

* Introduction :

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- Biodiversity (derived from 'Biological Diversity') refers to the variety of life forms, commonly expressed as the no. of species or the no. of genetic types in an area
- Biodiversity refers to every living thing and around 1.2 million species have been identified & described so far.

* Biodiversity involves the following concepts:

- 1) Genetic Diversity → describes the total no. of genetic characteristics of a specific species, subspecies, or a group of species.
→ In terms of genetic engineering & our new understanding of DNA, this could mean

(viii) Ques.

the total base-pair sequences in DNA; the total no. of genes, active or not; or the total no. of active genes.

2) Species Diversity → can be defined by 3 qualities:-

→ Species Richness → The total no. of species.

→ Species Evenness → The relative abundance of species.

→ Species Dominance → The most abundant of species.

3) Ecosystem Biodiversity → addresses the combined characteristics of biotic properties (biodiversity) & abiotic properties (geodiversity). It is the variation in ecosystems found in a region.

* Biological Classification of India:

- The division of India according to biogeographic characteristics is the biogeographical classification of India
- India harbours nearly 10% of world's floral diversity comprising over 17500 flowering plants, 6200 endemic species, 7500 medicinal plants & 246 globally threatened species in only 2.4% of world's land area
- There are 10 biogeographic zones in India:
 - (i) Trans-Himalayan Zone (ii) Desert zone
 - (iii) North-East zone (iv) Islands (v) Himalayan Zone

- (vi) Western Ghats zone (vii) Ganga-Brahmaputra Plain zone
- (viii) Deccan Plateau zone (ix) Semi Arid zone
- (x) Coastal zone

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* Value of Biodiversity:

- The value of biodiversity in terms of its commercial utility, ecological services, social & aesthetic values is enormous.
- Biodiversity value can be classified as follows:

1) Consumptive Use Value:

→ These are direct use values where the biodiversity products can be harvested & consumed directly e.g. fuel, food, drugs, fibre etc.

2) Productive Use Values:

→ These are commercially usable values where the product is marketed & sold.

→ It may include a no. of wild gene resources that can be traded for use by scientists for introducing desirable traits in the crops & domesticated animals.

→ Eg:- Elephant Tusk, musk, silk, wool, lac, fur etc.

3) Social Value:

→ These are the values associated with social life, customs, religions & psycho-spiritual aspects of people.

→ Many plants & animals have significant place in our psycho-spiritual arena like Tulsi, Peepal, lotus, bael, cow, snakes, bull, peacock, owl etc.

4) Ethical value:

→ It is also known as existence value. It involves ethical issues like "all life must be preserved."

→ The ethical value means that we may or may not 'use' a species, but we all still strongly feel that the species should exist in the nature. For eg:- Zebra, Giraffe, Kangaroo.

5) Aesthetic Value:

→ People from far & wide spend a lot of time & money to visit wilderness to enjoy the aesthetic value of biodiversity, known as eco-tourism.

→ Eco-tourism is estimated to generate \$ 12 billion of revenue annually that roughly gives the aesthetic value of biodiversity.

6) Option Value:

→ The option value is the value of knowing that there are biological resources existing on this biosphere that may one day prove to be an effective option for something important in the future.

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Biodiversity Levels:

- 1) At global level: About 2.6 million species have been identified till date, while many more species are believed to exist.
 - According to UNEP, the total no. of species are estimated to be between 9-52 million.
 - Invertebrates are known to make-up most of the species with 70% of species being them while plants make up 15% of species. The rest of the species constitute 15%.
 - The major centres of greatest biodiversity tend to be in the tropics. Warmer, wetter & larger areas tend to hold more species compared to their counterparts.
 - Also, areas of varied climate & topography, at lower altitude, & less seasonal areas hold more species comparatively.
 - In a simplified way it can be said that the no. of species are arranged like:- tropics > temperate > polar regions
 - The tropical moist forests are the most species rich areas and hold more than 90% of the world's species while they cover only about 7% of the world's surface.
 - The top 10 countries most biodiverse include:-
Brazil, Indonesia, Colombia, China, Peru, Mexico, Australia, Ecuador, India & The United States.

