UNIT 3 : ECOSYSTEM

UNIT STRUCTURE

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3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to :

- describe an ecosystem, its types and structure,
- get an idea about the productivity of the ecosystem, its elements and its trophic structure,
- acquire knowledge about food chain and food web, and how it is helpful to us,
- discuss energy flow in an ecosystem
- get a comprihensive idea about the ecological pyramid and its different types,
- discuss the important ecosystems.

3.2 INTRODUCTION

The word ‘ecology’ was used by the German scientist Ernest Hekel in 1869. The term means the study of the environment. The term ‘ecology’ has come from the Greek word ‘Oikos’, Oikos meaning ‘house’, and ‘logos’

meaning 'study of'. In other words, ecology is the study of the relationship among living beings and their relation with the environment. The group formed by the reproduction of a particular species within a specific geographical area is called a population. The population of different species together is called a biotic community. There exists inter-specific and intra-specific relations and dependence within a biotic community. It is not possible for a population or community to live in isolation. The environment in which the biotic community lives provides it with all the necessary ingredients and energy for its survival. This results in an inseparable relationship between the living beings and the environment.

In this unit, you will learn about the ecosystem, food chain, food web, energy flow, ecological pyramid etc. You will also learn about some important ecosystems.

3.3 ECOSYSTEM

The term 'ecosystem' (Greek: Eco-environment, system: action: reaction or interaction and inter dependence) was first used by A.G. Tansley in 1935. Russian ecologist Sukachev defined it as *Biogeo coerosis* in 1944. The intermingling of the organic and inorganic elements in the environment is called the ecosystem. The chemical cycle through which energy flows to the bio-diversity, food chain and material cycle etc. help create action and reaction within the intermixture. This is called ecological system. According to Odum (1963), ecosystem is the main active unit of ecology.

- **Types of Ecosystem:** There are different types of ecosystems in our environment. These are:
  - *Natural and Permanent Ecosystem:* This ecosystem becomes effective in a natural environment without human interference. This system is of two types –
    - Terrestrial Ecosystem: This system is effective on land, e.g. grassland ecosystem, desert ecosystem and forest ecosystem.
    - Aquatic Ecosystem: This system is effective in water. It is of two types:

(i) Freshwater Ecosystem : This works in streams, ponds and lakes.

(ii) Marine Ecosystem : This works in seas, oceans and bays.

- *Temporary and Natural Ecosystem:* This system is effective in a natural environment, but it is temporary and dependant on rainfall.
- *Artificial or Manmade Ecosystem:* These are created by man, e.g. croplands, space ecosystem, fisheries etc. The aquarium in the drawing room is also one type of artificial ecosystem.

- **Structure of Ecosystem:** The main factors of the ecosystem are the biotic and abiotic elements.
  - *Biotic Factors:* All living beings within an ecosystem are included in the biotic factors. These biotic factors are of two types depending on the mode of nutrition.
    - Autotrophic Factors
    - Heterotrophic Factors
  - AutotrophicFactors: These include green plants, photosynthetic bacteria and cyanobacteria. These organisms can produce their own food through the use of abiotic elements like CO_2 and H_2O during photosynthesis. So, these factors can be called producers. The autotrophic factors include grass, shrubs, trees and microscopic phytoplankton.

$$6CO_2+6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Radiated energy}} C_6H_{12}O_6$$

  - Heterotrophic Factors: The living beings included in these factors cannot produce their own food, and consume only pre-produced biotic food or else break down complex biotic compounds. Therefore, these factors are called consumers. Depending on their shape, the heterotrophic beings are divided into two types. They are –

(a) Macro Consumers: Those animals which consume the producers either directly and indirectly are called macro consumers. These animals can be divided into four types—

(i) Primary Consumers: Animals like cows, buffaloes, goats, deer, rabbits, horses etc. which directly consume plants are called primary consumers. These animals are also called herbivores.

(ii) Secondary Consumers: Animals like fox, wild cats, snakes, carnivorous fish, frogs, toads, centipedes etc. live by feeding on herbivorous animals.

(iii) Tertiary Consumers: Those animals which feed on secondary consumers for survival are called tertiary consumers. e.g. wolves.

(iv) Quarternary Consumers: Lions, tigers etc live by feeding on tertiary consumers. These are called quarternary consumers.

