

2. Ecology and Ecosystem

1 Define Ecology and explain scope of ecology.

→ Ecology: Ecology is a Greek word. (Oikos means house, logos - Science)

Ecology is branch of Biology.

Ecology is closely related to physiology, ethology and evolutionary biology.

Ecology is multi-disciplinary science.

Ecology is the study of the interrelationship between living and non living Organisms.

Ecological system are studied at different levels.

Ecology has two types

1) Autecology

2) Synecology

1 Autecology: It is the study of individual species in relation of the environment.

2 Synecology: It is the study of groups of organisms in relation to the environment.

→ Scope of Ecology:

1 Ecology helps to tackle the environmental problems.

2 Ecology helps to tackle the global problem like Greenhouse effects, Ozone depletion, Acid rain etc.

3 Ecology helps to understand biochemical cycles like water, carbon, oxygen etc.

4 It helps to protect flora and fauna.

5 Ecology helps to maintain balance in nature.

6 Ecology is the scientific study of earth, air, water and living organisms.

7 It helps in protecting the environment.

2. Give classification of ecology.

Classification of ecology:

(1) On the basis of nature of study ecology.

a Autecology: It is the study of individual species in relation of the environment.

Autecology is also called "species ecology."

b Synecology: It is the study of groups organisms in relation to the environment.

Synecology is also called "Ecology of communities."

Synecology has three types 1) Population ecology

2) Gene ecology

3) Taxonomic ecology

(2) On the basis of environment.

a. Aquatic Ecology: The study of the plants and animals that lives in waterbodies.

Aquatic Ecology has three types.

- 1) Marine ecology
- 2) Fresh water ecology
- 3) Stream Ecology

b. Terrestrial Ecology: The study of the which are found on land.

Terrestrial Ecology has three types.

- 1) Grassland ecology
- 2) Forest ecology
- 3) Desert ecology

3. Explain components of Ecosystem.

Components of ecosystem:

1. Biotic Components

In Biotic Components all the living things of the ecosystem.

It includes plants, animals and microorganisms.

2. Abiotic Components

In Abiotic components all the non-living things of the ecosystem.

It includes wind, water, soil etc.

→ Biotic Components are divided into three categories

- a) Producers
- b) Consumers

a) Producers: It refer to all the green plants of the ecosystem.

Green plants are prepare own food by photosynthesis process.

→ They can prepare food with use of sunlight, water, carbon dioxide.

b) Consumers: It refer to the all organisms that consume food that are prepared by producers.

Consumers can not prepare own food.

They are classified into three categories.

- 1) Primary Consumers
- 2) Secondary Consumers
- 3) Tertiary Consumers

4 Define ecological pyramid and its relationship to food structure.

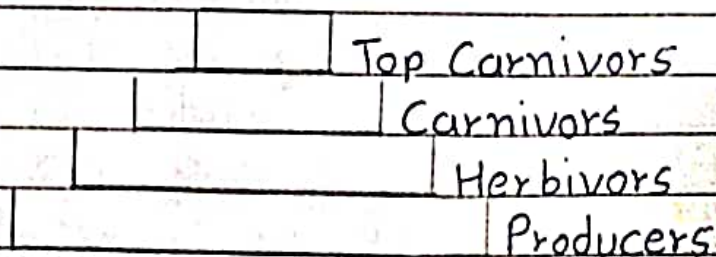
Ecological is graphical representation to the biomass at each trophic level in ecosystem.

There are three type of Ecological Pyramid.

- 1) Pyramid of number
- 2) Pyramid of Biomass
- 3) Pyramid of Energy.

1) Pyramid of number :

Pyramid of number represent the individual Organisms number at each trophic level of food chain.

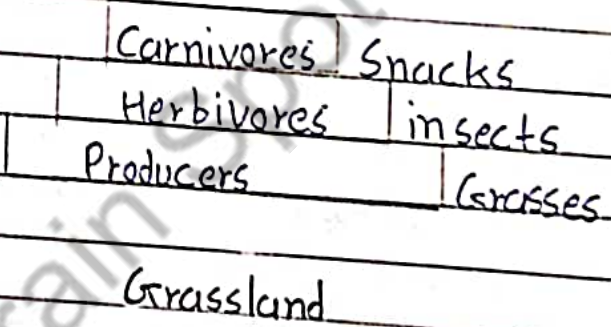


a) grassland

The pyramid does not take in account the size of the individuals.

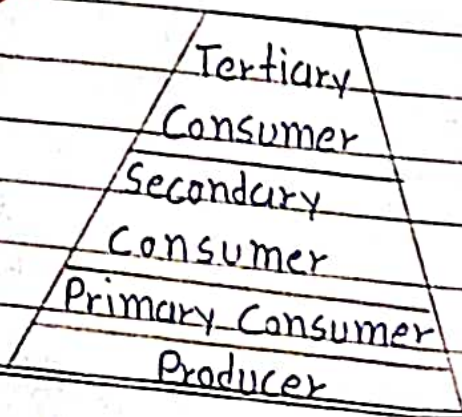
2. Pyramid of Biomass

Pyramid of Biomass represent the total Biomass in food chain at each trophic level.



