NCERT SOLUTIONS

CLASS - 12th



aglasem.com

Class : 12th
Subject : Biology
Chapter : 14
Chapter Name : Ecosystem

Q1 Fill in the blanks.
(a) Plants are called as _____ because they fix carbon dioxide.
(b) In an ecosystem dominated by trees, the pyramid (of numbers) is _____ type.
(c) In aquatic ecosystems, the limiting factor for the productivity is _____
(d) Common detritivores in our ecosystem are _____
(e) The major reservoir of carbon on earth is _____

Answer. (a) Plants are called as autotrophs because they fix carbon dioxide.
(b) In an ecosystem dominated by trees, the pyramid (of numbers) is inverted type.
(c) In aquatic ecosystems, the limiting factor for the productivity is light.
(d) Common detritivores in our ecosystem are earthworms .
(e) The major reservoir of carbon on earth is oceans.

Page : 256 , Block Name : Exercise

Q2 Which one of the following has the largest population in a food chain?
(a) Producers
(b) Primary consumers
(c) Secondary consumers
(d) Decomposers

Answer. (d) Decomposers : Decomposers include micro-organisms such as bacteria and fungi. They form the largest population in a food chain and obtain nutrients by breaking down the remains of dead plants and animals.

Page : 257 , Block Name : Exercise

Q3 The second trophic level in a lake is-
(a) Phytoplankton
(b) Zooplankton
(c) Benthos
(d) Fishes

Answer. (b) Zooplankton : Zooplankton are primary consumers in aquatic food chains that feed upon phytoplankton. Therefore, they are present at the second trophic level in a lake.

Page : 257 , Block Name : Exercise

Q4 Secondary producers are
(a) Herbivores
(b) Producers
(c) Carnivores
(d) None of the above

Answer. (d) None of the above : Plants are the only producers. Thus, they are called primary producers. There are no other producers in a food chain.

Page : 257 , Block Name : Exercise

Q5 What is the percentage of photosynthetically active radiation (PAR), in the incident solar radiation.
(a) 100%
(b) 50 %
(c) 1-5%
(d) 2-10%

Answer. (b) 50% : Out of total incident solar radiation, about fifty percent of it forms photosynthetically active radiation or PAR.

Page : 257 , Block Name : Exercise

Q6 Distinguish between
(a) Grazing food chain and detritus food chain
(b) Production and decomposition
(c) Upright and inverted pyramid
(d) Food chain and Food web
(e) Litter and detritus
(f) Primary and secondary productivity

Answer. (a) Grazing food chain and detritus food chain

	Grazing food chain		Detritus food chain
1.	In this food chain, energy is derived from the Sun.	1.	In this food chain, energy comes from organic matter (or detritus) generated in trophic levels of the grazing food chain.
2.	It begins with producers, present at the first trophic level. The plant biomass is then eaten by herbivores, which in turn are consumed by a variety of carnivores.	2.	It begins with detritus such as dead bodies of animals or fallen leaves, which are then eaten by decomposers or detritivores. These detritivores are in turn consumed by their predators.
3.	This food chain is usually large.	3.	It is usually smaller as compared to the grazing food chain.

(b) Production and decomposition

	Production		Decomposition
1.	It is the rate of producing organic matter (food) by producers.	2.	It is the process of breaking down of complex organic matter or biomass from the body of dead plants and animals with the help of decomposers into organic raw material such as CO_2, H_2O, and other nutrients.
2.	It depends on the photosynthetic capacity of the producers.	2.	It occurs with the help of decomposers.
3	Sunlight is required by plants for primary production.	3.	Sunlight is not required for decomposition by decomposers

(c) Upright and inverted pyramid

	Upright pyramid		Inverted pyramid
1.	The pyramid of energy is always upright.	1.	The pyramid of biomass and the pyramid of numbers can be inverted.
2.	In the upright pyramid, the number and biomass of organisms in the producer level of an ecosystem is the highest, which keeps on decreasing at each trophic level in a food chain.	2.	In an inverted pyramid, the number and biomass of organisms in the producer level of an ecosystem is the lowest, which keeps on increasing at each tropic level.

(d) Food chain and Food web

	Food chain		Food web
1.	It is a single linear sequence of organisms.	1.	It contains a number of interconnected food chains.
2.	Members present at higher trophic levels feed on single types of organisms.	2.	One organism has alternate food sources.

(e) Litter and detritus

	Litter		Detritus
1.	Litter contains all kinds of wastes generated above the ground.	1.	Detritus is composed of the remains of dead plants and animals.
2.	Litter contains both biodegradable and non-biodegradable matter.	2.	Detritus contains only biodegradable matter.

