Biomes: Meaning and types

Meaning

The distribution of plants and animals over the globe is not uniform. Again there is a variation of species of plants and animals from region to region. Based on the dominance of certain and usually distinctive species the world may be divided into some biomes or biotic regions or bio-geographical region. **Biomes are an area possessing particular climatic condition and which is distinguished by the dominance of certain and usually distinctive species.**

It may also be concluded that the biome is a large ecosystem wherein we study the total assemblage of plant and animal communities.

Biome Types

World biomes are dived variously on different bases like climate, vegetation, soil, water condition, heat, growth form of plants. Basically, world biomes are dived into the following two broad categories on the basis of the nature of the habitats-

(1) Land biomes and
(2) Aquatic biomes.

Though there is variation in the evolutionary stages of plants and animals over lands and in aquatic environments but on an average there is a close relationship between the world distributional patterns of plants and animals and the present climatic types of the world. Thus, based on relationship between the distributional patterns of plants and animals and world climates the world biomes have been divided into the following 3 broad categories-

(1) Tundra Biome
(2) Temperate Biome and
(3) Tropical Biome

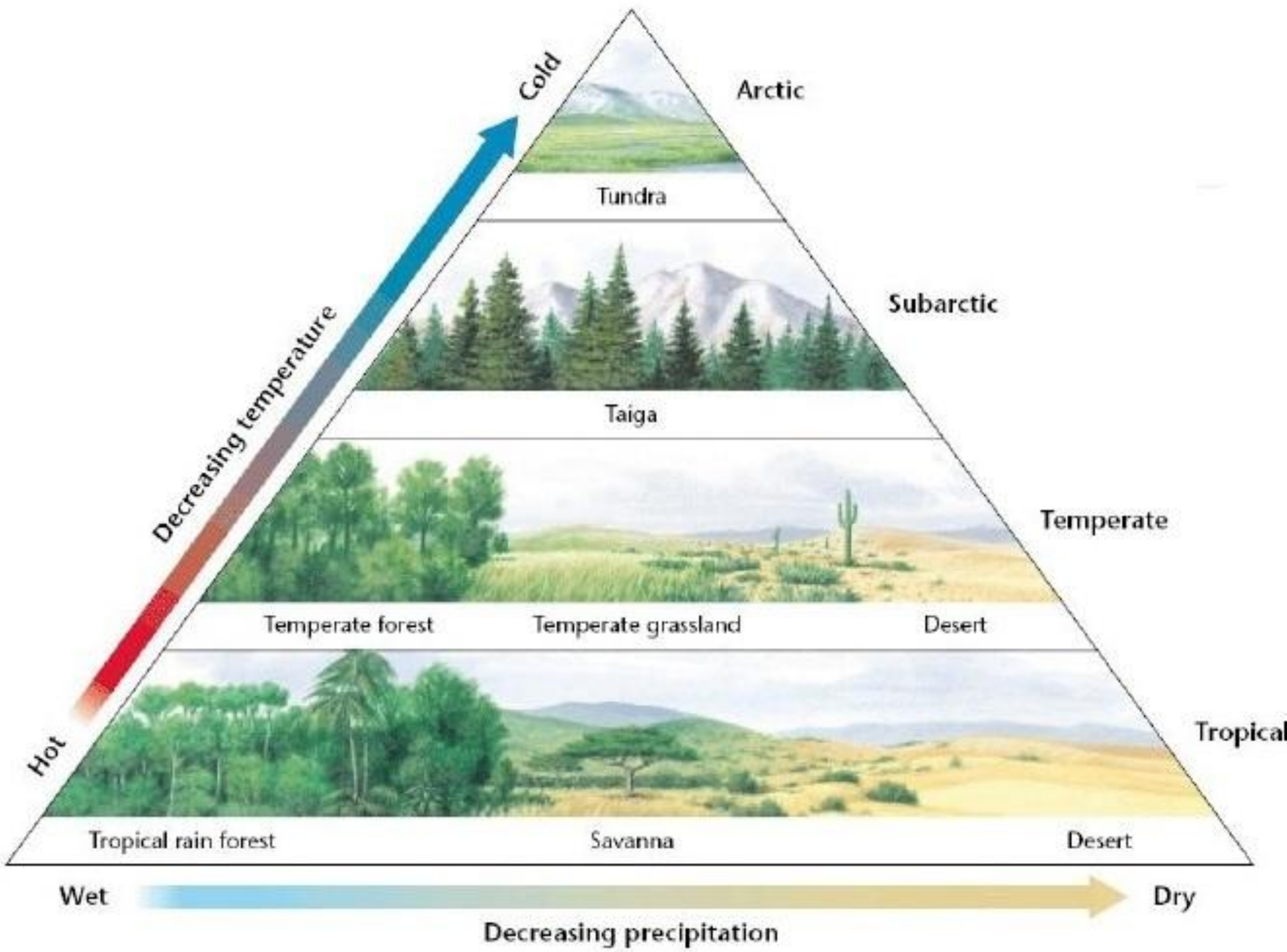
Since the vegetation is the most dominant component of the biomes and the vegetation and climate are very closely related and hence the world is divided into different biome types on the basis of major world climates and vegetation types.