- 2) At national level: India is uniquely rich in all 3 aspects of biodiversity i.e. genetics, species & ecosystem diversity.

- India encompasses a wide spectrum of habitats ranging from tropical rainforests to alpine vegetation and from temperate rainforests to coastal wetlands.
- The known biodiversity of India contributes 8.22% of the known global biodiversity.
- India is one of the 12 mega-diverse nations of the world accounting for 7.31% of the global faunal & 10.88% of the global floral total species.
- In plant diversity, India is in 10th position in the world & 4th in Asia.
- In Mammalian species in the world, India ranks 10th.
- In endemic species of higher vertebrates, it ranks 11th.
- 7th in terms of agricultural crops & animal husbandry.
- India has 2 major realms called the Palearctic and the Indo Malayan; and 3 biomes, namely the:- tropical humid forests, tropical dry deciduous forests and the warm deserts/semi-deserts.
- India is one of the 12 centres of origin of cultivated plants.
- There are 2 hotspots that extend into India. These are the Western Ghats, Sri Lanka and the Indo-Burman region (covering Eastern Himalayas).
- Furthermore, these hotspots are included among the top eight most important hotspots or hottest hotspots.
- India has 26 recognized endemic centres that are

⑤ home to nearly $\frac{1}{13}$ rd of all angiosperms identified ⑦

→ India has 6 Ramsar Wetlands, 5 world heritage sites

(Kaziranga, Keoladeo Ghana, Nanda Devi, & Sunderban National Park and Manas Wildlife Sanctuary), 12 biosphere reserves, 88 national parks and 490 sanctuaries.

3) Local level: Southern states of India have 3.83 million ha of recorded forest area which is around 20% of its geographical area.

→ Karnataka consists of 3 regions - Coastal zone, western ghats & eastern plains

→ 5 National Parks and 21 Sanctuaries lie in the area.

* Hotspots of Biodiversity in India are:

- (i) The Himalayas.
- (ii) Indo-Burma Region
- (iii) The Western Ghats
- (iv) Sundaland.

* Threats to Biodiversity:

• Biodiversity is the paramount factor for the survival of the living world in general & mankind in particular. The fewer species we have, the fewer will be people. Following are the major causes of threat to biodiversity:

- 1) Habitat Loss → Rapid industrialization, urbanization & growth in population have resulted in massive deforestation

and consequential habitat loss around the world.

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- For instance, mangroves have been cleared for fuel-wood & prawn farming which has led to a decrease in the habitat essential for breeding of marine fish.
- Scientists have estimated that human activities are likely to eliminate approximately 10 million species by 2050.

2) Poaching of Wildlife → for trade & commercial activities has been on the rise for the last many decades.

→ It has been a significant cause of the extinction of hundreds of species & the endangerment of many more, such as whales & many African large mammals, Asian tigers etc.

→ Illicit trade in wildlife is driving many species of plants & animals to extinction. Elephants are poached for ivory, tigers & leopards for their skin, pangolins for meat & scales and rose timber for hardwood furniture.

3) Man-Wildlife Conflict → Man-Wildlife Conflict is any interaction between humans & wildlife that results in a negative impact on human social, economical or cultural life, on the conservation of wildlife population, or on the environment.

• There are many consequences of man vs wildlife conflicts:-

- Destruction of wildlife habitat
- Injury & loss of life
- Crop damage & livestock depredation.
- Damage to human property.
- Trophic cascades.
- Decrease in geographic ranges & wildlife population

* Endangered & Endemic Species of India:

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1) Endangered → The endangered species in the country are categorized as vulnerable, rare, indeterminate & threatened.

• Among the important endangered animals & birds are the tiger, elephant, rhino, siberian crane, great Indian bustard, the florican and several birds of prey.

• Vultures, which were common a decade ago, have suddenly disappeared & are now highly threatened.

• Many plant species are now increasingly threatened due to changes in their habitat induced by human activity.

• Many plants are threatened due to overharvesting as ingredients in medicinal products.

2) Endemic → Species restricted to a particular region are ~~ka~~ endemic species. In India, these include the Indian wild ass, the Hangul or Kashmir Stag, the golden langur, the pygmy hog & a host of others.

