18. Ecosystems

Can you recall?

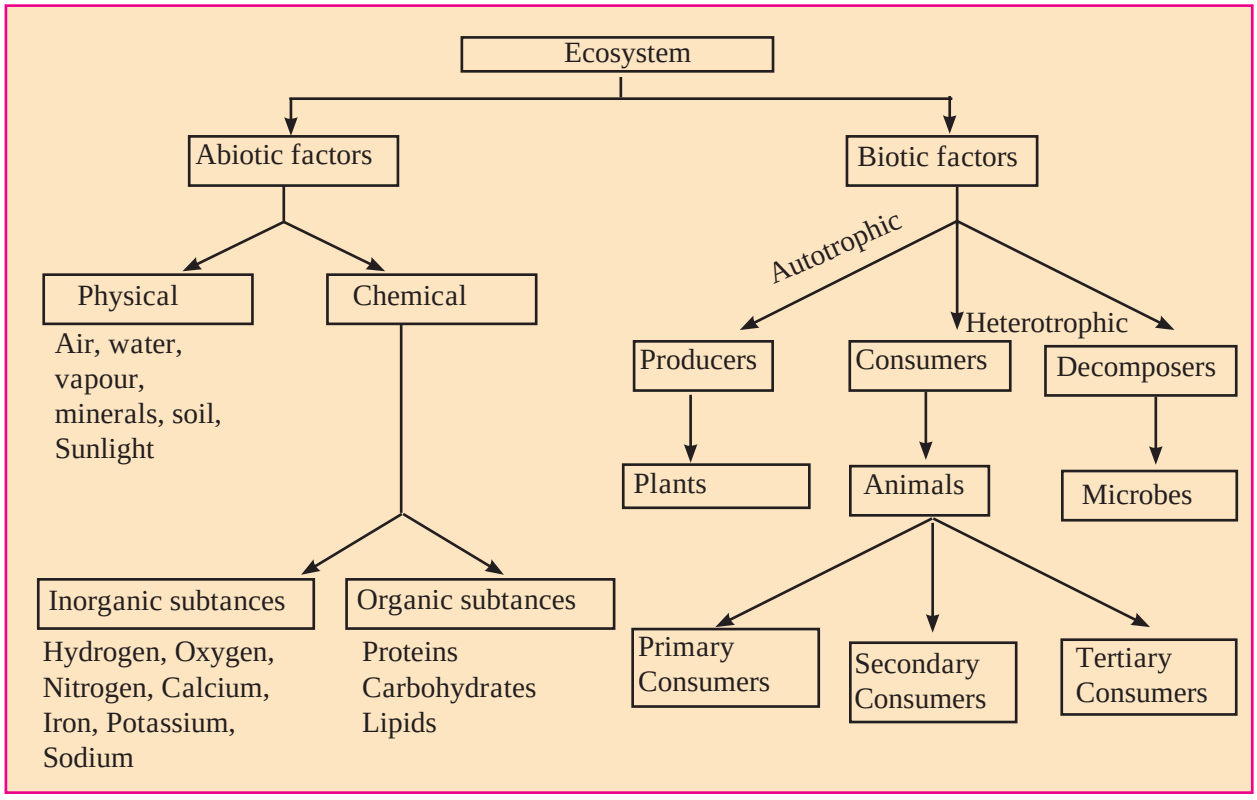
1. Which factors do you found in your surrounding?
2. Are these factors directly or indirectly related to you ?

Classify

Classify the following into living and non-living factors.
Sunlight, sunflower, elephant, lotus, algae, stone, grass, water, ant, soil, cat, fern, air, lion.

Ecosystem : The world around us is made up of living and non living factors. Living are called biotic factors while non living are called abiotic factors. There is a continuous interaction between these living and non living factors. Living organisms and their habitat, environment are corelated with each other.

The structure which is formed due to these reciprocal relationships is called an ecosystem. Biotic and abiotic factors and their interactions form an ecosystem.



