogen cycle, phosphorous cycle, rock cycle etc. are studied in bio-geochemical cycle. Here we shall study nitrogen cycle, oxygen cycle and carbon cycle.

The Nitrogen Cycle

Nitrogen is important to every living species because it is an inevitable component of amino acid. Protein is formed due to amino acid. Nitrogen mixes with the soil when lightening strikes.

Nitrogen is converted into ammonia by bacteria and ammonia is converted into nitrate by bacteria. Vegetation utilises the nitrate from the soil. This vegetation is used by animals and micro organisms. When animals die and vegetation is destroyed, it is decomposed and merges back into the soil. Some of the nitrogen from the soil mixes with the atmosphere.

Thus, nitrogen moves from atmosphere to land and vice versa in various components.



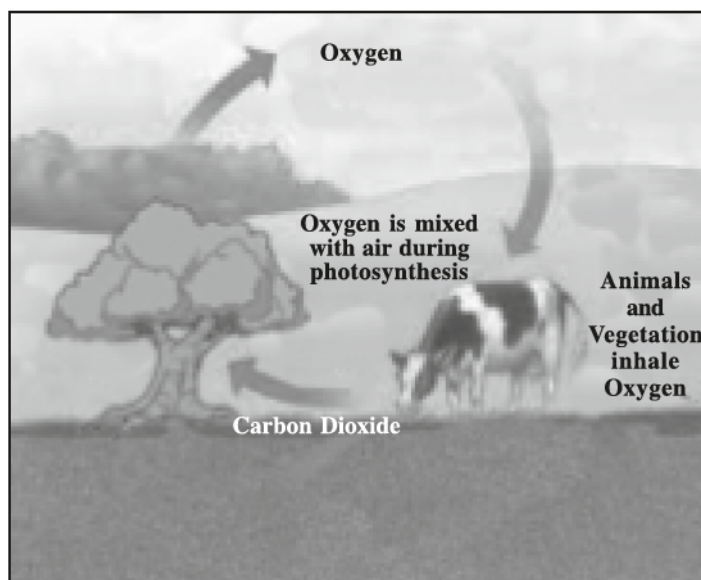
13.1 Nitrogen Cycle

Oxygen Cycle

The role of oxygen in biosphere is very important. It is an important element for animates. During respiratory process, vegetation and animals inhale oxygen from the air and exhale carbon dioxide. Vegetation, during their process of food making in the presence of sunshine, uses carbon dioxide from the atmosphere through photo synthesis process, and finally releases oxygen in the atmosphere. This way the carbon cycle joins the oxygen cycle.

Carbon Cycle

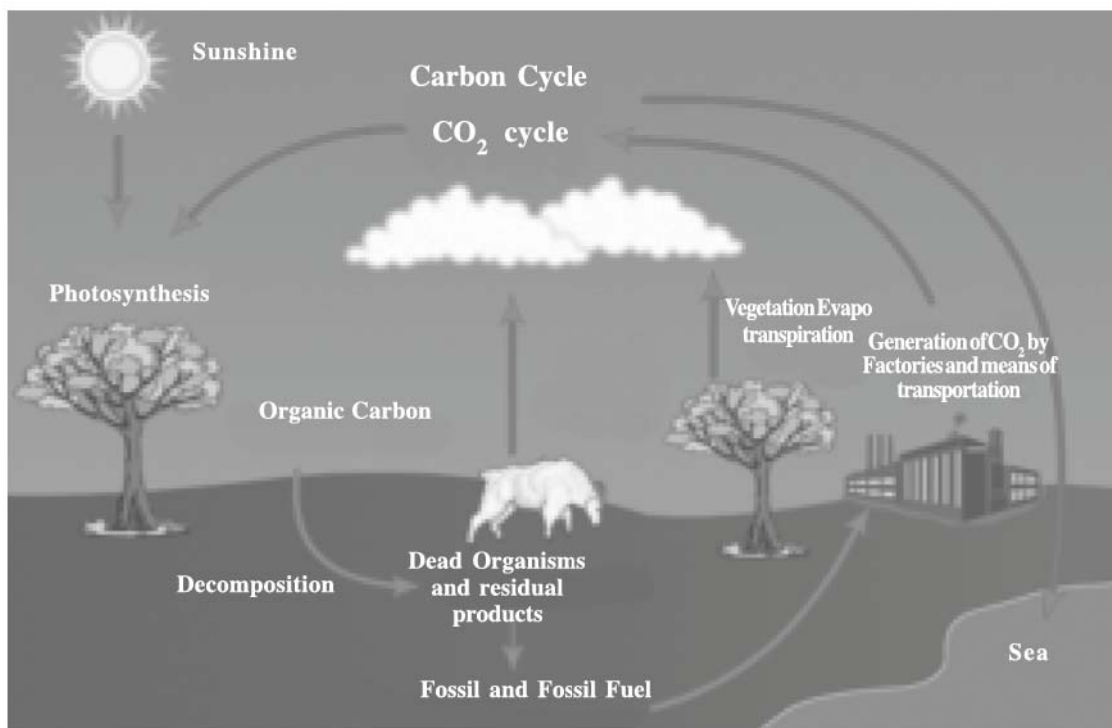
Carbon is present in solid, liquid or gaseous form in the biosphere or the eco-system. It is in the form of carbon dioxide (CO_2), carbon hydrates, calcium carbonate and carbon. The transformation of carbon takes place in biosphere along with energy. Man and other living organisms inhale oxygen during respiration process and exhale carbon dioxide which merges into the atmosphere. Vegetation