(b) Micro Consumers: There are certain living organisms in the environment which decompose dead plants and biotic compounds. They feed upon some of these matters and return the abiotic compounds to the environment. These organisms are called decomposers or detritivores e.g. bacteria, fungus. These organisms help in recycling matter.

- *Abiotic Factors:* Physico-Chemical factors are included in this category. These can be divided into three types –
  - Abiotic Matter: This includes carbon, nitrogen, carbon-dioxide, water etc. These are intimately related with the material cycle.
  - Biotic Compounds: Include carbohydrates, protein, lipids, nuclei acids etc. These are found in dead biotic matter.
  - Edaphic Factors: Climate, light, air, temperature etc. which are related to land are called edaphic factors.

- **Examples of Ecosystem (Fresh Water Ponds):** Fresh water ponds are a good example of ecosystem. Pond represents a fresh water ecosystem. The study of a pond gives a comprehensive idea of the structures and function of an ecosystem.
  - *Abiotic Elements :* Water, carbon dioxide, oxygen and its compounds, amino acids, humus etc are the abiotic matters of the pond

ecosystem. Adequate light, temperature and climatic conditions control the efficiency of the pond ecosystem.

- *Biotic Elements:* Producers and different consumers are the biotic factors. The biotic matters found in ponds are—
  - Autotrophic Consumers: Spirogyra, oscillator arabina, flagmitos, potamgaton velisner and ecocrinia are examples of autotrophic consumers.
  - Macro Consumers: Paramecium, daphnia cyclops etc are zooplanktons, worms etc are primary consumers. Small fishes living in water and insects like dung beetles live by feeding on primary consumers. These together are called secondary consumers. Comparatively, big fishes consume these small organisms. These living things which live by consuming secondary consumers are called tertiary consumers.
  - Decomposers or Micro Consumers: The numerous bacteria and fungi which are found in muddy water are called micro consumers. The main function of the micro consumers is to decompose dead animals, plants and animal refuse and then to return the abiotic compound to the pond ecosystem. Therefore, they are called decomposers.
- *Trophic Structure:* The living organisms which derive energy from the same source are said to belong to the same trophic structure. The green plants which use the sun's energy to produce food – e.g. planktons, herbs, shrubs or trees etc- are said to belong to the first trophic structure (T1). Herbivorous plants or primary consumers which depend upon the autotrophic producers for survival belong to the second (T2) trophic structure. Secondary consumers belong to the third (T3) trophic structure and the tertiary consumers belong to the fourth (T4) trophic structure. Quarternary consumers live in the T5 level, and the decomposers belong to the final or residual level in the structure. There can only be a few trophic structures in an ecosystem. This is because –

- In moving from one place to another, there is a dificiency in the food energy.
- The food is not used wholly
- A huge amount of energy is used in breathing.



CHECK YOUR PROGRESS

Q 1. What do you mean by ecosystem?

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Q 2. What are the biotic and abiotic factors?

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3.4 FOOD CHAIN

In a trophic structure, the process of eating and being eaten among the living beings helps the food energy to flow in an orderly manner. This is called the food chain. The characteristics of food chain are as follows :

- Food is consumed frequently. The big animals consume the small animals for food.
- The solar energy flows from the sun to the producers and from the producers to the consumers in one direction.
- Each time energy is transformed, 80-90% of the static energy is radiated as heat energy.
- There can be four to five trophic levels in one food chain. It may be mentioned that 6 food chains can supply enormous energy.
- Food chain is always unidirectional
- The omnivores dominate more than one trophic structure in one food chain.

Food chains are of two types– Grazing Food Chain and Detritus Food Chain.

- **Grazing Food Chain:** As a primary source of energy the grazing food chain produces food through photosynthesis using the sun's rays, and

thereby it creates the first trophic structure of the food chain. The primary consumers (herbivores) depend upon producer for survival and form the second level. On the other hand, the carnivores prey upon the herbivores. They are of many types. These food chains are long and they end in the decomposition level.