18.1 Components of Ecosystem

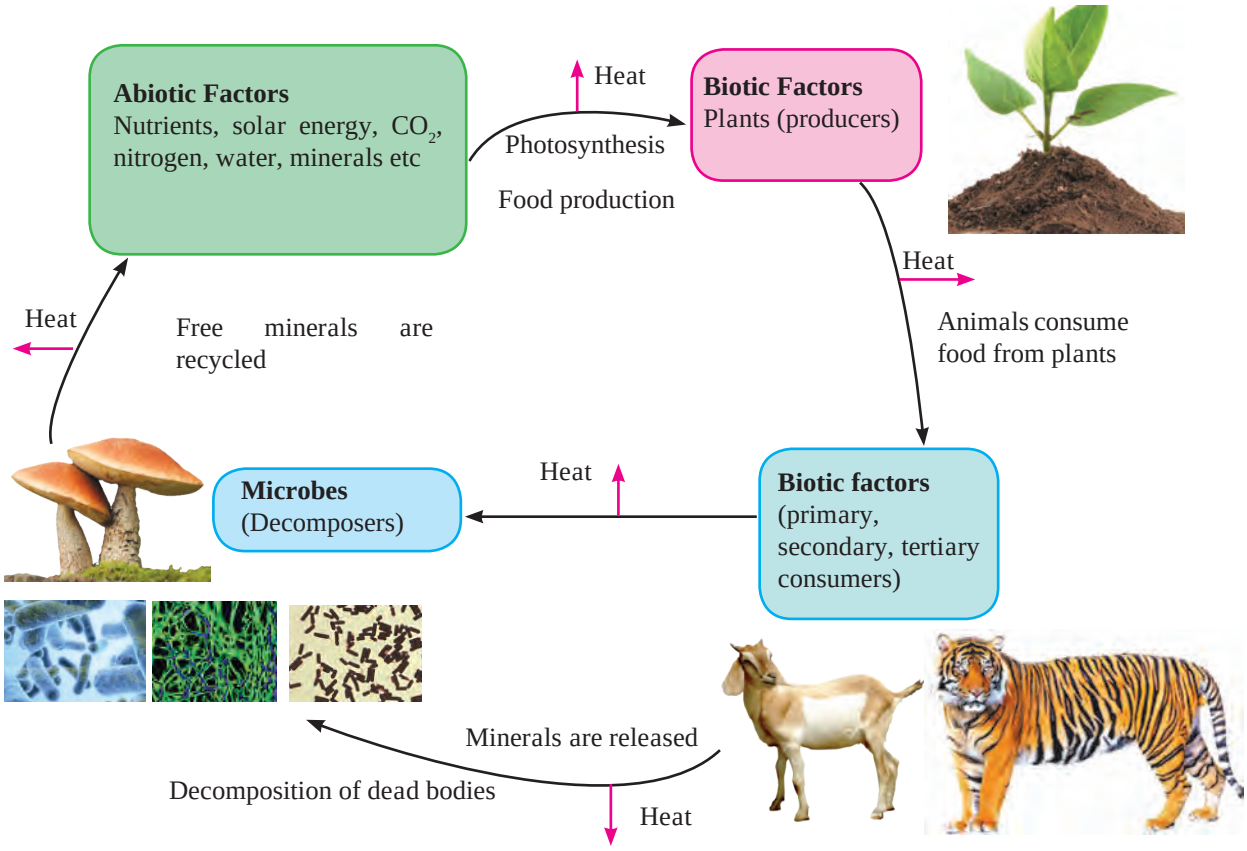
Do you know?

The organic substances (carbohydrates, proteins and lipids) from dead bodies of plants and animals are converted into inorganic substances (hydrogen, oxygen, calcium, iron, sodium, potassium etc.) by microorganisms. Therefore, microbes are said to be 'Decomposers'.

Structure of an ecosystem : Living organisms need different types of abiotic factors and they have different capacities to adapt with those abiotic factors. Some microbes need oxygen, while others don't. Some plants need more sunlight, while others grow well in shade.

Each and every abiotic factor (air, water, soil, sunlight, temperature, humidity) affects the biotic factors in the ecosystem. The abiotic factors in an ecosystem decide which biotic factors will survive in it and what will be their number. The proportion of abiotic factors in an ecosystem is always changing as biotic factors use or excrete abiotic factors. Every biotic factor affects abiotic factors as well as other biotic factors around it. Every living organism in an ecosystem plays a particular role while living, moving in that ecosystem.

The position of any living organism in context to other living organisms and the role it is playing is called 'Niche'. Eg. A sunflower plant in a garden evolves oxygen in the air and provides food and shelter for insects like ants, honey-bees etc.



18.2 Interactions among factors of an ecosystem

Can you tell?

1. What is the role of microbes in above interaction ?
2. How do producers obtain abiotic factors?
3. From where do the consumers get their food ?

Most of the ecosystems are complex and there is tremendous quantitative and qualitative variety of species in them. In ecosystems of tropical country like India, few species of living organisms are found every where in a large number. Remaining species of plants and animals are found in a small number. Some species are very few in number.Variety of ecosystems is found on earth. Each place has a different ecosystem. eg. Forest, pond, ocean, river etc. Types of ecosystems are formed according to size, place, climate, types of plants and animals.