3. Pyramid of Energy :

Pyramid of Energy represent the amount of Energy at each trophic level of Food Chain.



5 Explain Energy Flow in Ecosystem.

Such is the primary source of energy for every ecosystem.

The flow of an ecosystem starts with photosynthesis and release into the surroundings through metabolic process.

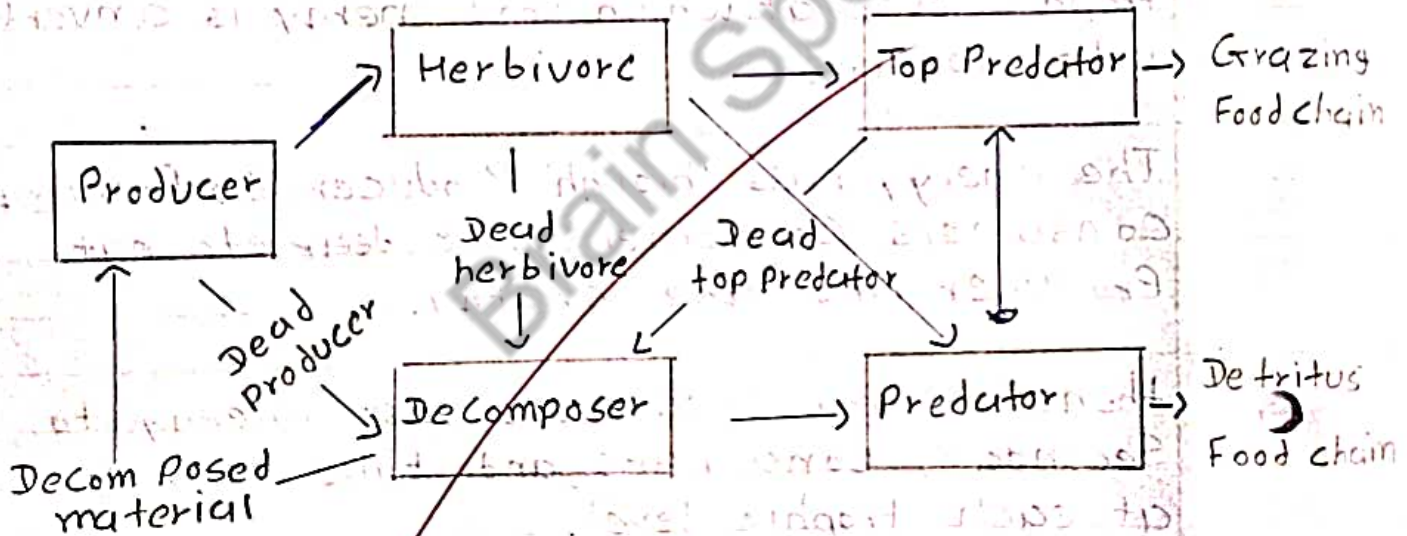
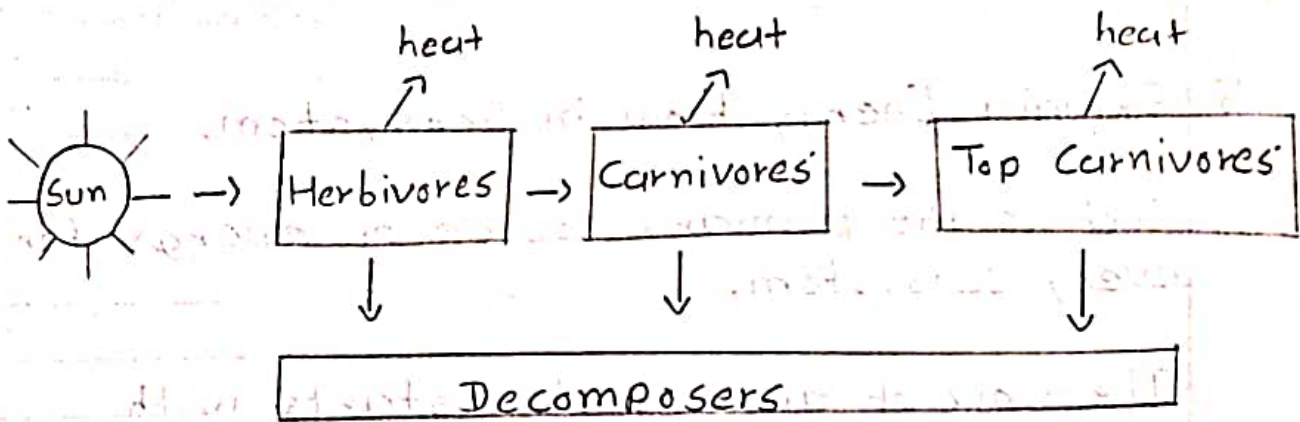
The amount of energy passing at each trophic level at which food energy is converted into biomass.

The energy pass through Producer to Primary Consumers. Consumers like deer etc eat Producer and take energy.

then Primary consumers pass energy to Secondary Consumers and take energy at each trophic level.

then Secondary Consumers pass energy to Tertiary Consumers and take energy at each trophic level.

