# Ecosystem



- (a) Plants are called as\_\_\_\_\_ because they fix carbon dioxide.
- Ans: Plants are called <u>autotrophs</u> because they fix carbon dioxide.

(b) In an ecosystem dominated by trees, the pyramid (of numbers) is \_\_\_\_\_ type.

Ans: In an ecosystem dominated by trees, the pyramid (of numbers) is of <u>inverted</u> type.

(c) In aquatic ecosystems, the limiting factor for productivity is

Ans: In aquatic ecosystems, the limiting factor for productivity is <u>light</u>.

(d) Common detritivores in our ecosystem are\_\_\_\_\_.

Ans: Common detritivores in our ecosystem are <u>earthworms</u>.

(e) The major reservoir of carbon on earth is \_\_\_\_\_.Ans: A major reservoir of carbon on Earth is <u>oceans</u>.

- 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 include microorganisms like bacteria and fungi. A largest population is formed by them in a food chain and they obtain nutrients by breaking down the remains of dead plants and animals.

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

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

Primary consumers are at the level of Second trophic. These are the organisms that eat the primary producers. Zooplankton is also one of them.

They are the primary consumers in aquatic food chains that feed upon phytoplankton and efficiently digest plant matter for energy.

### 4. Secondary producers are

- (a) Herbivores
- (b) **Producers**
- (c) Carnivores

#### (d) None of the above

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

Plants are the only producers and they lie at the lowest trophic level. Thus, they are called primary producers. There are no other producers in the food chain.

## 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%

About fifty percent of total incident solar radiation forms photosynthetically active radiation of PAR.

### 6. Distinguish between

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

#### Ans:

Grazing food chain	Detritus food chain
Energy is derived from the Sun in	Energy comes from organic matter
the grazing food chain.	which is generated in trophic levels
	of the grazing foodchain.
It starts with the producers,	It starts with detritus like dead
available at the first trophic level.	bodies of animals or fallen leaves,

The plant biomass is then eaten	which are then consumed by
by herbivores, which successively	decomposers or detritivores. These
are consumed by a spread of	detritivores are in turn eaten by
carnivores.	their predators.
This food chain is a large one.	Detritus food chain is smaller as
	compared to the grazing food
	chain.

## (b) Production and decomposition

### Ans:

Production	Decomposition
It is the rate of organic matter	Breaking down of complex organic
produced by producers.	matter with the help of
	decomposers from the body of
	dead plants and animals and
	converting into organic raw
	materials like CO <sub>2</sub> , H <sub>2</sub> O, and other
	nutrients.
It is dependent on the	It occurs with the help of
photosynthetic capacity of the	decomposers.
producers.	
The requirement of sunlight is	No sunlight requirement is there in
necessary by plants for primary	the process of decomposition.
production.	

## (c) The upright and inverted pyramid

Ans:

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

## (d) Food chain and Food web

## Ans:

Food chain	Food chain
It is a single linear sequence of	It is a network formed by
organisms.	interconnecting food chains.
In this chain, members are present	Alternate food sources are present
at higher trophic levels which	in one organism.
sustain single types of organisms.	

## (e) Litter and detritus

## Ans:

Litter	Detritus
Litter is all the wastes that are	Detritus is the remains of dead
produced above the ground.	plants and animals in an

	ecosystem.
Litter consists of both	Detritus consists of only
biodegradable and non-	biodegradable matter.
biodegradable matter.	

## (f) Primary and secondary productivity

#### Ans:

Primary productivity	Secondary productivity
It is defined as the rate at which	It is defined as the rate of
organic energy is stored as	production of organic matter by
organic matter produced by	consumers over a while.
producers per unit an area over a	
while.	

## 7. Describe the components of an ecosystem.

**Ans:** An ecosystem creates a link that has both the biological community as well as the non-living components of an area. The ecosystem was defined as the living world and its habitat by A.G. Tansley. It meant that any habitat on the earth which includes plants, animals, and non-living substances interact to produce materials that can be exchanged between living and nonliving components of the habitat in an ecosystem. Thus, they perform as a unit, which gets conspicuous during the processes of nutrient cycling, energy flow, decomposition, and productivity. Many ecosystems like ponds, forests, grasslands, etc are there.