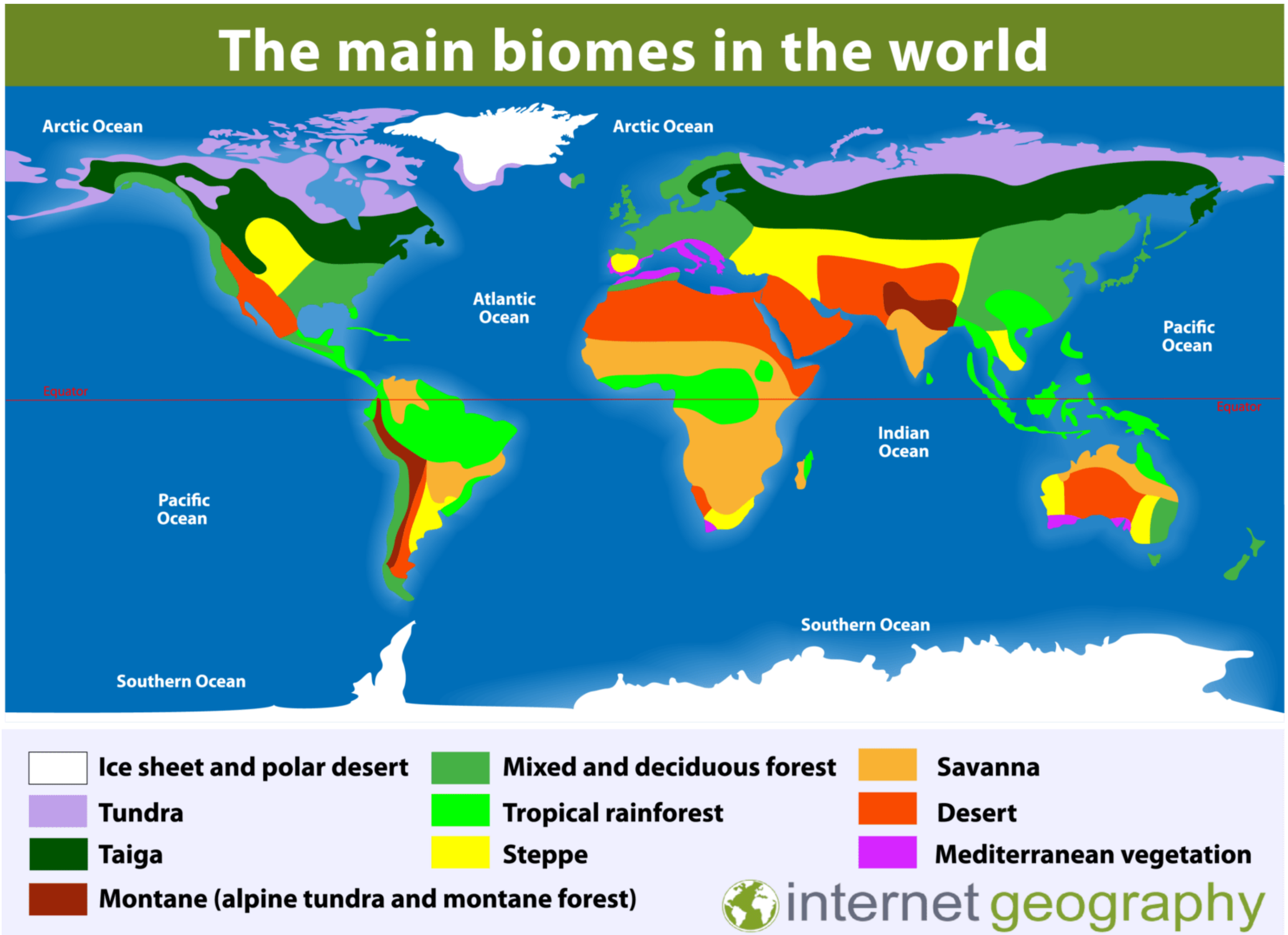
Thus, biomes are divided into second and third order biomes on the basis of vegetation types and characteristics as shown below-

Biome of first order (based on climatic zone)	**Biome of 2^{nd} order (based on vegetation)**	**Biome of third order**
1. TUNDRA BIOME	(i) Arctic Tundra Biome (ii) Alpine Tundra Biome	
2. TEMPERATE BIOME	(i) Taiga Forest Biome	a) North American Biome b) Asiatic Biome c) Mountain Forest Biome
	(ii) Temperate Deciduous Forest Biome	(a) North American Biome (b) European Biome
	(iii)Temperate Grassland Biome	a) Eurasian Steppe Biome b) North American Prairie Biome c) Pampa Biome d) Australian Grassland Biome
	(iv) Mediterranean Biome	a) Northern hemisphere Biome b) Southern Hemisphere Biome
3. TROPICAL BIOME	(i) Tropical Forest Biome	a) Evergreen Rainforest Biome b) Semi-evergreen Forest Biome c) Deciduous Forest Biome d) Semi-deciduous Forest Biome e) Montane Forest Biome f) Swamp Forest Biome
	(ii) Savanna Biome	a) Savanna Forest Biome b) Savanna Grassland Biome
	(iii)Desert Biome	a) Dry or arid Desert Biome b) Semi-Arid Biome