Figure 3.1 : Ideal Structure of Ecosystem

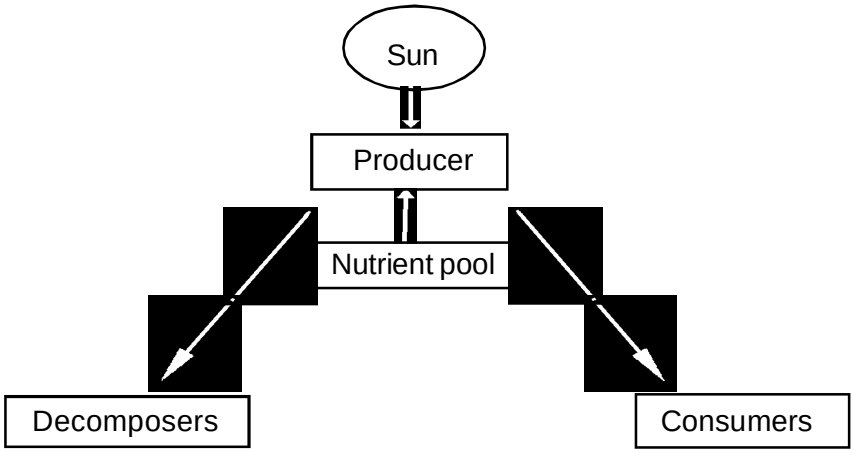


Table 3.1 : Food Chain

Types of Ecosystem	Producer	Herbivorous/ Carnivorous	Primary Carnivorous	Secondary Carnivorous	Tertiary Carnivorous
Grassland Ecosystem	Grass	Insect	Forg	Snake	Predatory Birds
	Grass	Rat/Mice	Sanke	Predatory Birds	
	Grass	Rabbit	Fox	Hyena	Lion
Pond Ecosystem	Phyto Plankton	Animal Plankton	Small Fish	Big Fish	Predatory Birds

- **Detritus Food Chain:** The dead mater is the primary source of energy of the detritus food chain. The fallen leaves and dead animals are the main sources of the dead biotic matter. Protozoa or unicellular organisms, bacteria, fungi etc are the primary consumers of decomposed matter. The insects and their larvae survive on decomposed matter. The detritus food chain is shorter than the grazing food chain.

Table 3. 2 : Grassland Food Chain

Types of Detritus	Detrivores	Detrivore Consumers	Small Carnivorous	Big Carnivorous
Mangrove Fallen Leaf Dead Bodies	Fungi Bacteria Protozoa	Insect Larva Certain Crustacean Mollascs & Fishes	Fish Fry and Small Fish	Big size Fish and Fish Eating Birds

3.5 FOOD WEB

The food relationship among the different living beings in the biotic community is called the *food web*. There is a web-like connection among the different trophic levels in different food chains. This is called the food web or food cycle.

No plant or animal in an ecosystem can be free of the food chain. The inter-relationship among the three types of food chain, e.g. *predatory food chain, parasitic food chain* and *necrophagous food chain*, - forms the food web. Some of the characteristics of food web are –

- Food web gives direction to an alterative means. Even though a crop may be destroyed due to disease related causes, the animals which survive on them are not affected, because of the availability of alternative sources of food. An ecosystem remains stable if alternative sources of food are available.
- The probability of alternative sources in the food web obstructs the increase in the population of the highly productive species.
- The food web especially contributes to the development of the ecosystem. e.g. Terrestrial food web.

In a grassland ecosystem, the five probable food chains mutually connect, and create a food web.

1) grass – grasshopper – predatory bird.
2) grass – grasshopper, lizard – predatory bird
3) grass – rabbit – predatory bird
4) grass – mouse/rat – predatory bird

5) grass – mouse / rat / snake – predatory bird



CHECK YOUR PROGRESS

Q 3. What is Food chain? What are its types?

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Q 4. What do you mean by Food web or Food cycle?

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3.6 ENERGY FLOW

The main function of the ecosystem is energy flow. The energy flow is governed by two main laws of thermo-dynamics. The *first law* is that – energy can neither be produced nor be destroyed; it can only be transformed from one state to another. The *second law* affirms that some amount of energy is lost in transformation.

Leaves contain chlorophyll and therefore they are green in colour. Because of the presence of chlorophyll, the plants can produce their own food using the sun's rays during photosynthesis. The biotic community that sustains itself through photosynthesis is called the primary producers of the ecosystem. The avarage percentage of radiated energy is 1-5%. The plants utilize a part of this energy during breathing.