The two components of an ecosystem are:

Biotic component: The living component of an ecosystem is the biotic component. Which includes biotic factors such as producers, consumers,

decomposers, etc. It is divided into major groups:

(a) Producers are green plants that include plants and algae. The presence of chlorophyll pigment, helps them carry out the process of photosynthesis in the presence of light. Thus, they are also referred to as converters or transducers.

(b) Consumers or heterotrophs are organisms that cannot manufacture food and are, therefore, directly (primary consumers) or indirectly (secondary and tertiary consumers) dependent on producers for their food.

(c) Decomposers are the microorganisms like bacteria and fungi. The largest population is contributed by them in a food chain by breaking down the remains of dead plants and animals, and nutrients are obtained.

Abiotic component: These are the nonliving components within an ecosystem such as light, temperature, water, soil, air, inorganic nutrients, etc.

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

**Ans:** An ecological pyramid is a graphical representation of the number, biomass, and energy of the successive trophic levels of an ecosystem. In an ecological pyramid, the lowermost trophic level is formed by the producers and the topmost level is that of carnivores.

There are three types of pyramids:

- > Pyramid of numbers
- > Pyramid of energy
- Pyramid of biomass

Pyramid of numbers: It shows the association between the number of producers, herbivores, and carnivores. Depending on the number of

producers, it can be upright or inverted. In a grassland ecosystem, grasses are the producers. The pyramid of numbers is often upright. In this type of 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, At the producer level the number of individuals will be greatest, while at the top carnivores, the number of individuals present will be least.



Whereas on the other hand, in a parasitic food chain, the pyramid of numbers is inverted. In this type of food chain, several fruit-eating birds are provided with food by a single tree (producer), which in turn support several insect species.

Pyramid of biomass: A pyramid of biomass may be a graphical representation of the whole amount of living matter present at each trophic level of an ecosystem. It can be upright or inverted. The pyramid of biomass in grasslands and forest ecosystems is upright as the amount of biomass present at the producer level is higher than at the top carnivore level. In a pond ecosystem, the pyramid of biomass is inverted as the biomass of fishes far exceeds the biomass of zooplankton (upon which they feed).



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

**Ans:** It is defined as the amount of organic matter or biomass produced by producers per unit area over a while. The primary productivity of an ecosystem depends on a 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.

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

- **Ans:** Decomposition is the process that involves the breakdown of complex organic matter or biomass with the help of decomposers from the body of dead plants and animals into inorganic raw materials like carbon dioxide, water, and other nutrients. The processes involved in decomposition are as follows:
  - Fragmentation: The first step in the process of decomposition is fragmentation. By the action of detritivores, there is the breakdown of detritus into smaller pieces like in earthworms is called fragmentation.
  - Leaching: Several water-soluble inorganic substances percolate into the deeper layers of soil along with rain or irrigation water, it is known as leaching.

- Catabolism: Bacteria and fungi degrade detritus through various enzymes into smaller pieces is called catabolism.
- Humification: The formation of a finely divided, amorphous darkcolored colloidal substance called humus, which acts as a reservoir of nutrients for plants is called humification.
- > **Mineralization:** By the action of microbes, humus is further degraded which finally results in the release of inorganic nutrients into the soil.

A dark-colored, nutrient-rich substance called humus is produced by the process of decomposition. Humus thus degrades and releases inorganic raw materials such as CO<sub>2</sub>, water, and other nutrients in the soil.

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

In ecosystems, useful energy flows in a one-way path. It enters the Ans: living things from the physical world, passes from one organism to a different and eventually escapes back to the physical environment in a less useful form. Energy enters an ecosystem from the Sun. Solar radiations are absorbed by the Earth's surface through the atmosphere. The process of photosynthesis is carried out by these radiations. Also, they help to maintain the Earth's temperature for the survival of living organisms. Few of the solar radiations are reflected by the Earth's surface. However, a very little 2-10 percent of solar energy is captured by green plants (producers) during photosynthesis to be converted into food. The total rate of photosynthesis, including the organic matter that is almost immediately used up in plant respiration, 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. For various processes such as respiration, growth, and reproduction, the remaining 90% of the energy is used. Similarly, only 10% of the energy of herbivores is transferred to carnivores. Therefore, this is called the ten percent law of energy flow.



Diagrammatic representation of flow of energy through different trophic levels