(f) Primary and secondary productivity

	Primary productivity		Secondary productivity
1.	It is defined as the amount of organic matter produced by producers per unit area over a period of time.	1.	It is defined as the rate of production of organic matter by consumers over a period of time.

Page : 257 , Block Name : Exercise

Q7 Describe the components of an ecosystem.

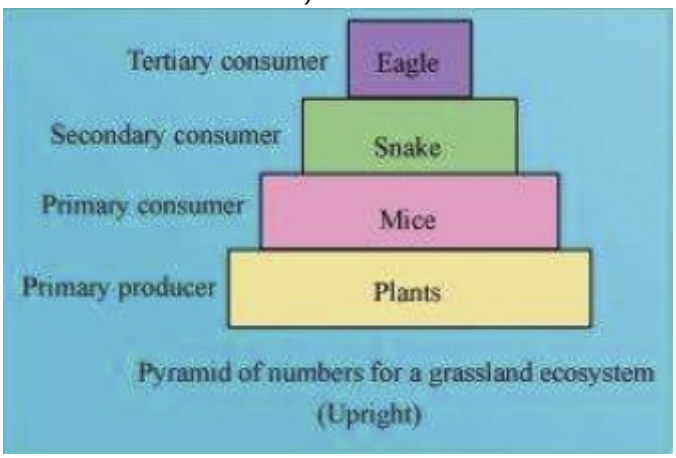
Answer. An ecosystem is defined as an interacting unit that includes both the biological community as well as the non-living components of an area. The living and the non- living

components of an ecosystem interact amongst themselves and function as a unit, which gets evident during the processes of nutrient cycling, energy flow, decomposition, and productivity. There are many ecosystems such as ponds, forests, grasslands, etc. The two components of an ecosystem are:
(a) Biotic component: It is the living component of an ecosystem that includes biotic factors such as producers, consumers, decomposers, etc. Producers include plants and algae. They contain chlorophyll pigment, which helps them carry out the process of photosynthesis in the presence of light. Thus, they are also called converters or transducers. Consumers or heterotrophs are organisms that are directly (primary consumers) or indirectly (secondary and tertiary consumers) dependent on producers for their food. Decomposers include micro-organisms such as bacteria and fungi. They form the largest population in a food chain and obtain nutrients by breaking down the remains of dead plants and animals.
(b) Abiotic component: They are the non-living component of an ecosystem such as light, temperature, water, soil, air, inorganic nutrients, etc.

Page : 257 , Block Name : Exercise

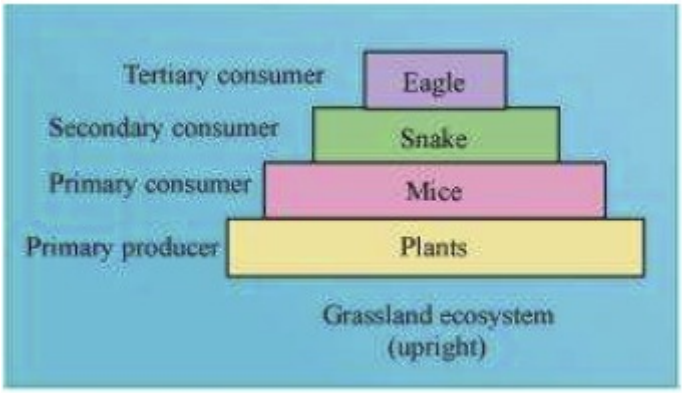
Q8 Define ecological pyramids and describe with examples, pyramids of number and biomass.

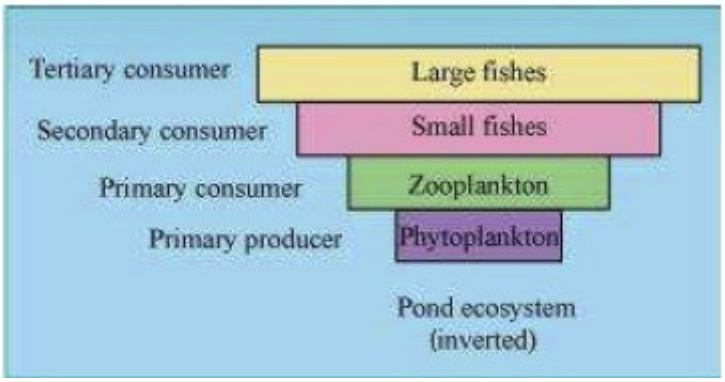
Answer. An ecological pyramid is a graphical representation of various ecological parameters such as the number of individuals present at each trophic level, the amount of energy, or the biomass present at each trophic level. Ecological pyramids represent producers at the base, while the apex represents the top level consumers present in the ecosystem. There are three types of pyramids:
(a) Pyramid of numbers
(b) Pyramid of energy
(c) Pyramid of biomass
Pyramid of numbers:lt is a graphical representation of the number of individuals present at each trophic level in a food chain of an ecosystem. The pyramid of numbers can be upright or inverted depending on the number of producers. For example, in a grassland ecosystem, the pyramid of numbers is upright. In this type of a food chain, the number of producers (plants) is followed by the number of herbivores (mice), which in turn is followed by the number of secondary consumers (snakes) and tertiary carnivores (eagles). Hence, the number of individuals at the producer level will be the maximum, while the number of individuals present at top carnivores will be least.