* Conservation of Biodiversity :

X In-situ conservation :

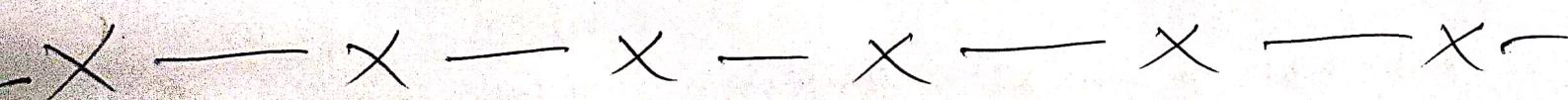
• In-situ or on-site conservation refers to the conservation of species within their natural habitat.

- This is the most viable way of biodiversity conservation. It is the conservation of genetic resources through their maintenance within the environment in which they occur.

Examples:- National Parks, Wildlife Sanctuaries, Biosphere reserves, gene sanctuaries.

~~X~~ Ex-situ Conservation:

- Ex-situ conservation means the conservation of components of biological diversity outside their natural habitats.
- In this method, threatened or endangered species of animals and plants are taken out of their natural habitat & placed in special settings where they can be protected & provided with natural growth.
- In Ex-situ conservation methods, the plants & animals taken away from their habitat are taken care of in an artificially created environment.
- Examples - Captive breeding, gene banks, seed banks, zoos, botanical gardens, aquaria, In vitro fertilization, cryopreservation, tissue culture.



Acid Rain :-

Acid rain is made up of highly acidic water droplets due to air pressure, most specifically the disproportionate levels of sulphur and nitrogen emitted by vehicles and manufacturing processes. It is often called Acid Rain as this concept contains many types of acidic precipitation.

Cause of Acid Rain: The causes of acid rain are Sulphur and Nitrogen particles which get mixed with the wet compounds of rain. Sulphur and Nitrogen particles which gets mixed with water are found in two ways either man-made i.e. as the emissions that are given out from industries or by natural causes like lightning strike in the atmosphere.

Effects:

- (i) Acid Rain is very harmful to agriculture, plants and animals. It washes away all the nutrients which are required for the growth and survival of plants.
- (ii) It causes respiratory issues in animals and humans.
- (iii) Acid Rain causes the corrosion of pipes, which further results in leaching of heavy metals such as iron.
- (iv) It damages the buildings and monuments made up of stones and metals.
- (v) It affects the aquatic ecosystem.

Ozone Layer Depletion :-

Ozone Layer is a specified region on earth's stratosphere that acts as a shield against the incoming UV rays of the sun. The Ozone Layer absorbs 97-99% of the medium-frequency UV light emitted by sun.

Depletion : The Ozone Layer is depleted by chlorofluorocarbons (CFC's). It was discovered in 1970s. They were used as refrigerants, aerosol spray, etc.

CFCs are light and can move up in the air and reach the stratosphere. Here the CFCs react with the ozone layer in the presence of UV radiation and cause it to break down into oxygen molecules. The result is the depletion of the Ozone Layer.

Effects of Depletion :-

- (i) If the ozone layer gets depleted, more UV rays enter the atmosphere. Where these UV rays comes in contact with the human skin, it can cause malignant skin cancers.
- (ii) High UV rays have shown that there has been epidermal damage in whales due to the thinning of the ozone layer. More sun damage has been noticed in many aquatic animals due to ozone layer depletion.
- (iii) Increased UV rays can affect that ~~that~~ it can affect plant life by damaging them under extreme exposure of UV rays. Plant growth will be affected as well. It affects the total vegetation of an area, reducing the life span of many plants. Damage in stomata causes a threat to the survival of plants.

Environmental Acts :-

Indian Forest Act, 1927

This act was first enacted in 1865. The India forest Act was amended in 1878 and once again it was amended in 1927. The India forest Act, 1927 did not focus on the conservation of forests, rather the laws of the British Colonial Government focused on control of extraction of timber from the forests. This is useful for the environment. The British were worried about the use of forests in India by the local people. All the reasons led to implementation of forest laws by the Colonial British Government.

• Wildlife Protection Act, 1972

Indian parliament enacted this Act in 1972, which provides for the safeguard and protection of the ~~wildlife~~ wildlife in the country. This act lays down restrictions on hunting many animal species.

