

1. 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 \_\_\_\_\_.

- Ans.** (a) Autotrophs (b) Inverted  
(c) Sunlight (d) Earthworm and vulture  
(e) Ocean

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)

3. The second trophic level in a lake is \_\_\_\_\_.

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

**Ans.** (b)

4. Secondary producers are \_\_\_\_\_.

- (a) Herbivores (b) Producers
- (c) Carnivores (d) None of the above

**Ans.** (d)

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)

6. Distinguish between

- (a) Grazing 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.**
- (a) Grazing food chain begins with primary producers or plants and ends in carnivores (tertiary or top carnivores) whereas detritus food chain begins with detritus or dead organic matter and it ends in carnivores.
  - (b) Production is the phenomenon in which the biomass or energy is produced while decomposition refers to the breakdown of complex organic matter into simpler ones.
  - (c) In upright pyramid, biomass or number of organisms or amount of energy decreases on moving to upper trophic levels while in an inverted pyramid these quantities tend to increase on going to successive trophic levels.
  - (d) A food chain is a sequence of different types of organisms by which the flow of energy occurs from one trophic level to another food web is the network of various food chains inter-connected to each other.
  - (e) Letter is the dead organic material fallen on the surface of the soil like leaves, remains of animals and excreta. Detritus is the dead organic matter found below the soil surface which is eaten up by the detritivores or broken down by decomposers.
  - (f) **Primary productivity:** It is the rate of synthesis of biomass or energy fixation by the plants.  
**Secondary productivity:** It is the rate of synthesis of biomass by consumers (herbivores and carnivores).
7. Describe the components of an ecosystem.

**Ans.** The components of an ecosystem can be divided into two categories:

(1) Biotic and (2) Abiotic

(1) **Biotic components:**

- (i) **Producers** – Green plants which can synthesise their own food.
- (ii) **Consumers** – They do not synthesise their food. They may be
  - **Primary consumer/herbivores** – consuming plants as food.
  - **Secondary and tertiary consumers or carnivores** – The food on either herbivores or carnivores.
- (iii) **Decomposers** – These organisms break down the dead bodies or waste products of plants and animals into simpler inorganic compounds.

(2) **Abiotic components:** These includes

(i) **Climatic components**

- Light
- Temperature

- Wind
- Rain
- Atmospheric gases
- Atmospheric humidity

(ii) **Soil factors**

- Organic materials
- Soil water
- Minerals
- Soil air

(iii) **Topographic factors**

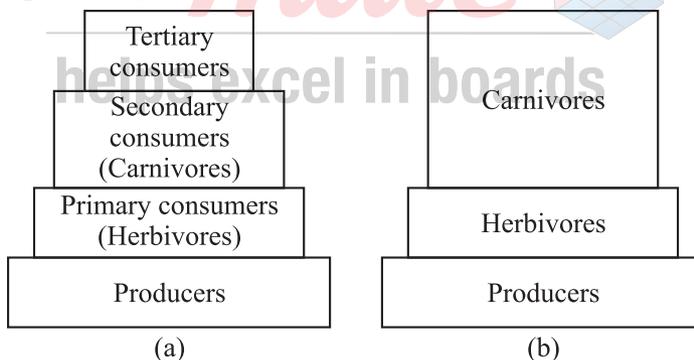
- Altitude
- Direction and steepness slope

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

**Ans.** Ecological pyramid is a graphical method to show the number of organisms or biomass or amount of energy present at different trophic levels.

**Pyramid of number:** Number of individuals at each trophic level is shown in pyramid. The pyramid of number (for example of a grassland) is upright. In this there is a decrease in the number of organisms starting from primary producers (plants) to top consumers (carnivores).

**Pyramid of biomass:** Biomass of each trophic level is shown in pyramid while pyramids of biomass of a tree or grassland ecosystem are upright, the pyramid of a pond ecosystem is inverted.



**Fig. 7.1 (a) Pyramid of Number in a grassland ecosystem; (b) Pyramid of Biomass in a grassland ecosystem**

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

**Ans. Primary productivity:** It is the amount of energy fixed or biomass synthesised by primary producers or green plants per unit area per unit time during photosynthesis.

**Factors affecting primary productivity:**

- ❖ Plant species inhabiting a particular area
- ❖ Sunlight
- ❖ Temperature
- ❖ Soil water
- ❖ Nutrients

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

**Ans.** Decomposition is the breakdown of dead or waste organic matter by micro-organisms. Decomposition is both physical and chemical in nature.

Process involved in decomposition are

- ❖ **Fragmentation:** Breakdown of detritus into smaller particles.
- ❖ **Catabolism:** Enzyme degradation of detritus into simpler organic substances by bacteria and fungus.
- ❖ **Leaching:** Water soluble inorganic nutrients go down into the soil.

Various inorganic and organic substances are obtained by decomposition. Inorganic substances are obtained in the process of mineralisation while organic substances are obtained in humification. A dark coloured amorphous substance called humus is formed by decomposition.

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

**Ans.** Flow of energy in an ecosystem is unidirectional. The ultimate source of energy is sun. The solar energy is captured by the green plants which utilise it in synthesising their own food. The energy fixed by the green plants is transferred to herbivores which feed on them. The energy is then transferred to higher trophic levels (carnivores). At every step, considerable amount of energy is lost. According to 10% law only 10% of total energy stored in a trophic level is transferred to the next trophic level of a food chain.

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

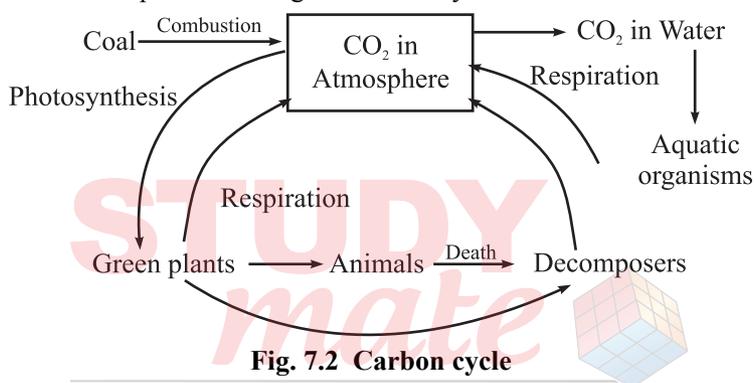
**Ans.** The movement of nutrient elements through various components of an ecosystem takes place by a biogeochemical cycle. It is of two types – gaseous and sedimentary. Sedimentary cycle involves cycling of sulphur, phosphorus, etc., which are located in earth's crust.

**Phosphorus Cycle:** Phosphorus is a very important element as it is present in various substances found in living beings. The cycling of phosphorus in an ecosystem occurs in such a way that plants obtain it from soil or rocks. The animals or primary consumers obtain it from plants. Secondary consumers or carnivores take it from herbivores while omnivores (like man) receive

it both from plants and animals. Phosphorus present in organisms is also released during decomposition.

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

**Ans.** Carbon is an important constituent of living matter. Green plants take it in the form of  $\text{CO}_2$  from atmosphere and fix it as carbohydrates. Carbon which is also present in proteins, fats, etc. is transferred to the organisms of other trophic levels. Apart from being released in atmosphere as  $\text{CO}_2$  during respiration, carbon is also released in atmosphere through burning of wood, fossil fuel and decomposition of organic matter by microbes.



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