Factors determining biome-

I. Latitude
II. Altitude
III. Temperature
IV. Precipitation




The main biomes in the world
Arctic Ocean
Arctic Ocean
Atlantic Ocean
Pacific Ocean
Pacific Ocean
Indian Ocean
Equator
Equator
Southern Ocean
Southern Ocean
Ice sheet and polar desert
Tundra
Taiga
Montane (alpine tundra and montane forest)
Mixed and deciduous forest
Tropical rainforest
Steppe
Savanna
Desert
Mediterranean vegetation
internet geography

1. **Tundra Biome**

This biome is found mainly in tundra region. It stretches from Alaska and is continued to the southern fringe of Greenland. In Eurasia it is confined mainly in peninsula of Siberia. In southern hemisphere it occurs in some of the sub-Antarctic islands. Among all the biomes the tundra of northern hemisphere is relatively the most continuous and distinctive.

Here, the climate is very dry and cold. Precipitation is very low and much of it falls in the form of snow. Winters are very long and summers are short. During long winters most parts of tundra are covered with snow. Thus, the soils are parentally frozen in winter. Although there are areas of mountain and high-land in the tundra, its dominant physiography is of flat or gently plain surface with many lakes and small depression.

The vegetation of tundra varies from locality to locality within very short distance. Grasses and sedges are the main vegetation in summer, but there grows lichens and mosses also. Herbaceous plants viz.- bilberry, cranberry, yellow cloud berry etc. grow during short summer and there is also a sudden wonderful growth of innumerable small flowering plants.In spite of rigorous environment animal life is plentiful here. Large number of migratory birds especially waterfowl, and birds are found in summer. Important animals are caribou, white bear, rain deer, muskoxen, arctic fox etc.

2. **Taiga Biome**

In northern hemisphere the tundra gives away to coniferous forest which extends in a broad belt across North America and Eurasia. This biome is confined almost exclusively to the northern hemisphere. Only in the south island of Newzeland there is a similarity with it. The lands of boreal forest have a cold continental type of climate.

The needle leaved cone-bearing evergreen trees is the characteristics vegetation. Millions of tightly packed conifers cover vast areas of Eurasia and N.America. The dominant species are mostly pines and firs. On the polar margin trees are small and short.Animals include elk, rodents, caribou, lagomorphs, weasels, badger, shank, otter, many birds and insects.

3. **Temperate Deciduous Forest**

This biome lies in the mid latitude and is found on both the western and eastern margins of the continents. The chief region in the northern hemisphere are the united states, western Europe and Eastern Asia (Manchuria, Korea, Northern and central China and Japan) in southern hemisphere it includes the southern Chile, south-Eastern Australia (Tasmenia) and Newzeland.

The natural vegetation is deciduous forest. The trees have broad leaves. It has also evergreen shrubs, many herbaceous plants, ferns and mosses at the ground level. Animal life includes mainly bear, wolf, deer, oxen, fox, pig, wild cat and many small creatures in Europe; deer, black deer, panther, red-fox and grey squirrel in America. Wild life in eastern Asia includes Manchurian tiger, wild cat, wolf, red deer, small spotted deer, moles, shrew etc. but now they are rare. Amphibians and reptile were once fairly common. Birds are commonly found. Streams and lakes are rich in fish.

4. Temperate Grassland

Temperate grassland covers extensive area especially in the great plains of North America, the steppe belt of Eurasia and plains of Manchuria in the northern hemisphere; the pampas of Argentina, Uruguay, the Velds of South Africa and the interior plains of Murray-darling basin in Australia in southern hemisphere.

Most of these areas are grass covered, because of long period of winter frost, low rainfall and high evaporation. The nature of grass varies, in the moisture areas tall grasses occur; in the drier areas the grass is short and sparse and grows in short and clumps (cluster), associated with grasses like legumes. Among the herbivorous animals bison, pronghorn in America, wild horse, wild ass, saga antelope in Eurasia, antelope, zebra, Inu in south Africa and kangaroo in Australia are important. Besides other animals are also found here viz. wolf, fox, panther etc. birds, reptiles, amphibian and fish are also found.

5. Broad leaved evergreen forest

This biome occurs in the mid-latitude on the western margins of the continents where Mediterranean type of climate prevails. The areas are the coast lands surrounding the Mediterranean, the great valley of California, Central Chile, the south-western corner of Cape Province, south-western Australia and the areas in South Australia.

