

# Class 11 Geography Notes Chapter 15 Life on the Earth

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Life on the earth is found almost everywhere. Living organisms are found from the poles to the equator, from the bottom of the sea to several km in the air, from freezing waters to dry valleys, from under the sea to underground water lying below the earth's surface.

The biosphere includes all the living components of the earth. It consists of all plants and animals, including all the micro-organisms that live on the planet earth and their interactions with the surrounding environment.

The biosphere and its components are very significant elements of the environment. These elements interact with other components of the natural landscape such as land, water and soil.

They are also influenced by the atmospheric elements such as the temperature, rainfall, moisture and sunlight. The interactions of biosphere with land, air and water are important to the growth, development and evolution of the organism.

The term ecology is derived from the Greek word 'oikos' meaning 'house', combined with the word 'logy' meaning the 'science of or 'the study of. Literally, ecology is the study of the earth as a 'household', of plants, human beings, animals and micro-organisms.

A German zoologist Ernst Haeckel, who used the term as 'oekologie' in 1869, became the first person to use the term 'ecology'. The study of interactions between life forms (biotic) and the physical environment (abiotic) is the science of ecology. Hence, ecology can be defined as a scientific study of the interactions of organisms with their physical environment and with each other.

Ecosystems are of two major types: terrestrial and aquatic. Terrestrial ecosystem can be further be classified into 'biomes'.

A biome is a plant and animal community that covers a large geographical area. The boundaries of different biomes on land are determined mainly by climate.

From a structural point of view, all ecosystems consist of abiotic and biotic factors. Abiotic factors include rainfall, temperature, sunlight, atmospheric humidity, soil conditions, inorganic substances (carbon dioxide, water, nitrogen, calcium, phosphorus, potassium, etc.).

Biotic factors include the producers, the consumers (primary, secondary, tertiary) and the decomposers. The producers include all the green plants, which manufacture their own food through photosynthesis.

The primary consumers include herbivorous animals like deer, goats, mice and all plant-eating animals.

The carnivores include all the flesh-eating animals like snakes, tigers and lions. Certain carnivores that feed also on carnivores are known as top carnivores like hawks and mongooses.

Decomposers are those that feed on dead organisms (for example, scavengers like vultures and crows), and further breaking down of the dead matter by other decomposing agents like bacteria and various micro-organisms.

Generally, two types of food-chains are recognised: grazing food-chain and detritus food-chain. In a grazing food-chain, the first level starts with plants as producers and ends with carnivores as consumers at the last level, with the herbivores being at the intermediate level.

There are five major biomes — forest, desert, grassland, aquatic and altitudinal biomes.

The sun is the basic source of energy on which all life depends. This energy initiates life processes in the biosphere through photosynthesis, the main source of food and energy for green plants.

During photosynthesis, carbon dioxide is converted into organic compounds and oxygen. Out of the total solar insolation that reaches the earth's surface, only a very small fraction (0.1 per cent) is fixed in photosynthesis. More than half is used for plant respiration and the remaining part is temporarily stored or is shifted to other portions of the plant.

Oxygen is the main by-product of photosynthesis. Oxygen occurs in a number of chemical forms and combinations. It combines with nitrogen to form nitrates and with many other minerals and elements to form various oxides such as the iron oxide, aluminium oxide and others. Much of oxygen is produced from the decomposition of water molecules by sunlight during photosynthesis and is released in the atmosphere through transpiration and respiration processes of plants.

Other than carbon, oxygen, nitrogen and hydrogen being the principal geochemical components of the biosphere, many other minerals also occur as critical nutrients for plant and animal life. These mineral elements required by living organisms are obtained initially from inorganic sources such as phosphorus, sulphur, calcium and potassium.

### **Class 11 Geography Notes Chapter 15 Important Terms:**

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- **Biosphere:** The biosphere includes all the living components of the earth. It consists of all plants and animals, including all the micro-organisms that live on the planet earth and their interactions with the surrounding environment.
- **Environment:** The environment is made up of abiotic and biotic components.
- **Ecology:** The term ecology is derived from the Greek word 'oikos' meaning 'house', combined with the word 'logy' meaning the 'science of or 'the study of. Literally, ecology is the study of the earth as a 'household', of plants, human beings, animals and micro-organisms.

- **Ecological systems:** The interactions of a particular group of organisms with abiotic factors within a particular habitat resulting in clearly defined energy flows and material cycles on land, water and air, are called ecological systems.
- **Habitat:** A habitat in the ecological sense is the totality of the physical and chemical factors that constitute the general environment.
- **Ecosystem:** A system consisting of biotic and abiotic components is known as ecosystem.
- **Ecological adaptation:** All these components in ecosystem are inter-related and interact with each other. Different types of ecosystems exist with varying ranges of environmental conditions where various plants and animal species have got adapted through evolution. This phenomenon is known as ecological adaptation.
- **Abiotic factors:** Abiotic factors include rainfall, temperature, sunlight, atmospheric humidity, soil conditions, inorganic substances (carbon dioxide, water, nitrogen, calcium, phosphorus, potassium, etc.).
- **Biotic factors:** Biotic factors include the producers, the consumers (primary, secondary, tertiary) and the decomposers.
- **Producers:** The producers include all the green plants, which manufacture their own food through photosynthesis.
- **Primary consumers:** The primary consumers include herbivorous animals like deer, goats, mice and all plant-eating animals.
- **Carnivores:** The carnivores include all the flesh-eating animals like snakes, tigers and lions. Certain carnivores that feed also on carnivores are known as top carnivores like hawks and mongooses.
- **Decomposers:** Decomposers are those that feed on dead organisms (for example, scavengers like vultures and crows), and further breaking down of the dead matter by other decomposing agents like bacteria and various micro-organisms.
- **Biome:** A biome is a plant and animal community that covers a large geographical area. The boundaries of different biomes on land are determined mainly by climate. Therefore, a biome can be defined as the total assemblage of plant and animal species interacting within specific conditions.
- **Food Chain:** This sequence of eating and being eaten and the resultant transfer of energy from one level to another is known as the food-chain.
- **Flow of energy:** Transfer of energy that occurs during the process of a food chain from one level to another is known as flow of energy.
- **Food web:** The food-chains get interlocked with one another. This inter-connecting network of species is known as food web.
- **Water cycle:** All living organisms, the atmosphere and the lithosphere maintain between them a circulation of water in solid, liquid or gaseous form. This is known as the water or hydrologic cycle.
- **Oxygen cycle:** Oxygen is the main by-product of photosynthesis. It is involved in the oxidation of carbohydrates with the release of energy, carbon dioxide and water. The cycling of oxygen is a highly complex process.
- **Denitrification:** Some bacteria can even convert nitrites into nitrates that can be used again by green plants. There are still other types of bacteria capable of converting nitrates into free nitrogen, a process known as denitrification.

- Biogeochemical cycle: Bio refers to living organisms and geo to rocks, soil, air and water of the earth. These cyclic movements of chemical elements of the biosphere between the organism and the environment are referred to as biogeochemical cycles.
- Ecological balance: Ecological balance is a state of dynamic equilibrium within a community of organisms in a habitat or ecosystem. It can happen when the diversity of the living organisms remains relatively stable.
- Succession: This change is due to competition where the secondary forest species such as grasses, bamboos or pines overtakes the native species changing the original forest structure. This is called succession.