The Act was amended in 2006. An amendment bill was introduced in the Rajya Sabha in 2013 and referred to a Standing Committee, but it was withdrawn in 2015.

• Noise Pollution Act

The average level of noise pollution in respect of seven metro cities of the country during last three years, is provided. The analysis of data indicates ~~a~~ fluctuating trend in the noise levels. During day time many cities has high noise in comparison to night. Even ~~the~~ crackers are banned on Diwali because they really create a noise and air pollution on high amount.

Role of IT in Environment :-

Information Technology has tremendous potential in the field of environment education and health as in any other field like business, economics, politics or culture. Development of internet facilities, Geographic Information System (GIS) and information through satellites has generated a wealth of up-to-date.

Database on Environment System :-

- (i) National Management Information System (NMIS) has compiled a database on Research and Development projects along with information about research scientists and personnel involved.
- (ii) Environmental Information System (ENVIS), GOI has created an information system called ENVIS, with its headquarters in Delhi, it functions ~~and development~~ in 25 different centres all over the country.
- (c) Geographical Information System (GIS) has proved to be a very effective tool in environmental management. GIS is a technique of superimposing various thematic maps using digital data on a large number of inter-related or inter-dependent aspects.
- (d) World Wide Web (www), with resources on every aspect, class-room activities, and digital files of photos, power-point lecture presentations, animations and quiz has proved to be extremely useful both for the students and the teachers of environmental studies.

Global Warming

* What is global warming?

Since the Industrial Revolution, the global annual temperature has increased in total by a little more than 1 degree Celsius, or about 2 degrees Fahrenheit.

Between 1880 — the year that accurate record keeping began and — 1980, it rose an average by 0.07 degree Celsius (0.13°F) every year.

Since 1981, however the rate of increase has more than doubled. For the last 40 years we've seen the global annual temperature rise by 0.18°C , or 0.32°F , per decade.

"Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs and other pollutants."

There are several causes of global warming, which have a negative effect on humans, plants and animals. These causes may be natural or might be the outcome of human activities. In order to curb the issues, it is very important to understand the negative impacts of global warming. The concept of global warming is quite controversial but the scientists have provided relevant data in support of the fact that the temperature of the earth is rising constantly.

Causes of Global Warming

following are the major causes of global warming

Man-made Causes of Global Warming

Deforestation

Plants are the main source of oxygen. They take in carbon dioxide and release oxygen thereby maintaining environmental balance. Forests are being depleted for many domestic and commercial purposes. This has lead to an environmental imbalance, thereby giving rise to global warming.

Use of Vehicles

The use of vehicles, even for a very short distance results in various gaseous emissions. Vehicles burn fossil fuels which emit a large amount of carbon dioxide and other toxins into the atmosphere resulting in a temperature increase.

Chlorofluorocarbon

With the excessive use of air conditioners and refrigerators, humans have been adding CFC's into the environment which affects the atmospheric ozone layer. The CFC's has led to Ozone layer depletion making way for the ultraviolet rays thereby increasing the temperature of the Earth.

Industrial Development

With the advent of industrialization, the temperature of the earth has been increasing rapidly. The harmful emissions from the factories add to

the increasing temperature of the earth
In 2013 the intergovernment Panel for Climate change reported that the increase in the global temperature between 1880 and 2012 has been 0.9°C . The increase is 1.1°C when compared to the pre-industrial mean temperature

Agriculture

Various farming activities produce carbon dioxide and methane gas. These add to the greenhouse gases in the atmosphere and increase the temperature of the earth.

Overpopulation

An increase in population means more people breathing. This leads to an increase in the level of carbon dioxide, the primary gas causing global warming in the atmosphere.

Natural Causes of Global Warming

Volcanoes

Volcanoes are one of the largest natural contributors to global warming. The ash and smoke emitted during volcanic eruptions goes out into the atmospheric and affects the climate.

Water Vapour

Water Vapour is a kind of greenhouse gas. Due to the increase in the earth's temperature more water gets evaporated from the water bodies

and stays in the atmosphere adding to global warming.