On the other hand, in a parasitic food chain, the pyramid of numbers is inverted. In this type of a

food chain, a single tree (producer) provides food to several fruit eating birds, which in turn support several insect species. Pyramid of biomass A pyramid of biomass is a graphical representation of the total amount of living matter present at each trophic level of an ecosystem. It can be upright or inverted. It is upright in grasslands and forest ecosystems as the amount of biomass present at the producer level is higher than at the top carnivore level. The pyramid of biomass is inverted in a pond ecosystem as the biomass of fishes far exceeds the biomass of zooplankton (upon which they feed).





Page : 257 , Block Name : Exercise

Q9 What is primary productivity? Give brief description of factors that affect primary productivity.

Answer. It is defined as the amount of organic matter or biomass produced by producers per unit area over a period of time. Primary productivity of an ecosystem depends on the variety of environmental factors such as light, temperature, water, precipitation, etc. It also depends on the availability of nutrients and the availability of plants to carry out photosynthesis.

Page : 257 , Block Name : Exercise

Q10 Define decomposition and describe the processes and products of decomposition.

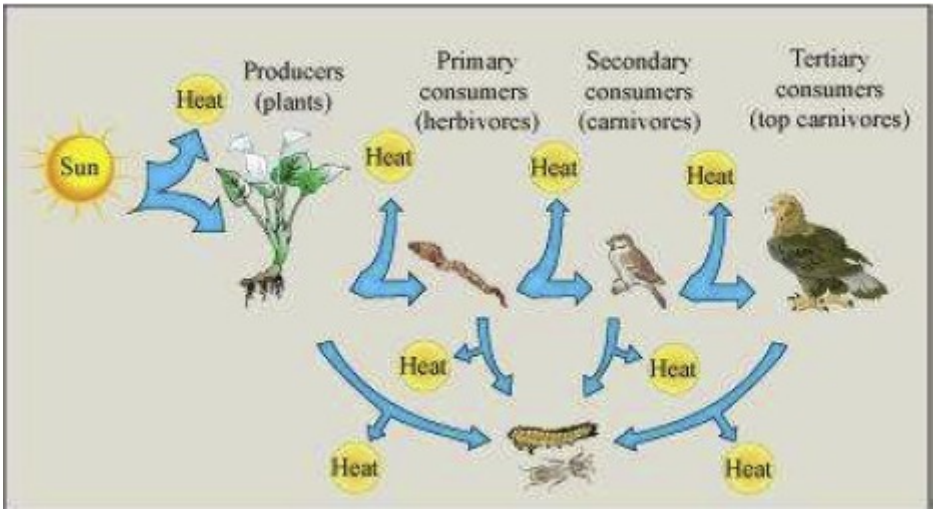
Answer. Decomposition is the process that involves the breakdown of complex organic matter or biomass from the body of dead plants and animals with the help of decomposers into inorganic raw materials such as carbon dioxide, water, and other nutrients. The various processes involved in decomposition are as follows:
(1) Fragmentation: It is the first step in the process of decomposition. It involves the breakdown of

detritus into smaller pieces by the action of detritivores such as earthworms.
(2) Leaching: It is a process where the water soluble nutrients go down into the soil layers and get locked as unavailable salts.
(3) Catabolism: It is a process in which bacteria and fungi degrade detritus through various enzymes into smaller pieces.
(4) Humification: The next step is humification which leads to the formation of a dark- coloured colloidal substance called humus, which acts as reservoir of nutrients for plants.
(5) Mineralization: The humus is further degraded by the action of microbes, which finally leads to the release of inorganic nutrients into the soil. This process of releasing inorganic nutrients from the humus is known as mineralization. Decomposition produces a dark coloured, nutrient-rich substance called humus. Humus finally degrades and releases inorganic raw materials such as CO_2, water, and other nutrient in the soil.

Page : 257 , Block Name : Exercise

Q11 Give an account of energy flow in an ecosystem.