The main features of energy flow are –

- The energy from the sun to the producers, and from the producers to the different consumers in the food chain always flows in one direction. During energy transformation, 80-90% energy utilized in metabolic activities like respiration, excretion etc is lost as heat energy. This means that in the next trophic level, only 10-20% energy is realized.
- In thermodynamics, energy flow follows both the laws mentioned above. For example–
  - Lindaman (1942) through a fresh water ecosystem (a lake) has

explained the model of unidirectional energy flow through a diagram, and has shown that autotrophic organisms utilize only 0.1% of the solar radiation during photosynthesis. Of the total production, 21% is used in metabolic activities, 63% in an unused state, 3% in decomposition and 13% is kept for herbivores. In case of herbivores, 30% is used in metabolic activities, 57% is left unused and 3% is used in decomposition. This means that 20% of autotrophic energy is used in secondary production. The process of energy transformation from herbivores to primary carnivores happens again and again.

- E.P. Odum (1963) has shown through a model of the energy flow in the three trophic levels that – 50% of the light energy which falls on green plants is extracted by autotrophic organisms, and only 1% is transformed to the biotic community.

  On the basis of this discussion, depending upon the energy flow, the characteristics of an ecosystem can be defined as follows :

  - Energy flows in a unidirectional manner
  - The usable energy is reduced gradually
  - The radiated energy from the sun is changed into the non-living state as heat energy.



CHECK YOUR PROGRESS

Q 5. How is the energy flow directed?

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3.7 ECOLOGICAL PYRAMID

The graphical representation of the population or biotic community in an ecosystem, the reserved energy in the different trophic levels in a food chain is called the ecological pyramid. The concept of ecological

pyramid was first suggested by the English scientist Charles Elton in 1927. Therefore, it is also known as Eltonian Pyramid. The lower, middle and upper levels of the pyramid denote the population of the producers, herbivores and carnivores respectively. The ecological pyramid can be vertical towards the top or the opposite, or it can be in the shape of a weaver's reel.

Depending upon the ecological parameter, ecological pyramid is divided into three types.

- **Pyramid of Numbers:** In this pyramid, a graphical representation of the size of the biotic population in different trophic levels is given. Grassland ecosystem and pond ecosystem are very good examples of pyramid of numbers. In the predatory food chain, even though the organisms in the trophic structure increase in size gradually, they, however, decrease in numbers. In the pond ecosystem, the phytoplankton leads to big fishes, and in the grassland ecosystem, grass leads to predatory birds. The producers are small in size, but large in numbers. On the other hand, the higher level carnivores are bigger in size but smaller in numbers.
- **Pyramid of Biomass:** The dry weight of biotic matter in an ecosystem is called biomass. The graphical representation of the biomass in per unit structure of the trophic level is called pyramid of biomass. The pyramid of biomass of the terrestrial ecosystem is always vertical. The biotic population is the largest at the producer level, and it decreases gradually towards the upper reaches of the trophic structure. In an aquatic ecosystem (pond ecosystem), the pyramid of biomass is upside down, or the apex is at the bottom. The organisms in this trophic structure depend upon the reproductive capacity and age of the community because the number of zooplanktons is more than thet of the phytoplankton, but less than the secondary consumers.

Figure 3.2 : Pyramid of Biomass (Pond Ecosystem)

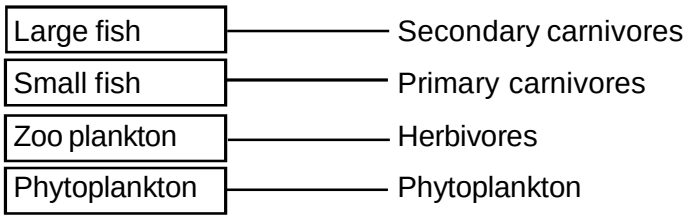


Figure 3.3: Pyramid of Biomass (Terrestrial Ecosystem)

