



## NCERT Class 12 Biology Exercise Solutions

### Chapter 12 – Ecosystem

#### 1. Fill in the blanks.

- (a) Plants are called \_\_\_\_\_ 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 \_\_\_\_\_.

Ans: (a) Autotrophs

(b) inverted

(c) Light

(d) earthworms

(e) Oceans

#### 2. Which one of the following has the largest population in a food chain?

- (a) Producers
- (b) Primary consumers
- (c) Secondary consumers
- (d) Decomposers

Ans: (d) Decomposers

Decomposers, like bacteria and fungi, make up the biggest group in the food chain. They get their food by breaking down the bodies of dead animals and plants.

#### 3. The second trophic level in a lake is

- (a) Phytoplankton
- (b) Zooplankton
- (c) Benthos
- (d) Fishes

Ans: (b) Zooplankton

Zooplankton occupies the second level in a lake's food chain as they are the main consumers in the aquatic ecosystem, feeding on phytoplankton. Therefore, they are positioned at the second trophic level.

#### 4. Secondary producers are

- (a) Herbivores

**(b) Producers**

**(c) Carnivores**

**(d) None of the above**

**Ans:** (d) None of the above

Secondary producers do not exist. Only plants act as producers by making their own food through photosynthesis as autotrophs.

**5. What is the percentage of photosynthetically active radiation (PAR) in the incident solar radiation?**

**(a) 100%**

**(b) 50 %**

**(c) 1-5%**

**(d) 2-10%**

**Ans:** (b) 50 %

Photosynthetically active radiation or PAR constitutes about 50% of the total incident solar radiation.

**6. 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**

**Ans:** The differences are as follows:

**(a) Grazing food chain and detritus food chain**

Grazing food chain	Detritus food chain
Energy is derived from the sun	Energy is derived from organic matter produced in trophic levels of the grazing food chain
It typically entails a large population	It is comparatively smaller
Starts with producers at the first trophic level. The plant biomass is then consumed by herbivores which is in turn are consumed by different carnivores	Starts with detritus such as dead bodies of fallen leaves and animals that are consumed by detritivores or decomposers which in turn are consumed by predators.

**(b) Production and decomposition**

Production	Decomposition
Rate of producing food(organic matter) by producers is known as production	Disintegration of complex organic matter from the bodies of dead animals and plants with the help of decomposers into organic raw

	material namely water, carbon dioxide, other such nutrients is decomposition.
For primary production, sunlight is required	Decomposition does not require sunlight
Dependent on the photosynthetic capacity of producers	Takes places with the help of decomposers

**(c) Upright and inverted pyramid**

Upright pyramid	Inverted pyramid
Pyramid of energy is always upright	Pyramid of numbers and biomass can be inverted
At the producer level of an ecosystem, this pyramid has the highest number and biomass of organisms which declines at each trophic level in a food chain	At the producer level of an ecosystem, this pyramid has the lowest number and biomass of organisms which rises at each increasing trophic level in a food chain

**(d) Food chain and Food web**

Food chain	Food web
Constitutes for a single linear sequence of entities	Consists of a number of interconnected food chains
Members inhabiting higher trophic levels feed only on one type of entity	Any given individual has alternate options for food sources

**(e) Litter and detritus**

Litter	Detritus
Comprises of all kinds of wastes above the ground level	Comprises of residues of dead animals and plants
Consists of biodegradable and non-biodegradable substances	Consists of biodegradable substances only

**(f) Primary and secondary productivity**

Primary productivity	Secondary productivity
It is the amount of organic matter generated by producers per unit area over a specific span of time	It is the rate of generating organic matter by consumers over a span of time

**7. Describe the components of an ecosystem.**

**Ans:** An ecosystem is a unit where living and non-living components interact. These components work together in processes like energy flow, nutrient cycling, and decomposition.

There are two types of components in an ecosystem: abiotic and biotic.

Abiotic components include things like temperature, light, water, wind, soil, and nutrients.

Biotic components include decomposers, consumers, and producers. Producers, like plants and algae, use chlorophyll to make their own food through photosynthesis.

Consumers rely on producers for food, either directly or indirectly. Decomposers, like fungi and bacteria, break down dead organisms and play a vital role in the food chain.

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

**Ans:** An ecological pyramid is a graph that shows different ecological factors, such as the number of individuals, energy, or biomass, at each trophic level. These pyramids represent producers at the bottom and top-level consumers at the top. There are three types of pyramids:

1. Pyramid of numbers: This graph represents the number of individuals at each trophic level in a food chain. It can be either upright or inverted, depending on the number of producers. For example, in a Grassland ecosystem, the pyramid is upright, with the highest number of individuals at the producer level and the least at the top carnivores. In a parasitic food chain, the pyramid is inverted, with producers providing food to fruit-eating birds, which in turn support a few species of insects.