Melting Permafrost

Permafrost is frozen soil that has environmental gasses trapped in it for several years and is present below Earth's surface. It is present in glaciers. As the permafrost melts it releases the gasses back into the atmosphere, increasing Earth's temperature.

Forest Blazes

Forest blazes or forest fires emit a large amount of carbon-containing smoke. These gasses are released into the atmosphere and increase the earth's temperature resulting in global warming.

Effects of global Warming :-

⇒ Rise in Temperature

Global warming has led to an incredible increase in earth's temperature. Since 1880, the earth's temperature has increased by ~1 degrees. This has resulted in an increase in the melting of glaciers which have led to an increase in the sea level. This could have devastating effects on coastal regions.

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Threats to the Ecosystem

Global warming has affected the coral Reefs that can lead to the loss of plant and animal lives. Increase in global temperatures has made the fragility of coral reefs even worse.

⇒

Climate Change

Global warming has led to a change in climatic conditions. There are droughts at some places and flood at some. This climatic imbalance is the result of global warming.

⇒

Spread of Diseases

Global warming leads to a change in the patterns of heat and humidity. This has led to the movement of mosquitoes that carry and spread diseases.

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Ecosystem Structure and Function

- ⇒ The ecosystem is the structural and function unit of ecology where the living organisms interact with each other and the surrounding environment.
- ⇒ In other words, an ecosystem is a chain of interaction between organisms and their environment. The term "Ecosystem" was first coined by A. G. Tansley, an English botanist, in 1935.

Types of Ecosystem

- ⇒ An ecosystem can be as small as an oasis in a desert, or as big as an ocean, spanning thousands of miles. There are two types of ecosystem:
 - Terrestrial Ecosystem
 - Aquatic Ecosystem

Terrestrial Ecosystem

- ⇒ Terrestrial Ecosystem are exclusively land-based ecosystems. There are different types of terrestrial ecosystem distributed around various geological zones. They are as follows:
 - 1- Forest Ecosystem
 - 2- Grassland Ecosystem
 - 3- Tundra Ecosystem
 - 4- Desert Ecosystem.

Forest Ecosystem

- ⇒ A forest ecosystem consists of several plants, animals and microorganisms that live in coordination with the abiotic factors of the environment.
- ⇒ Forests help in maintaining the temperature of the earth and are the major carbon sink.

gives
is freshwater
gives, etc.

Grassland Ecosystem

- ⇒ In a grassland ecosystem, the vegetation is dominated by grasses and herbs.
- ⇒ Temperate grasslands, savanna grasslands are some of the example of grassland ecosystems.

Tundra Ecosystem

- ⇒ Tundra ecosystem are devoid of trees and are found in cold climates or where rainfall is scarce.
- ⇒ These are covered with snow for most of the years. The ecosystem in the Arctic or mountain tops is tundra type.

Desert Ecosystem

- ⇒ Deserts are found throughout the world. There are regions with very little rainfall. The days are hot and the nights are cold.

Aquatic Ecosystem

- ⇒ Aquatic ecosystems are ecosystem present in a body of water. These can be further divided into two types, namely:

1. Freshwater Ecosystem
2. Marine Ecosystem.

Freshwater Ecosystem

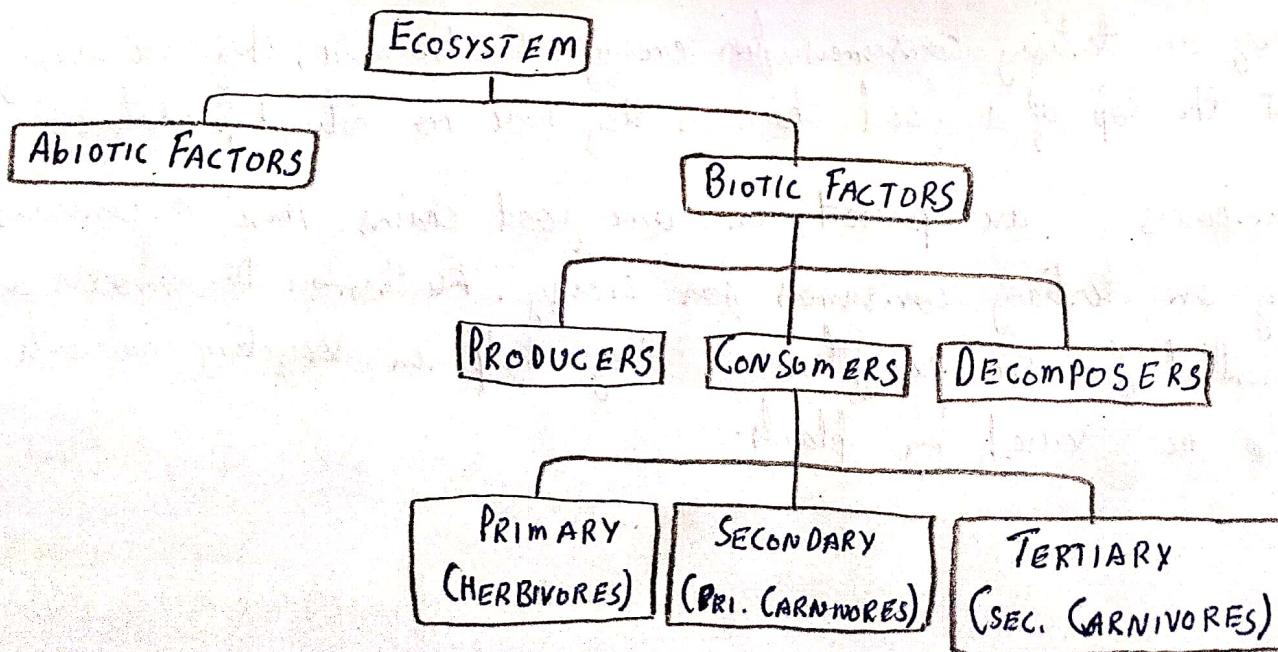
=> The freshwater ecosystem is an aquatic ecosystem that includes lakes, rivers, streams and wetlands. These have no salt content in contrast with the marine ecosystem.

Marine Ecosystem

=> The marine ecosystem includes seas and oceans. These have a more substantial salt content and greater biodiversity in comparison to the freshwater ecosystem.

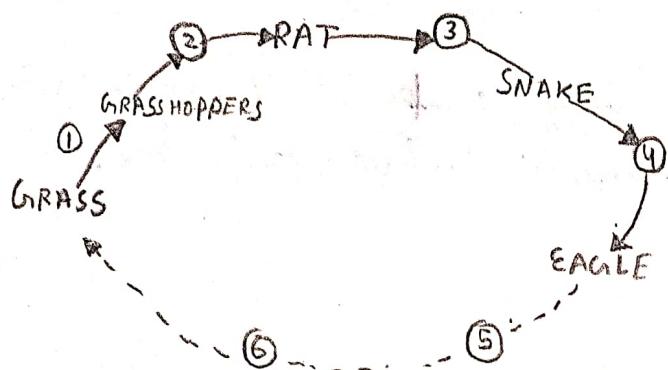
Structure of the Ecosystem

- => The structure of an ecosystem is characterised by the organisation of both biotic and abiotic components.
- => This includes the distribution of energy in our environment. It also includes the climatic conditions prevailing in that particular environment.
- => The structure of an ecosystem can be split into three main components, namely:
 - Biotic Components
 - Abiotic Components
- => The biotic and abiotic components are interrelated in an ecosystem. It is an open system where the energy and components can flow throughout the boundaries.



Biotic Components

- => Biotic components refer to all life in an ecosystem. Based on nutrition, biotic components can be categorised into autotrophs, heterotrophs and saprotrophs (or decomposers).
- Producers include all autotrophs such as plants. They are called autotrophs as they can produce food through the process of photosynthesis. Consequently, all other organisms higher up on the food chain rely on producers for food.
 - Consumers or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers.
 - Primary consumers are always herbivores that rely on producers for food.
 - Secondary depend on primary consumers for energy. They can either be a carnivore or an omnivore.
 - Tertiary are organisms that depends on secondary consumers for food. Tertiary consumers can also be an omnivore.
 - Quaternary are present in some food chain. These organisms prey on tertiary consumers for energy. Furthermore, they are usually at the top of a food chain as they have no natural predators.
 - Decomposers are present in some food chains. These organisms prey on tertiary consumers for energy. Furthermore, decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants.