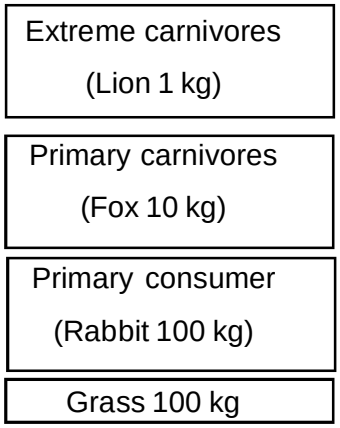
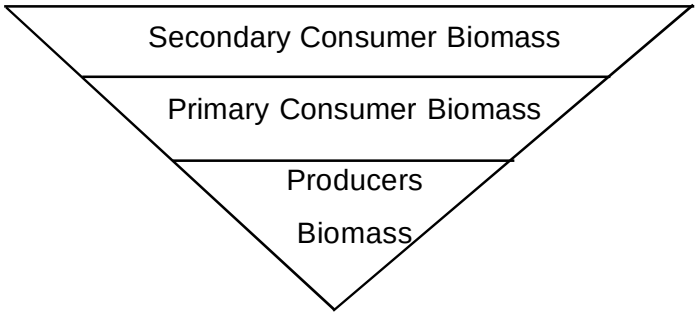
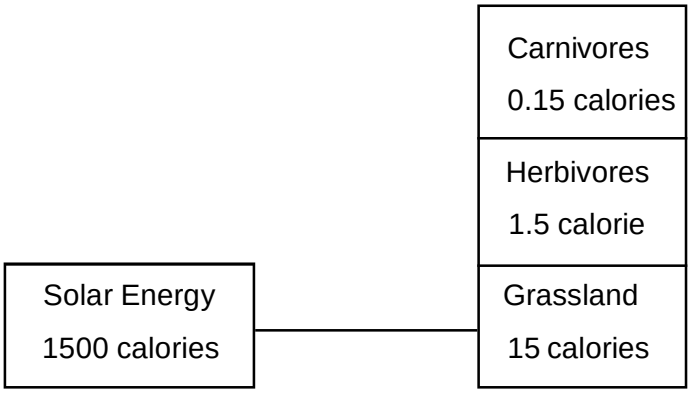


Figure 3.4: Inverted Pyramid of Biomass (Pond Ecosystem)



- **Pyramid of Energy:** The graphical representation of the amount of energy per unit area and per unit time in a trophic structure is called pyramid of energy. According to the second law of thermodynamics, each time energy moves from the lower trophic levels to the higher levels, 80-90% of the energy is made available for the autotrophic. The herbivores and carnivores get 10% and 20% energy respectively for metabolic activities. In each trophic structure, 10% chemical energy is saved. Lindaman first proposed this chemical reaction in 1942, Pyramid of energy is always straight and vertical.