The natural vegetation is classed as broad leaved evergreen forest and scrub. However, because of variation of climate, soil and relief different type of vegetation may be distinguished as (a) broad leaved evergreen forest (b) degenerated wood land and scrub (c) deciduous forest at higher elevation (d) coniferous forest at again higher altitude and (e) alpine vegetation.

Animal life is not abundant in this biome. In Mediterranean Europe a few wild creatures such as mountain goat, wolf, gaggle and monkey confine to survive. In California herbivorous creatures e.g. deer, elk and ground squirrel, carnivorous as grizzly, bear and mountain lion, numerous birds, such as giant candor were common. In south western Australia animal life is dominated by kangaroo and other marsupials.

6. Desert

The deserts are the areas of low rainfall usually less than 10 inches of annual rainfall. Wither in hot or cold desert there is too little and too variable rainfall that support more than a few plants. This biome includes the main hot desert regions of **Sahara**, the **Arabian** and **Thar** deserts, the **Kalahari** Desert of South-West Africa, the **Great Australian** desert in the western part of that continent, the **Atacama** Desert of northern Chile and the desert of Mexico-USA border.

The important animals are camels, mountain sheep, goat, squirrel, antelope, mouse, rat, small rodent etc. Different types of snake and birds are also common. These all animals are able to manage to live without drinking water for longtime. Vegetations are very sparse. Dispersed grasses and different scrubs are found in limited extent in all the deserts.

7. Tropical grassland

The tropical grassland biome or savanna lands are the regions of marked seasonal changes. Temperatures are high all the year round. Rainfall is heavy in summer and winter is dry. Savanna grassland includes grasslands of Africa, South-American savanna lands and also Australian grasslands.

There is, in fact a wide variation in savanna which ranges from entirely tree less grassland to thickly wooded grassland. However, the vegetation of most savanna is dominated by tall grasses (6 feet to 10 feet). This tall grass is called ‘elephant grass.

The savanna grasslands are the home of different herbivorous animals. The elephant, antelope, zebra, giraffe, rhinoceros, wild cow, deer, wild buffalo, pig etc. are most common herbivorous animals. Among carnivorous the tiger, lion, fox are most common. The tropical grasslands are unique in their possession of large number of birds, snakes and insects.

8. Tropical deciduous forest Biome

The tropical deciduous forest biome is associated with tropical monsoon regions and attains its greatest extent in southern and south-eastern Asia. Of course, many areas of the world experience monsoon winds but only the area where the climate is completely dominated by monsoon is southern and south-eastern Asia. The parts of America, northern Australia also enjoy monsoon climate. In this biome, during winter most of the broad leaved tree and shrubs abandoned their leave.

There is a rich wild life in this biome. Of the carnivorous fox, tiger and other number of cat families are most important. The herbivorous like deer, a few antelopes, wild pigs, rhinoceros, and elephants are found in many parts of this biome. Many kinds of monkeys, birds, and reptiles are also common. Many beautiful and brilliantly coloured birds are found and the peacock is native to this region. Lizards, snakes including a large number of poisonous reptiles, crocodiles are common. Different insects including many poisonous are common features.

9. Tropical scrub forest

This biome is mostly confined in an extensive area of north-east Brazil. This is also known as dry north-east region of Brazil. Topographically, it is a hilly upland region. Rainfall occurs mainly between December and April. Temperature is very high during summer.

As the name indicates the vegetation is totally scrub type. The trees and scrub usually bear small leaves, which are shed during the dry season. Grasses thrones spike are common vegetation. During the rainy period the vegetation is green luxuriant. Among herbivorous the zebra, buffalo, elephant, deer, antelope are common. Tigers, foxes are the common carnivorous of this biome. Different monkeys, birds, snake, parrots, ducks and butterflies are available.

10. Tropical rain-forest

The tropical rain forest biome occurs in equatorial latitudes within few degrees north and south of the equator, which are always hot, humid and wet. The average monthly temperature is always about 27^0c. The average annual rainfall is usually about 80 inches (2032mm). Heavy convection rains fall daily.

The climatic condition provides optimum situation for varieties of plants growth. The tropical rain forest occurs mainly in the areas of Amazon basin, on the coastlands of West Africa and the Congo basin. It is also found in Malaysia and Indonesia.

The vegetation is very thick and evergreen. Trees are very tall due to their struggle for light and air. Various types of herbivorous animals like elephant, buffalo, deer, antelope, goat, wild cow, zebra are found. Different squirrel, monkeys are also common. Varieties of birds with well developed climbing feet, snake, ducks, poisonous insects, coloured butterflies, material mosquitoes, poisonous ants etc. are common features of this biome. Lion, tiger, fox and some other small rodent are the main carnivorous animals.

11. Mountain Biome

There are areas in the world which because of their greater height create complex biotic conditions. Therefore, all the mountains and plateaus have a distinctive biome, which is known as mountain biome.

High altitude, rugged topography, thin stony soils, interior drainage, cold climatic condition are some basic characters of this biome. The mountain biome has many similarities in respect of climate with tundra biome. Here also the low temperature tends to cover the surface by snow during winter season. The number of plant species in any mountain area is somewhat limited although alpine flora is much richer than tundra flora. Grasses, mosses and lichens are abundant.