- ① The grasshoppers eat the plants
- ② The mice eat the grasshoppers
- ③ The snake eat the mice
- ④ The eagles eat the snake
- ⑤ When the hawks die, fungi breaks the bodies down and turns into nutrients
- ⑥ The nutrients along with sun and water cause the grass to grow.

- The food chain is an ideal representation of flow of energy in the ecosystem.
 - In food chain, the plants or producers are consumed by only the primary consumers, primary consumers are fed by only the secondary consumers and so on.
 - The producers that are capable to produce their own food are called autotrophs.
 - Any food chain consists of three main trophic levels, viz., producers, consumers and decomposers.
 - The energy efficiency of each trophic level is very low, Hence, shorter, the food chain greater will be the accessibility of food.
- => The typical food chain in a ground ecosystem proceeds as grass → mouse → Snake → hawk.
- => Food webs are more complex and are interrelated at different trophic level.

Abiotic Components

⇒ Abiotic components are the non-living component of an ecosystem. It includes air, water, soil, minerals, sunlight, temperature, wind, altitude, turbidity, etc.

Organic
water
Hawks
other

Function of Ecosystem

- It regulates the essential ecological processes, supports life system and renders stability.
- It is also responsible for the cycling of nutrients between biotic and abiotic components.
- It maintains a balance among the various trophic levels in the ecosystem.
- It cycles the minerals through the biosphere.
- The abiotic components help in the synthesis of organic compounds that involves the exchange of energy.

Food Chain

- The sun is the ultimate source of energy on earth required for all plant life. The plants utilize this energy for the process of photosynthesis, which is used to synthesize their food.
- During this biological process, light energy is converted into chemical energy and is passed on through successive levels. The flow from a producer, to a consumer and eventually, to an apex predator or a detritivore is called the food chain.
- Dead and decaying matter, along with organic debris, is broken down into its constituents by scavengers.

- Organisms have more than one choice for food and hence can survive better.
- Hawks don't restrict their food to snakes, snakes eat animals, other mice, and mice eat grass as well as grasshoppers and so on.
- A more realistic illustration of feeding habits in an ecosystem is called a food web.

Food web

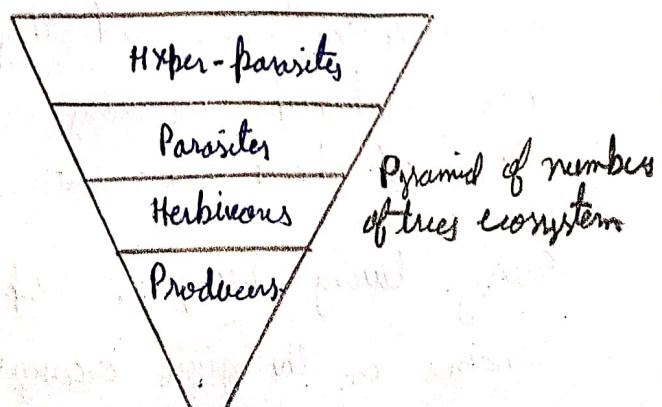
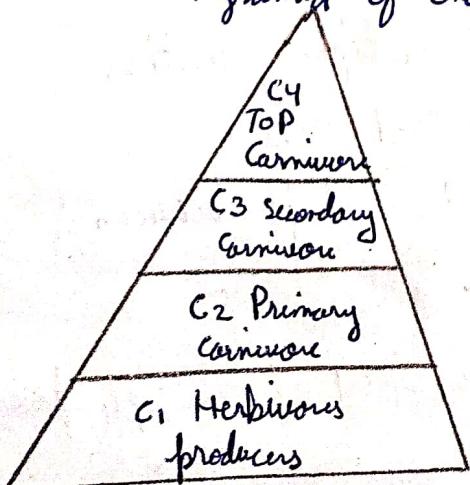
- Charles Elton presented the food web concept in year 1927, which he termed as food cycle.
- Charles Elton described the concept of food web as:
- The carnivore animals prey on the herbivores.
- These herbivores obtain the energy from sunlight.
- The later carnivores may also be preyed upon by other carnivores.
- Until a reach where all animals that are related together by food, and all are dependent on plants in the long run.
- This is termed as a food chain and all the food chains in a community is known as the food web.
- A food web is a graphical depiction of feeding connections among species of an ecological community.
- Food web is a graphical inclusion of food chains of a particular ecosystem.
- All the food chain are interconnected and overlapping within an ecosystem and they constitute a food web.
- These relationships are very complex, the relationships between the food chains are interrelated.
- Every living being is responsible and is a part of multiple food chains in the given ecosystem.