Answer. Energy enters an ecosystem from the Sun. Solar radiations pass through the atmosphere and are absorbed by the Earth's surface. These radiations help plants in carrying out the process of photosynthesis. Also, they help maintain the Earth's temperature for the survival of living organisms. Some solar radiations are reflected by the Earth's surface. Only 2-10 percent of solar energy is captured by green plants (producers) during photosynthesis to be converted into food. The rate at which the biomass is produced by plants during photosynthesis is termed as 'gross primary productivity'. When these green plants are consumed by herbivores, only 10% of the stored energy from producers is transferred to herbivores. The remaining 90 % of this energy is used by plants for various processes such as respiration, growth, and reproduction. Similarly, only 10% of the energy of herbivores is ransferred to carnivores. This is known as ten percent law of energy flow.



Page : 257 , Block Name : Exercise

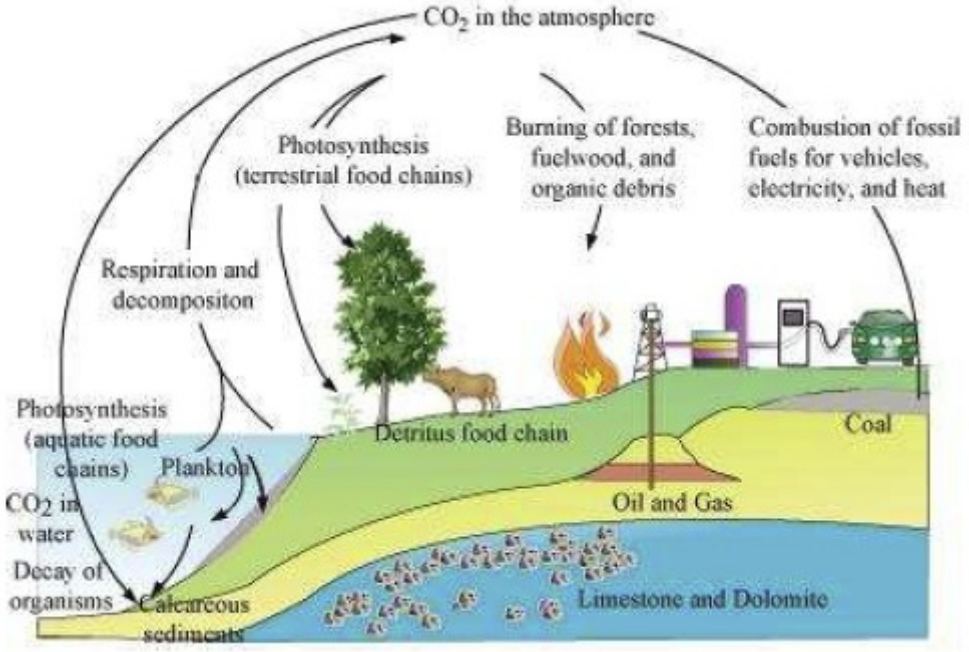
Q12 Write important features of a sedimentary cycle in an ecosystem.

Answer. Sedimentary cycles have their reservoirs in the Earth's crust or rocks. Nutrient elements are found in the sediments of the Earth. Elements such as sulphur, phosphorus, potassium, and calcium have sedimentary cycles. Sedimentary cycles are very slow. They take a long time to complete their circulation and are considered as less perfect cycles. This is because during recycling, nutrient elements may get locked in the reservoir pool, thereby taking a very long time to come out and continue circulation. Thus, it usually goes out of circulation for a long time.

Page : 257 , Block Name : Exercise

Q13 Outline salient features of carbon cycling in an ecosystem

Answer.



The carbon cycle is an important gaseous cycle which has its reservoir pool in the atmosphere. All living organisms contain carbon as a major body constituent. Carbon is a fundamental element found in all living forms. All biomolecules such as carbohydrates, lipids, and proteins required for life processes are made of carbon. Carbon is incorporated into living forms through a fundamental process called 'photosynthesis'. Photosynthesis uses sunlight and atmospheric carbon dioxide to produce a carbon compound called 'glucose'. This glucose molecule is utilized by other living organisms. Thus, atmospheric carbon is incorporated in living forms. Now, it is necessary to recycle this absorbed carbon dioxide back into the atmosphere to complete the cycle. There are various processes by which carbon is recycled back into the atmosphere in the form of carbon dioxide gas. The process of respiration breaks down glucose molecules to produce carbon dioxide gas. The process of decomposition also releases carbon dioxide from dead bodies of plants and animals into the atmosphere. Combustion of fuels, industrialization, deforestation, volcanic eruptions, and forest fires act as other major sources of carbon dioxide.

Page : 257 , Block Name : Exercise