As the vegetation is limited, therefore the animal life is also limited. Animals are mostly herbivorous. The yak is mostly common animal. The Himalayan Tibetan region has much more herbivorous and carnivorous animals. Among herbivorous different deers, antelope, goat, buffalo, wild pig are most important. The tiger, fox etc. are the most important carnivorous. Different birds and white bear are also common characteristics.

Thus, according to various biomes, we find different plants and animals over the earth’s surface.

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Ecology and Ecosystem

ECOLOGY

Ecology, in a simple term, is a science that studies the interdependent, mutually reactive and interconnected relationships between the organisms and their physical environment on the one hand and among the organism on the other hand. The term '**Ecology'** was first coined by German biologist '**Ernst Haeckel**" in 1869.

It may be pointed out that Darwin's concept of "**Evolution of Species**" through natural selection involving interactions between biological species and habitat was the key stone of the formulation of various terms and concepts of inter-relationship between organism and their physical environment in one way or the other. Thus, Ernst Haeckel coined the term 'oecology' or 'oekology' (derived from the Greek words **'Oikos'** meaning habitation and '**logos**' meaning study which implies a study of habitation of organisms).

Thus, it may be concluded that 'ecology is a science that studies inter-relationships between biotic and abiotic components of a natural ecosystem on one hand and among organisms on the other hand.

ECOSYSTEM

An ecosystem is a region with a specific and recognizable landscape form, such as a forest, grassland, desert, wetland or coastal area. The nature of ecosystem depends on its geographical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands and also controlled by climatic conditions- the amount of sunlight, temperature and rainfall in the region. The geographical, climatic and soil characteristics form its *non-living or abiotic components*. These features create conditions that support a community of plants and animals that evolution has produced, to live in these specific conditions. The living part of the ecosystem is referred to as its *biotic component.*

Ecosystem are divided into *terrestrial* or land-based ecosystems and *aquatic* or water-based ecosystems. These form the two main habitats for the earth's living organisms. All the living organisms in an area live in communities of plants and animals. They interact with the abiotic environment and with each other at different points in time for various life-support systems. Life can exist only in a small portion of the earth's land, water and atmosphere. At global level, the thin skin of the earth on the land, sea and air forms the *biosphere.*

Thus, it may be said that, the living community of plants and animals in any area together with the non-living components of the environment- soil, air and water- constitute an ecosystem.

FUNCTIONS OF ECOSYSTEM

The ecosystem functions through several biogeo-chemical cycles and energy-transfer mechanisms. The integral components of the ecosystem (biotic and abiotic) interact with each other through several functional aspects. Plants, herbivores and carnivores are part of food chains with three to four links in each chain. All these chains together form a web of life, on which human depends for all their needs. Each of the food chain uses energy that comes from the sun and powers the ecosystem. The sun is the primary source of energy.

At each level of the food pyramid, energy is used up for the living activities of plants and animals. Plants directly use energy from the sun to photosynthesis, thus, they are the producers in an ecosystem. Animals live on plants (herbivores), or the other animals (carnivores). The herbivores and carnivores are together the consumers. Detrivores includes soil organisms which break down dead material (detritus) such as leaves and dead wood into smaller fragments; decomposers such as fungi and microbes act on these and convert them into simple inorganic nutrients used by plants.

ENERGY FLOW IN AN ECOSYSTEM

Every ecosystem has several inter related mechanisms that affect human life. These are the water cycle, carbon cycle, oxygen cycle, nitrogen cycle and energy flow. While every ecosystem is controlled by these cycles, each ecosystem's abiotic and biotic features are specific to that ecosystem.

All the functions of the ecosystem are in some way related to the growth and regeneration of its plants and multiplication of its animal's species. These interlinked processes can be depicted as various cycles. All these processes depend on energy from sunlight. During photosynthesis, carbon dioxide is absorbed by plants and oxygen is released into the atmosphere in the presence of sunlight. Animals depend on this oxygen for their respiration. The water cycle depends on rainfall, which is necessary for plants and animals to live. The sun drives the cycle through transpiration of water given out by plants. The energy cycle recycles nutrients into the soil on which plant life grows. Our own lives are closely linked to the proper functioning of these cycles of life. If human activities go on altering them, no life can survive on earth.

The cycles are based on the flow of energy through the ecosystem.

- ***Producers:*** the energy from sunlight is converted by plants through photosynthesis into growing of leaves, flowers, fruits, branches, trunks and roots. Since plants can grow by converting the sun's energy into their tissues, they are known as *producers* in ecosystem.