Many types of ecosystems are found in biosphere. Their specific functions continue according to their environment. Though these ecosystems look independent and different they are linked to each other directly or indirectly. Therefore we can not separate these small ecosystems from each other, but can classify them according to their functions.

Looking back

New words are created with the developement in science. Same is the case with the word ecosystem. "How can we describe the inter relationship between physical and biological factors in one word ?" In 1930, this question was asked to a scientist Ray Claffam. 'ecosystem' was his answer. His colleague A.G. Tansle used this word in 1935. 'Biotic community' is another name for 'ecosystem.'

In some regions on earth, a large area has same climate and abiotic factors. The living organisms in those area are also similar. So a specific ecosystem developes in a vast area. Such large ecosystems are called 'Biomes'. These biomes contain many small ecosystems. Earth itself is a vast ecosytem.Two types of biomes are found on the earth. i. Land biomes ii. Aquatic biomes

Land biomes : The biomes which exist only on land are called land biomes. Due to unequal distribution of abiotic factors different types of ecosystems exist. Eg. Grasslands, evergreen forests, deserts, iceland ecosystem, ecosystems in Taiga, tropical rainforests etc.

a. Grassland Ecosystem : Grasslands develop where rainfall is not enough to grow big trees. Vast growth of grass is found in these ecosystems. Longer summer and limited rain develop dwarf plants in these areas. Animals like goat, sheep, giraffe, zebra, elephant, deer, chital, tiger, lion, etc. are found in this ecosystem. Similarly various birds, insects, microbes are also present.

18.3 Grassland

Collect information

1. What are the possible threats to grasslands?
2. Why did Asian Cheetah become extinct in last century?
3. Observe Asian Cheetah on internet? describe it.

Complete the table

Complete the following chart in context to a grassland.

Producers	Primary consumers	Secondary consumers	Tertiary consumer	Decomposers
Parthenium, *Cynodon*, *Kusali*	Cow, deer, rabbit, *Leptocorsia*, ...	Snakes, Birds, Jackals, Wolf, ...	Lion, Hyena, Vulture, Kite, ...	*Fusarium* *Aspergillus* ....

Do you know?

About 150 years ago, Dudhwa forest was the habitat for single horned Rhino. But in 20th century this animal became extinct due to unrelenting hunting. On 1st April 1984 this rhino was restored there. They were bred in captivity and then released in their habitat. For this 27 square km grassland and forest where round the year water sources were available were selected. Two observatories were established. These efforts are successful.

Think about it. Can we call a tree an independent ecosystem ?

b. Evergreen forests : Its a natural ecosystem where variety of plants, animals and abiotic factors is found.

18.4 Forest ecosystem

Complete the table

National park/ Sanctuary	State
1. Geer	
2. Dachigam	
3. Ranthambore	
4. Dajipur	
5. Kaziranga	
6. Sunderban	
7. Melghat	
8. Periyar	

Complete the table Write the information about various components of forest.

Producers	Primary consumers	Secondary consumers	Tertiary consumers	Decomposers
Dipterocarpus, Teak, Pine, Sandalwood	Ant, Grasshopper, Spider, Butterfly	Snake, Bird Lizard, Jackal	Tiger, Falcon Cheetah	*Aspergillus*, *Polycarpus* ....

Do you know?

- Many ecosystems are conserved in around 520 sanctuaries and national parks in India.
- The Great Himalayan National park is the largest sanctuary where white panther, a rare species is conserved.
- Elephants, wild bears, wild buffalloes, deers, tigers, panthers are conserved at Kaziranga (Asam). Two third of the total number of single horned rhinos in the world is found at kaziranga.
- The sanctuary at Bharatpur is famous for aquatic birds.
- Ranthambore sanctuary is famous for tigers.
- Geer forest in Gujrat is the only habitat/shelter for the spectacular Asiatic lion.

Aquatic ecosystems : 71 % of the earth surface is covered by water and only 29 % has land on it. Therefore study of aquatic biomes becomes very important. According to area, aquatic biomes are widespread. Types of aquatic ecosystems are - Fresh water ecosytem, marine ecosystem, creek ecosystem.

18.5 Aquatic ecosystem

A. Fresh water ecosystem : Ponds, lakes and rivers are included in aquatic ecosystems. The transition of energy in these ecosystems is through water currents and river. Decomposers are at the bottom of water reservoirs. They decompose dead bodies of plants and animals convert into abiotic factors. Oberve such ecosystems arround you and complete the following chart.