2. The pyramid of biomass is a visual representation of the amount of living matter at each level of an ecosystem. It can be either upright or inverted. In grasslands and forests, it is upright because there is more biomass at the producer level than at the top carnivore level. However, in a pond ecosystem, the pyramid is inverted because the biomass of fishes is greater than the biomass of the zooplankton they feed on.

3. The energy pyramid is a visual representation that shows how energy flows through different levels in an ecosystem. It is always upright and cannot be flipped because energy is lost as heat as it moves from one level to the next. Each bar in the energy pyramid represents the amount of energy present at each level during a specific time period or per unit area annually.

## Pyramid of Biomass

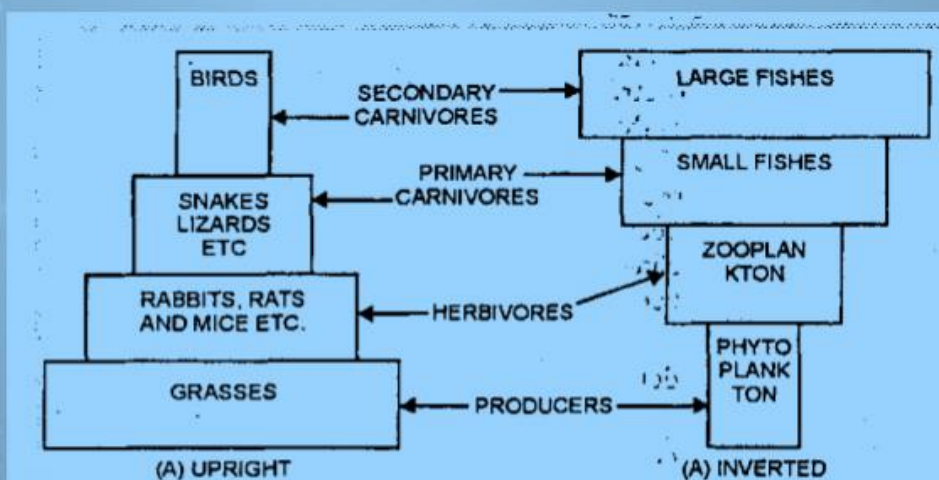


FIGURE 14.10. Pyramids of biomass  
(A) in a grassland ecosystem (B) in a pond ecosystem.

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

**Ans:** Primary productivity refers to the quantity of organic matter or biomass produced by producers in a specific area over a period of time.

It can be influenced by various factors like rainfall, temperature, water, and light. Additionally, primary productivity relies on the presence of nutrients and the ability of plants to perform photosynthesis.

**10. Define decomposition and describe the processes and products of decomposition.**

**Ans:** Decomposition is a process where complex organic matter from dead animals and plants breaks down into inorganic raw materials like water, carbon dioxide, and nutrients. There are different stages in decomposition:

1. Fragmentation: Detritus is broken down into small particles by detritivores like earthworms.
2. Leaching: Water-soluble nutrients move into the soil layers and become unavailable salts.
3. Catabolism: Fungi and bacteria break down detritus into small particles using enzymes.
4. Humification: This phase leads to the formation of humus, a dark substance that stores nutrients for plants.
5. Mineralization: Microbes further break down humus, releasing inorganic nutrients into the soil. This process is called mineralization. Humus degrades to release water, carbon dioxide, and other nutrients into the soil.

**11. Give an account of energy flow in an ecosystem.**

**Ans:** Energy in an ecosystem flows in one direction, starting from the sun. Green plants capture solar energy to make their own food. Herbivores eat the plants and transfer the energy to carnivores. However, only 10% of the energy is passed on to the next trophic level due to energy loss at each step.