- ***Consumers:*** the plants are used by herbivores as food, which give them energy. A large part of this energy is used up for the metabolic function of these animals such as breathing, digesting food, supporting the growth of tissues, maintaining blood flow and regulating body temperature. Energy is also used for activities such as searching for foods, finding shelter, breeding and rearing young ones. The carnivores, in turn, depend on the herbivores on which they feed. Omnivores eat both animals and plants. Herbivores, carnivores and omnivores are together called *consumers.*

- ***Decomposers:*** when plants and animals die, this material is returned to the soil after being broken down into simpler substances by decomposers, such as insects, worms, bacteria and fungi. Animals excrete waste products after digesting food, which goes back to the soil and plants absorb these nutrients through their roots. This links the energy flow to the nitrogen cycle.

  Thus, different plants and animal species are linked to one another through food chains. Each food chain has three or four links. However, as each plant or animal can be linked to several other plants or animals through many different food chains, these interlinked chains can be depicted as a complex food web. This is thus called the "web of Life" since it shows that there are thousands of inter-relationships in nature.

- Energy flow: the energy in the ecosystem can be depicted in the form of a food or energy pyramid. The food pyramid has a large base of plants called producers. The pyramid has a narrower middle section that depicts the number or the biomass of herbivorous animals, which are called first-order consumers. The apex depicts the small biomass of carnivorous animals called the second-order consumers. Humans are one of the animals at the apex of the pyramid (omnivorous). Thus, to support human, there must be a large base of herbivorous animals and an even greater quantity of plant materials.

The transfer of energy from the source in plants through a series of organisms, by eating and being eaten, constitute the food chain. At each transfer, a large proportion of energy is lost in the form of heat. These food chains are not isolated sequences, but are interconnected. This interlocking pattern is known as the food web. Each step of the food web is called a *trophic level*. These trophic levels together form the *ecological pyramid* (Fig.1)