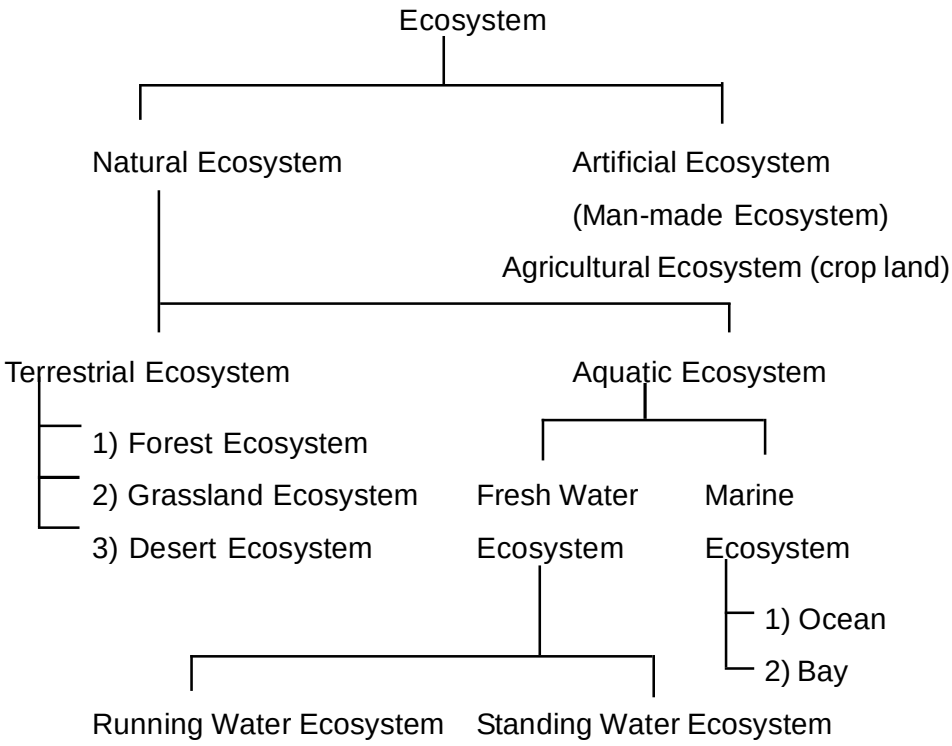
Figure 3.5: Pyramid of Energy



3.8 MAIN ECOSYSTEMS

There are three types of ecosystems in the environment (i) *Terrestrial ecosystem, (ii) Fresh water ecosystem, (iii) Marine Ecosystem.* The plants and animals residing in a specific geographical region is called biomass. The condition of plants is dependent upon various physical factors like the type of soil, rainfall, amount of light, time etc.

Table 3.2 :Different Ecosystems in the World



- Running Water Ecosystem
  - 1) River Ecosystem
  - 2) Brook Ecosystem
  - 3) Stream Ecosystem
- Standing Water Ecosystem
  - 1) Lake Ecosystem
  - 2) Pond Ecosystem



CHECK YOUR PROGRESS

Q 6. Who propagated the concept of ecological pyramid?

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Q 7. What are the main ecosystems?

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ACTIVITY – 3.1

Discuss broadly the different ecosystems of the world.

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- **Terrestrial Ecosystem**
  - *Forest Ecosystem*

    The forest ecosystems are of different types, namely –
    - Evergreen Forest Ecosystem
    - Coniferous Forest
    - Deciduous Forest

    Evergreen forest ecosystems are also known as tropical rainforests. It covers an area of $20X10^6$ square kilometers. This constitutes $^1/_{12}$ of the earth. Evergreen forests are found in different parts of the world, e.g. Mexico, South America (Amazon and Orinock river basin), African Congo river basin, South-east Asia etc. In India,

rainforests are found in the Western Ghats, Andamans, North-East Himalayas (Assam) etc. Almost half the population of plants and animals in the world are found in these regions. Therefore, the rainforests are rich in biodiversity. It is also very productive. In the rainforests, 1200 kilo calories of energy are produced per square metre per year. The main characteristics of rainforests as

- Its temperature is high (23^0 to 27^0C)
- Every year, 200-1000cm of rainfall occurs
- Warm and moist climate
- Contains sufficient quantities of minerals and humus
- The height of plants depends upon the species. Some trees grow up to 30-40 metres.
- Plants which can grow in the shadow of big trees, like, bamboo, ferns and other shrubs also exist.
- 70-80% insects and 80-85% birds reside in the rainforests. Other animals which live in these forests are monkeys, langur, snakes, ant- eaters, bats, cheetah etc.
- The main trees of the rainforests are rosewood, mahogany, dimro, nutmeg etc.

➢ *Grassland Ecosystem:* The main grasslands of the world are the plains of Europe and Asia, the Prairies of north America and Canada, the Pampas of South America, the Tuscus of New Zealand and Veldts of Africa etc. The largest grasslands are the Plains of Russia and Siberia. It covers almost $9X10^6$ square km area. It has been ascertained that every year, 2500 kilo calories of energy is produced per sq. meter in these grasslands. The main characteristics of the grassland region are:

- The amount of rainfall every year is 25-95 cm
- Amount of humus in the soil is more
- The plants are different varieties of short and long grass. E.g. Andropagan Panicam, Desmodium, Cyanodon.
- The animals are primary consumers, grazing mammals (eg. bison, antelope, zebra, big-horned sheep and deer), and animals

living in burrows (e.g. Rat, rabbit, prairie dog and land squirrels). These herbivorous animals are food for wolves and predatory birds.

- These grasslands are very useful for crop production and cow rearing.