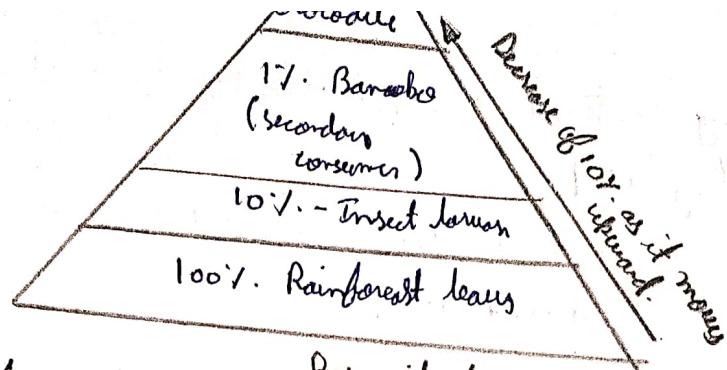
\Rightarrow Ecological pyramids

- The trophic levels of different organisms based on their ecological position as producer to final consumer is represented by ecological pyramid.
- The food producer is present at the base of the pyramid and on the top.
- Other consumer trophic levels are present in between.
- The pyramid includes a number of horizontal bars presenting specific trophic levels.
- The length of each bar stands for the total number of individuals bars presenting specific trophic levels.
- An ecological pyramid is a graphical representation outlined to show the biomass or bio productivity at each trophic level in a given ecosystem.
- There are trophic pyramid, energy pyramid, or sometimes food pyramid.
- The productivity pyramids shows the production or turnover in biomass.

Types of pyramids:

- The ecological pyramids are of three categories:
 - 1- Pyramid of numbers.
 - 2- Pyramid of biomass
 - 3- Pyramid of energy or productivity.





Pyramid of numbers:

Pyramid of energy

- Pyramid of numbers represents the population of trophic level as the total number of individuals of different species present at each trophic level.
 - Pyramid of numbers may be upright and or completely inverted depending upon count of individual present and so.
 - The pyramid of number does not completely define the trophic structure for an ecosystem as it is very tough to count all the organisms present there.
- ⇒ Pyramid of number - upright : grassland ecosystem.
- In this pyramid, the number of individuals is decreased from lower level to higher trophic level.
- ⇒ Pyramid of numbers - inverted : tree ecosystem.
- In this type of pyramid, the number of individual is increased from lower level to higher trophic level. Eg. tree ecosystem.

Pyramid of biomass

- Pyramid of biomass represents the total dry weight of organisms.
- It is usually determined by collecting all organisms involving each trophic level separately and measuring their dry weight.
- This will serve to solve the size difference problem because all kinds of organisms at a trophic level are weighed.

- Certain mass of living material of each trophic level at a particular time called as standing crop.
- The standing crop is measured as the mass of living organisms (biomass) or the number in a unit area.
- pyramid of biomass: upright.
- It is because the producers are small phytoplankton that grow and reproduce very rapidly.
- The top, high trophic level consists very less amount of biomass.

Pyramid of energy

- The pyramid of energy represents the flow of energy from lower trophic level to higher trophic level.
- During the flow of energy from one organism to other, there is remarkable loss of energy.
- This loss of energy is in the form of heat.
- Thus, least energy is available in the tertiary consumers.
- Thus, shorter food chain has more amount of energy available even at the highest trophic level.
- An energy pyramid is regarded most suitable to compare the functional roles of the trophic level in an ecosystem.
- Now, suppose an animal eats the plants containing 100 calorie of food energy, the animal uses some of it for its own metabolism and stores only 10 calorie as food energy.
- A lion that eats that animal gets an even smaller amount of energy.