13.2 Oxygen Cycle

consumes carbon dioxide from the atmosphere and forms carbohydrates. Dead vegetation decomposes into carbon dioxide and merges with atmosphere.

Carbon dioxide is generated when fossil fuel (coal, petroleum etc.) and wood are burned and merge with the atmosphere. Thus, a carbon cycle is completed after different stages are attained.



13.3 Carbon Cycle

Food Chain

Biosphere is a global system. It contains two components viz. Biotic and Abiotic components. Every species requires energy to endure and also needs some material to maintain physiology. Every living organism needs food in specific quantity.

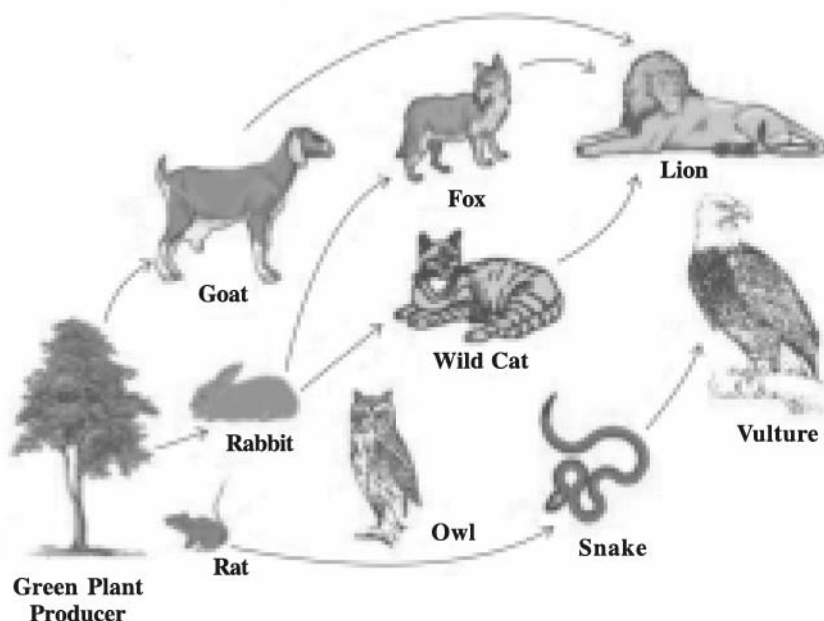
Green plants use sunshine. They produce necessary quantity of carbohydrates with the help of photosynthesis process. Thus, green plants are first to produce energy from the sunshine. So these are called **primary producers** or **autotrophs** and are dependent on the energy which is produced by themselves.

Some micro organisms and animals use green plants as their food but they do not produce their food. These are dependent on the food produced by other component. The energy produced by green plants is utilised by other animals and thus the form of energy changes. Animals which use green plants as their food are called **herbivores or primary consumers**. Cow, buffalo, deer etc. are such herbivores or **'primary consumers'**.

Animals which eat only meat are known as carnivores. Lion, tiger, leopard, python etc. are carnivores. These carnivores thrive on herbivores. These animals are placed in the category of **secondary consumers**. Thus, the energy produced from sunshine is transferred first into green plants, then to herbivores and then to carnivores.

Those animals which thrive on the residues of dead animals and putrefied food are called **'decomposers'**. Vulture, kites, termites etc. are decomposers. Thus the solar energy is transferred in a chain of herbivores-carnivores-decomposers. This is called **Food Chain**.

Every level in this chain is called a **trophic level**.