**12. Write important features of a sedimentary cycle in an ecosystem.**

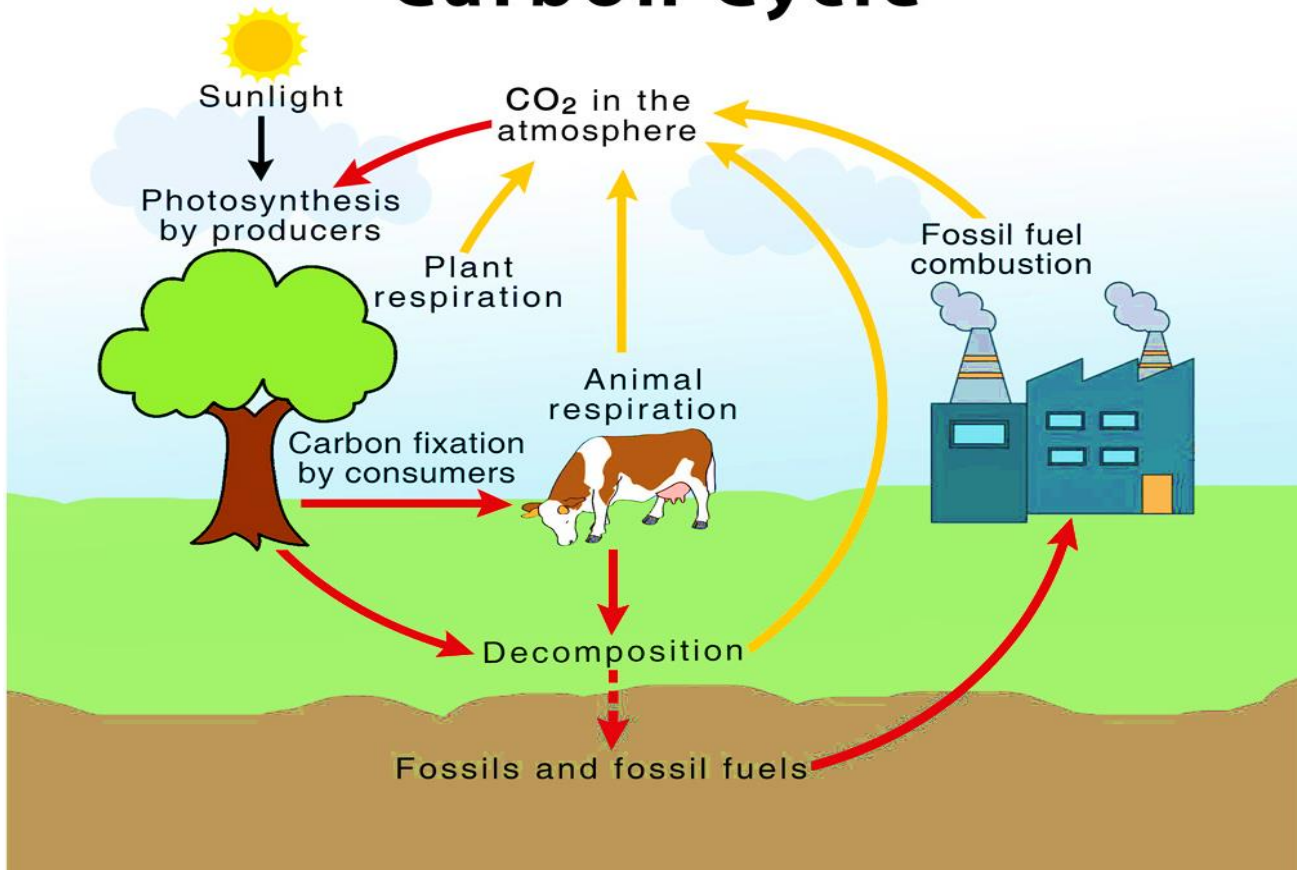
**Ans:** Sedimentary cycles occur in the Earth's crust or rocks and contain reservoirs. Nutrient elements like phosphorus, sulphur, potassium, and calcium are found in the Earth's sediments. These cycles are slow and take a considerable amount of time to complete their circulation, making them less efficient. This is because the nutrient elements can become trapped in reservoir pools during recycling, causing a delay in their release and continuation of circulation. As a result, they often remain out of circulation for extended periods of time.

**13. Outline salient features of carbon cycling in an ecosystem.**

**Ans:** The carbon cycle is a vital cycle that occurs in the atmosphere. All living organisms are made up of carbon, which is an essential element. Carbon is found in biomolecules such as lipids, carbohydrates, and proteins, which are crucial for life processes. Plants, as primary producers, incorporate carbon through photosynthesis. During photosynthesis, plants use carbon dioxide from the atmosphere and sunlight to produce glucose, which is then used by other living organisms. To complete the cycle, it is necessary to recycle the absorbed carbon dioxide back into the atmosphere. This can be done through various processes. Respiration breaks down glucose molecules and releases carbon dioxide gas. Decomposition

also releases carbon dioxide from the bodies of dead animals and plants into the atmosphere. Other sources of carbon dioxide include industrialization, fuel combustion, deforestation, forest fires, volcanic eruptions, and more.

# Carbon Cycle



YOUR MILE