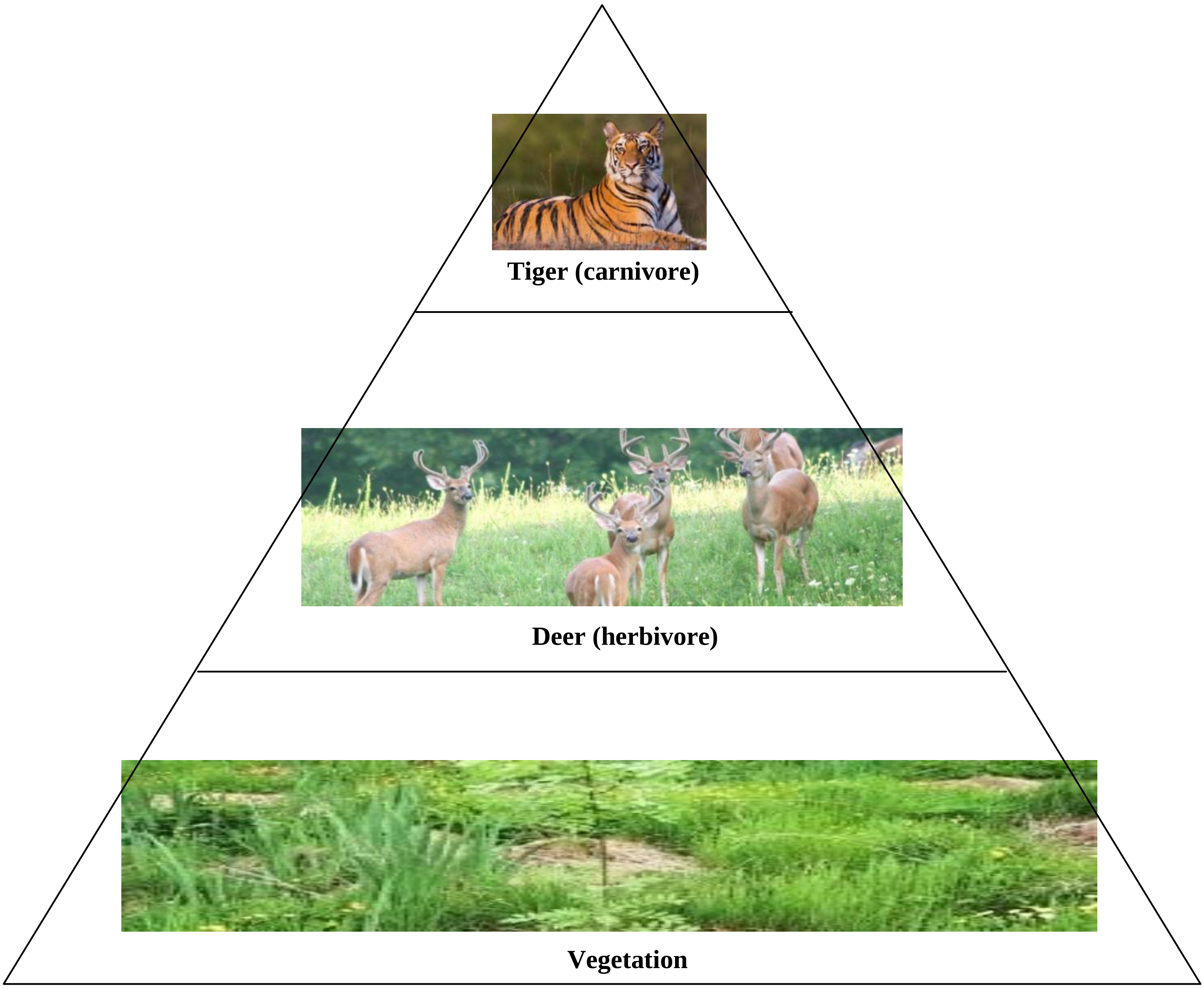

Fig 1: Food/Energy pyramid

2.4 FOOD CHAIN, FOOD WEB AND ECOLOGICAL SUCCESSION

Every living organism is in some way dependent on other organisms and on their habitat. Plants are food for herbivorous animals, which are in turn food for carnivorous animals. Some organisms such as fungi live only on dead material and inorganic matter. Plants are producers in every ecosystem—terrestrial and aquatic. The herbivores are primary consumers as they live on the producers. They include animals such as the deer and elephants in forests), blackbuck (in grasslands), and chinkara or Indian gazelle (in semi-arid areas that use the sparse grass). In the sea, there are small fish that live on algae and other plants. Domestic animals such as cattle, sheep and goats are the herbivores in agricultural systems that feed on shrubs and agricultural residue of crops.

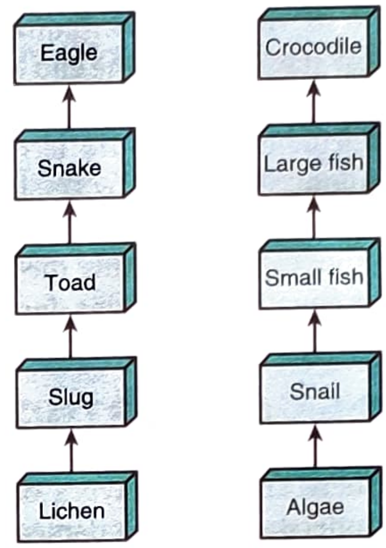

Fig. 2.2 Simple food chains

At a higher level are carnivores or secondary consumers, which live on the herbivores. In our forests, the carnivores include tigers, leopards, jackals, foxes and wild cats. The marine carnivores in the sea range from microscopic forms to giant mammals such as the whale. Decomposers or detritivores include worms, insects, bacteria and fungi which break down dead, organic material into smaller particles and finally into simpler substances that are used by plants as nutrition. Thus, decomposition is a vital function in nature without which all the nutrients would be tied up in dead matter and no new life would be produced.

Food chain: It can be defined as a chain consisting of producers, consumers, decomposers, each at a different trophic level. Each chain has four to five links (**Fig. 2.2**).

Food web: In an ecosystem, there are a very large number of interlinked chains; together, these form a food web. If the links in the chains that make up the web of life are disrupted due to human activities that lead to the loss or extinction of species, the web breaks down.

2.4.1 Ecological Succession

Ecological succession is a process through which ecosystems tend to change over a period of time. Succession can be related to seasonal environmental changes, which create alterations in the community of plants and animals living in the ecosystem. Other successional events may take much longer periods of time, extending to several decades. If a forest is cleared, it is initially colonised by a secondary group of species of plants and animals, which gradually change through an orderly process of community development. One can predict that a cleared or open area will gradually be converted into a grassland, then a shrub land and finally a woodland and a forest, if permitted to do so without further human interference. There is a tendency for succession to produce a more or less stable state at the end of several succession stages.

The most frequent successional changes occur seasonally in a pond ecosystem; this ecosystem fluctuates from a dry terrestrial habitat to the early aquatic stage in the monsoon. This is the colonisation stage by small aquatic species such as algae and zoo plankton. This gradually passes through several stages into a mature aquatic ecosystem, with amphibians, fish, aquatic weeds and other vegetation. After the monsoon, the pond shrinks and reverts to its dry stage in summer when its aquatic life remains dormant.

Meaning and Scope of Biogeography

Meaning

Biogeography is a major branch of physical geography and is concerned with phenomena of biosphere. Biogeography may be defined as the study of geographical aspects of plants and animals life, especially in terms of their distribution.

Biogeography simply means the study of living organisms, including plants, animals and micro-organisms of the biosphere which is life supporting layer and surrounds the earth and makes the plant and animal life possible without any protective device.

J.Tivy (1982) has defined biogeography as-

"Biogeography as the term indicates, is both a biological science. Its field of study is the biologically inhabited part of the lithosphere, atmosphere and hydrosphere, or as it has become known, the biosphere."

Varieties of organisms exist in the biosphere i.e part of the earth which contains living organisms. Their forms as well as their spatial distribution are not uniform. These are controlled by the environmental conditions. Biogeography is the geography of organic life, the study of spatial distribution of animate nature including both plants and animals and processes that produce variations in the patterns of their distribution. It is concerned with multitudinous forms of plant and animal life of biosphere as well as the complex biological activities. More accurately, it is the study of biosphere, which envelops the surface of the earth and consists of all living organisms living on land, water and air.