- *Desert Ecosystem:* 20% (1/5th) of the world's land area is desert. Some famous deserts are mainly in south-west America (the famous west desert Death Valley) Mexico, Peru, North Africa (Sahara and Kalahari), China (Tibet, Gobi), India (Thar), South America (Atacama) and Mid-Australian region (Tanami Gibson, Victorian) etc. The main characteristics of the desert ecosystem are :
  - Amount of rainfall is 5-25 cm only.
  - Climate is extremely dry.
  - Too hot in daytime and too cold at night
  - Population of plants and animals is much less.
  - Among the plants, shrubs and small trees can be found sparingly. Some plants are seen growing only in the rains. They have a very short shelf life (10-14days) e.g. Boerhaavia. Some plants can retain water, eg. Hardy Grass. Some other plants can live for long, eg. Dates. Some plants are fleshy and juicy, e.g. Cacti, Euphabia.
  - The chief animal of the desert is the camel. In addition, there are also kangaroos, rats, rabbits, foxes, cats and some other mammals. Among reptiles, there are horned lizards; among birds, there are insectiovorous birds, owls; and among the insects, there are ants, wasps, centipedes, spiders etc.

- **Aquatic Ecosystem:** Water constitutes 71% of the total volume of the earth. Only 29% is land. Therefore, the number of aquatic ecosystems is more. Aquatic ecosystem is mainly of two types – *Freshwater ecosystem and marine ecosystem.*
  - *Freshwater Ecosystem* : It is of two types –
    - Standing Water (lake and pond)
    - Running Water (stream, river)

- Standing Water (lake and pond):

Lake Ecosystem: Lakes and ponds are standing water bodies. Lakes are large in size and also deep. Lakes are classified on the basis of productivity and physical factors. Deep lakes are divided on the basis of the capacity of light to penetrate its depth.

(a) Spilimnion – the surface temperature becomes 11-12^{0}C because of the sun's heat in the summer; it becomes cold in winter.

(b) Hypolimnion – Deep surfaces are always cool (5^{0}C)

(c) Thermocline – There is variation in heat.

Depending upon productivity, lakes are divided into two types –

First : Eutrophic lake : Its depth is less. There are large number of bio producers, but the amount of oxygen is less. The circulation of nutrition is frequent. e.g. Kashimir's Dal Lake.

Second:Oligotrophic lake. These lakes are generally quite deep. The mountain inside the lakes are called vidges.They are Circulation of nutrition is also less.

Pond Ecosystem: The plants found in ponds are :

a) Those which can be seen with the help of microscopes like chlamydomones, chlorella, spirogyra, eugonium, zygnema,

b) Those which floted on water such as – floating plants like cerataphylum, articularia, hydrila,

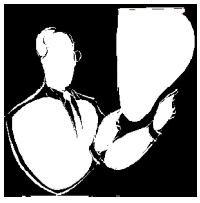
c) Floating plants like ozola, wolphia, salvinia, pigtia lemona, echornia etc.

d) Plants with roots like vallisnaria, nelumb, typha etc. The roots of saggitaria, frogomytes can however be seen.

Among animals, there are zoo planktons like ciliates and flagellata protozoa, rotifera, daphnia, cyclops, haylly, dragonfly, damal fly; nekton like- water boatman, beetles, water insects, fish, frog, turtles, snakes etc. and those that live in the depths like hydra, prawns, crabs and the different varieties of snails etc.

- ❍ Running Water Ecosystem (Stream, river) : Running water ecosystem is also known as flotic ecosystem. In this ecosystem, water always flows and it is always changing.

➢ *Marine Ecosystem:* Marine ecosystem is of three types: *open seas, coastal regions, and bay regions.* The main feature of the marine ecosystem is that its water is salty (average salinity 3.5%). The salt content varies according to the depth. The factors responsible for the limitation of the biotic community are the temperature of the sea, salinity, water pressure, and light. As the depth of the sea increases, the water pressure also increases.



LET US KNOW

Words to remember-

- ➢ Biogeocirnosis
- ➢ Aquarium
- ➢ Heterotrophic
- ➢ Ecological System
- ➢ Autotrophic
- ➢ Biome
- ➢ Ecological Pyramid
- ➢ Food Chain
- ➢ Food Web
- ➢ Primary Productivity
- ➢ Secondary Productivity
- ➢ Trophic Level



CHECK YOUR PROGRESS

Q 8. What are the main characteristics of the rainforests?

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Q 9. Where in India can you find desert ecosystem?

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Q 10. Write the names of some plants and animals found in the pond ecosystem.