Producers	Primary Consumes	Secondary Consumes	Tertiary Consumes	Decomposers
Aquatic plants, *Ulothrix, Hydrilla, Azolla, Nitella, Typha, Pistia, Eichhornia,*	Aquatic insects, Snails, Annelids, ...	Small fishes, Frogs	Large fishes, Herons, Crocodiles	Bacteria, fungi, ...

Discuss

Are the local ecosystems like river, ponds, lakes safe ?

B. Marine Ecosystems : Marine plants grow in these ecosystems. Shallow water contains small fishes, prawns feeding on algae. The central part of sea has less number of aquatic living organisms. Large fishes are secondary consumers. Ocean has a large amount of nutrients. The bottom of oceans has more number of decomposers. Dead bodies of plants and animals, waste materials are decomposed by bacteria.

Internet My Friend 1. Collect the information about mishaps in aquatic ecosystems occurred due to human interference.

2. How is Creek different from Sea?

Think about it.

Today Divija visited a hill. Honey-bees were hovering on flowers. One of them stung Divijias hand. Divija was hurt due to that sting and said with anger that all the honey-bees from the whole world must get destroyed. Afterwords, she thought what will happen if all honey-bees are destroyed ? We won't get honey, Nothing more. What would be your explaination to Divija ?

Diminishment of ecosystem due to human interference : Many human activities have side effects on functions of ecosystems and cause their diminishment. Eg. mining and excessive cutting of trees changes the use of land, so interactions between biotic and abiotic factors are also affected.

Different human activities have different effects on ecosystems. They can be tranformation of an ecosystem from one to another or extinction of a species.

Human activities responsible for diminishment of ecosystems

Increasing use of resources due to increased population : Humans are the consumers in an ecosystem. Ecosytems can provide basic needs in normal conditions, but due to increased population, man kept on snatching natural resources on large scale. Changing life style demands 'more' than 'necessary'. That has increased stress on the ecosystems and has generated vast amount of wastes.

18.6 Diminition of ecosystem

Urbanization : Due to continuous process of urbanization. More and more agricultural lands, marshlands, wetlands, forests and grasslands are being destroyed for buildings and other basic facilities around. As a result of this human interference, ecosystems either change or get completely destroyed.

Industrialization and traffic : Raw materials required for industrialization are obtained by destroying forests. This result in destruction of forests.

To provide the amenities for increased traffic, many times roads and railways are built through forests and wetlands.

Tourism : People visit scenic places mainly for nature watch, entertainment and visit to sacred places. A lot of ameneties are created for these tourists. This causes destruction of local ecosytems due to increased stress.

Collect information

Visit any tourist centre nearby. Collect information about effect of tourism on the ecosystem there.

Large Dams : Dams cover vast lands. So the forests or grassland in that area get converted into aquatic ecosystems. Dams also lessen the water current in lower area. Therfore the previous ecosystems in that running water get destroyed.

Use your brain power

1. Which biotic factors get affected due to a dam ?
2. What will be the effects on biotic factors in the running water of river ?

Wars : Differences and competition over land, water, mineral resources or some economic and political reasons lead to war among human races. Heavy bombing and mine explosions are done in wars. These are not only life threatening but also change or destroy natural ecosystem.

Thus natural disasters (earthquake, volcano, floods, droughts) and human interferences result in changes/destruction of ecosystems.

Natural ecosystems must be protected as they maintain balance in the biosphere.

Exercises

1. Complete the following by using correct option.

a. Air, water, minerals, soil are..... factors of an ecosystem.
(physical, organic, inorganic)

b. River, ponds, ocean are ..... ecosystems.
(land, aquatic, synthetic)

c. Man is ..... in an ecosystem.
(producer, consumer, decomposer)

2. Match the following

Producers	Ecosystem
a. Cactus	1. Forest
b. Aquatic plants	2. Creek
c. Mangroves	3. Aquatic
d. Pine	4. Desert

3. Give my information

a. Ecosystem b. Biome c. Food web

4. Give scientific reasons

a. Plants in an ecosystem are called consumers.

b. Large dams destroy ecosystems.

c. Rhinos were restored in Dudhwa forest.

5. Answer the following.

a. What are the effects of icreased population on ecosystems ?

b. How is urbanization responsible for destruction of ecosytems ?

c. What are the reasons for war ?

d. Explain the interactions among the factors of an ecosystem.

e. Differentiate between evergreen forests and grasslands.

6. Describe the following pictures.

Project :

1. Visit an ecosystem nearby, List the biotic and abiotic factors in it. Show with pictures or sketches, how they are dependant on each other.
2. With the help of internet find out the loss of ecosystems due to wars or atomic explosions. Describe in your words.

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