Scope of Biogeography

It is evident from the above that the study of living organisms i.e plants and animals is the core of biogeography. The primary goal of a bio-geographer is to present a clear picture of spatial pattern of distribution of plants and animals, the temporal and spatial variations and processes and causes thereof.

The primary subject matter of biogeography comprises the analysis and interpretation of different aspects of living organisms including plants and animals of biospheric ecosystem. Thus geographically biogeography is dived into two basic branches-plant biogeography or **phytogeography** and **zoogeography** or animal geography.

The basic spatial unit for biogeographical studies is the biosphere or part thereof. The study of abiotic or physical components of biospheric ecosystem or part thereof is a pre requisite condition for the understanding of different aspects of plants and animals communities. Thus, the study of land and soil (lithosphere), air (atmosphere) and water (hydrosphere) forms the base of the biogeographical studies.

The study of soil system in terms of its flora, fauna and organic matter, mineral matter, soil solution, soil atmosphere, soil structure, soil profiles and soil horizons, soil formation, soil types, soil erosion, soil conservation etc. forms basic subject matter of biogeography.

The consideration of biogeographical processes forms the core of biogeography because these processes account for the analysis, interpretation and exploration of different biogeographical aspects of plants and animal communities.

The systematic study of plants community in terms of their types, biotic succession (primary and secondary succession), serial stages of biotic community, evolution, dispersal and distribution pattern, vegetation formations and ecosystems etc. is the fundamental subject matter of **plant geography or phytogeography.**

The **zoogeography or animal geography** includes the consideration of animal classification, evolution, dispersal, distribution and extinction of animals.

The **marine biogeography** studies the characteristic features of marine bio-zones, classification and characteristic features of marine organisms, marine biological communities of planktons, rektons and benoths, marine rainforest (corals) etc.

The study of various aspects of biodiversity and wildlife conservation forms essential part of biogeography.

Besides, the study of impacts of environmental conditions on different aspects of plants and animals communities and in turn biotic reactions and responses to human activities is also the significant aspect of the scope of biogeography.

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Significance of Biogeography

The study of biogeography has now become more relevant and significant for human society, because various biotic resources form the base of human society. Various biogeographical processes such as speciation and evolution, reproduction of species, dispersal, distribution and extinction of flora and fauna, biogeochemical cycles, hydrological cycles, oxygen-carbon-nitrogen-phosphorous cycles, energy level and circulation in the biospheric ecosystems helps in understanding of floral and faunal wealth, their exploitation and utilization, and conservation of biotic resources. The value and significance of biogeographical studies may be viewed in the following perspectives:

Ecological balance and ecosystem stability

The flora and fauna, including micro-organisms, form the biotic components of biospheric ecosystem. The nature and patterns of interactions and interrelationships between abiotic (land, topography, soil, air, humidity and water) and biotic components determine the state of environment and ecosystem stability and instability. Rich flora and fauna and rich biodiversity are prerequisite conditions for ecological balance and ecosystem stability wherein any change caused by natural factors in the ecosystem is suitably counterbalanced by the inbuilt homeostatic mechanism of the environment (Ecosystem). The study of biogeographical processes helps us in properly understanding the state of our environment and biotic communities.

Nature and wild areas

The proper study of level of human interferences in nature and wild areas enables us to initiate the steps to protect least disturbed areas having both endemic flora and fauna. Such wild areas are protected from human encroachment to keep the habitats and flora and fauna in almost original state and these protected natural areas or wild areas are called ‘biosphere reserves’ or ‘natural reserves’.

Natural resources

Since biogeography studies both abiotic and biotic components (plants and animals), it provides knowledge of nature, quantity, availability and non-availability, economic and social value of varied types of natural resources including mineral resources and ecological resources.

Value and importance of biodiversity

The study of biodiversity is a significant part of biogeographical studies. The value and importance of biodiversity are viewed in terms of benefits, getting directly and indirectly from biological communities comprising plants, animals and micro-organisms. **Direct use value** refers to those ecological products which are directly harvested from plants and animals such as food, seeds, timber, skins, furs etc. **Indirect use value** is assigned to those ecological resources which are not directly exploited and consumed, such as sight seeing, bird watching, bird's singing, animals watching etc. Indirect use of biodiversity also includes ecological services like purification of water by organisms, creation and protection of soils by plants and animals, regulation of weather and climate by forest, function and regulation of hydrological cycle, bio-geochemical cycle, maintenance of ecological balance and ecosystem stability etc. The economic benefits from rich biodiversity are in the form of consumptive use of products and productive use like food, clothing, shelter, vitamins, drugs and medicines, fur, wood and commercial timber, industrial raw materials etc.

The academic significance of biogeography is equally important. Since biogeography studies different methods and approaches of preservation and conservation of both habitats and biotic communities which are threatened and endangered, and are on the edge of extinction, a biogeographer plays significant roles at regional, local and international levels in the plans and projects of wildlife conservation and management.

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