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3.9 LET US SUM UP

- After going through this unit, we have come to learn about ecosystem. There are different ecosystems in the world, namely forest ecosystem, grassland ecosystem, desert ecosystem and acquatic ecosystem.
- All these different types of ecosystem are discussed in detail. Besides, the unit also deals with food-chain, food web, ecological pyramids etc. We also got a comprehensive idea about food chain, food web, ecological pyramid etc. We have learnt that the pond we see everyday contains different plants and animals, which develop a relationship amongst them.



3.10 FURTHER READING

1) Asthana, D. K. & Meera A. (2012). *A Textbook of Environmental Studies*. New Delhi: S. Chand and Company Ltd.
2) Bharucha, E. (2004). *A Textbook of Environmental Studies.* New Delhi: UGC.
3) Kaushik, A. & Kaushik, C. P.(2006). *Perspectives in Environmental Studies.* India: New Age Publications (Academic).



3.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The interaction created by the inter-relationship between the biotic and abiotic factors in the environment is called an ecosystem.

Ans to Q No 2: All the living beings living in an ecosystem are called the biotic elements.

Carbon, nitrogen, carbon, dioxide, water, carbohydrates, proteins, lipids, nucleic acid, climate, light, temperature, air etc. are abiotic factors.

Ans to Q No 3: The process of eating and being eaten among animals in any trophic structure helps the food energy to flow in a disciplined manner. This is called food chain. Food chains are of two types

(a) Grassland food chain

(b) Detritus food chain

Ans to Q No 4: The food-related relationship among different beings in a biotic community is called food web or food cycle.

Ans to Q No 5: Heat energy is directed by the two laws of thermo-dynamics. The first law is that – energy can neither be created nor be destroyed; it can only be transformed from one state to another. The second law states that during transformation, some amount of energy is lost.

Ans to Q No 6: An English scientist named Charles Elton.

Ans to Q No 7: There are three types of ecosystems in the environment –

(i) Terrestrial Ecosystem (ii) Freshwater Ecosystem, and

(iii) Marine Ecosystem.

Ans to Q No 8: Its temperature is high (23^0 – 27^0 C)

- Every year, there is 200 – 1000 cm rainfall.
- Warm and moist climate
- Contains sufficient amount of mineral and humus.
- The height of plants differs according to species. Some trees grow upto 30-40 metres in height
- Trees which can grow under the shadow of these big trees are bamboo, ferns and shrubs etc.

Ans to Q No 9: India's Thar Desert.

Ans to Q No 10: Spyrogyra, Eugonium, Zygnema Azola, Wolpaia, Salvinia, Pigtia Lemona, Echomia, Cerataphylum, Articularia, Hydrilla,

Vallisnaria, Nelumb, Typha, Saggitaria, Frogomytes, Ciliates and Flagellate protozoa, Rotifers, Daphnia, Cyclops, haylly, dragonfly, damal fly, water boatman, beetles, water insects, fish, frogs, turtles, snakes etc. and those that live in the depths like hydra; prawns, crabs, different varieties of snails.



3.12. POSSIBLE QUESTIONS

VERY SHORT ANSWER QUESTIONS

Q 1. What are the different types of ecosystems?

Q 2. Write the names of the elements of an ecosystem.

Q 3. Define trophic structure.

Q 4. What is food chain?

Q 5. What is the significance of food web?

Q 6. Write the names of primary producers and secondary producers.

Q 7. Write the names of the forest biomass?

Q 8. Where in India can we find tropical rainforests?

Q 9. What are the different types of ecological pyramid?

SHORT ANSWER QUESTIONS

Q 1. What are the different characteristics of aquatic biome?

Q 2. What is the role of the biotic and abiotic factors in the ecosystem?

Q 3. What is the difference between food chain and food web?

Q 4. Why does energy always flow in one direction?

Q 5. Explain one pyramid of biomass.

LONG ANSWER QUESTIONS

Q 1. Describe a pond ecosystem as an ideal ecosystem.

Q 2. What is biome? Describe tropical rainforests and grassland biome.

Q 3. What is ecological pyramid? Describe the various ecological pyramids found in an ecosystem.

Q 4. Write the characteristics of food chain. Describe two kinds of food chain with examples.

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