13.4 Food Chain

Bio Diversity :

Every animal and vegetation on this earth is different from one another. There are innumerable animals having different shape, size and colour, mankind, vegetation and micro- organisms on this earth. Their number and their life style show a special balance. The differences seen among the living organisms is called '**Bio-diversity**'. The word bio-diversity gives a picture of diversity among vegetation and animals.

India is included among 12 mega bio- diversity countries. In India, there are 10 bio-diversity regions. : These are (1) Trans Himalayas (2) Himalayan Region (3) Indian Deserts (4) Semi-Arid regions (5) Western Ghats (6) Southern Peninsula (7) Ganga Plains (8) North-East India (9) Islands (10) Coastal Regions

Of these 10 bio-diversity regions, four regions viz. desert, semi-arid region, part of western Ghats and coastal region are located in Gujarat.

Ecological imbalance and its impacts

The arrangement of bio-geochemical cycle and energy flow is set very meticulously. Changes occur within them periodically. A living organism lives according to this arrangement. It has no direct interference on physical or biotic factors. With rational thinking power, man has been able to create settlements, mining, industries, transport routes etc. in adverse conditions. While doing this, man has directly interfered with the natural cycles. By constructing Panama Canal, man has damaged the marine ecology. The cricket stadium at Sharjah has damaged desert ecology.

Human needs increase with population explosion. With developing technology, man expands his residential and industrial area. This deprives the wild animals of their abodes and their area is either reduced or destroyed. Deforestation for getting fuel and timber, to hunt wild animals for getting hide, skin and meat, to kill musk deer for getting musk, to kill rhino for getting its horn and to kill elephant for its ivory are carried out by man. Many other animals are killed for different purposes. This is a

matter of concern. Moreover, the excessive use of pasture land causes reduction in the diversity and abundance of herbivores and the carnivores dependent on them.

Generally every living organism has the capacity to acclimatize with environmental changes in the atmosphere. But wild animals cannot adjust to the speedy and non-natural i.e. man-made changes in the environment, and hence they become extinct.

Bio-conservation is not the work of Government only. The work cannot be successful by making laws. For this, associations of nature and animal lovers should be formed and their guidance and encouragement should be sought. Only then such associations can be successful. Many associations in our country are working to save wild animals. Government as well as non-government help is available.

Conservation of Bio-Diversity

Bio-diversity only can enrich the human life. For the conservation of the environment, it is important to develop understanding about them in order to preserve them. Bio-diversity in all ecosystems is in danger only because of only one living organism, and that is Man.

Come, get together and we can certainly do this to conserve bio-diversity.

- Shall plant local species of trees and preserve them, so that the number of living organisms like birds, butterfly and small insects increases.
- Shall grow local vegetables and encourage local fruit growers.
- Will form association to bring awareness among people about local bio-diversity.
- Will avoid to our best the use of commodities made from animals.
- Will use renewable energy like wind energy, solar energy etc. and encourage it.
- Eco clubs will be established at school level; shall visit forest department and other institutions working for bio-diversity, join these institutions and will actively participate in such activities.

EXERCISE

1. Write detailed answers to the following questions :

- (1) Explain the ecosystem in details.
- (2) Write about food chain.
- (3) Explain the remedies to conserve bio-diversity.

2. Write short notes :

- (1) Biochemical cycles
- (2) Nitrogen Cycle
- (3) Carbon Cycle
- (4) Oxygen Cycle

3. Answer the following questions in one or two sentences :

- (1) State the Bio-geographical regions of Gujarat.
- (2) Prepare a list of bio-geographical regions of India.
- (3) Which spheres are included in ecosystem ?
- (4) Which are the primary producers ?
- (5) Which are the primary consumers ?

4. Select the correct option given for the following questions and write the answer.

- (1) Up to how many kilometres does the biosphere exist in the atmosphere ?
(a) 25 km (b) 26 km (c) 28 km (d) 29 km
- (2) With which bio-chemical cycle is the lightening phenomena associated ?
(a) Nitrogen (b) Oxygen (c) Carbon dioxide (d) Phosphorus
- (3) Which gas is released by vegetation in atmosphere during photosynthesis ?
(a) Nitrogen (b) Phosphorus (c) Oxygen (d) Carbon dioxide
- (4) Solar energy is transferred into a chain of grass herbivores carnivores decomposers.
What is it called ?
(a) Energy resource (b) Trophic level (c) Food chain (d) Ecosystem
- (5) What is the number of countries which are rich in bio-diversity ?
(a) 12 (b) 15 (c) 10 (d) 13

Activity

- During your school trip convince the pilgrims coming to holy places to reduce the use of plastic and to dump the litter at a proper place.