Tertiary Consumers when death then decomposers eat tertiary Consumers.



Decomposers take energy and send energy in soil.

again Producer take energy in Soil through the process of Photosynthesis.

This is the energy flow in Ecosystem.

Energy Flow pass the Energy in two way.

1) Single channel

2) Y-shaped.

1 Single Channel:

This Flow model is first published by H.T. Odum.

There is loss of energy at every trophic level and also a corresponding in biomass.

2 Y-Shaped:

Y-shaped model shows a common boundary, light and heat flow as well as import.

In Y-shaped model one represents the grazing food chain.

6 Write a short note on symbiosis relationship.

-> Symbiosis: Symbiosis is Greek word which means that with and living.

Symbiosis is relationship between two organisms from different species.

For the organism the relationship may be beneficial or harmful.

There are three type of Symbiosis.

1) Mutualism

2) Commensalism

3) Parasitism.

1 Mutualism:

This symbiosis have two side relationship.

It is mutually beneficial symbiotic relationship.

In this symbiosis both parents are benefit.

In this relationship organism can not survive without each other.

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Ex. Bees relationship with Flowers,

2. Commensalism:

This symbiosis have one side relationship.

In this symbiosis one parents are benefit and second parents in is not benefit but it is not harmful.

In this symbiosis one organisms benefit but they not harm to the host.

Ex. Spider Uses tree to build its web.

3. Parasitism:

This symbiosis have one sides relationship.

In this symbiosis one parents are benefit and one parents harm second parents.

In this symbiosis one organisms benefit but they harm second organisms host.

Ex. Mosquitoes feed the blood from other organisms.

7 Explain Food chain and Food web in the detail.

-> Food chain:

A Food chain is the path by which energy passes from one living organism to another organism.

Energy passing through the one to another organism.

Food chain also shows how organisms are related to each other by the food they eat.

These are the three type of Food chain.

1 Predator Food Chain:

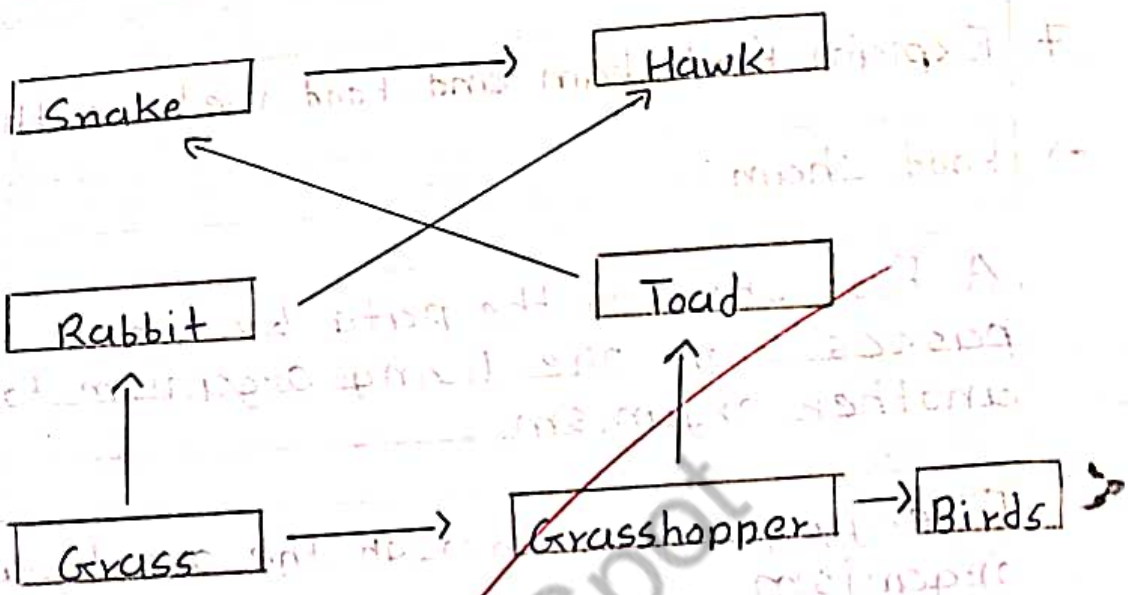
This Food chain known as a grazing Food chain.

This Food chain starts from the producer and ends with higher consumer level.

In this Food chain size of the organism increases than their number decreases.

grass → Grasshopper → Toad → Snake

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Food web

This food chain starts from the producer level. The food chain is known as a primary food chain. This food chain is also called as a simple food chain. There are three types of food chains. Producer food chain.

2. Parasitic Food chain:

This Food chain starts from big host and ends with the parasitic Organisms.

Cow \rightarrow Worm \rightarrow Protozoa

3. Saprophytic Food chain:

This Food chain known as detritus Food chain.

This Food chain starts from death Organisms and ends with decomposers.

Death \rightarrow Fungi \rightarrow Bacteria.
Organisms

\rightarrow Food web

The Food web interlinked at different trophic levels to form a complex interaction between different from the point of view of food.

Charles Elton concluded that maximum Five Food chain interlinked with each other.

8 Explain these cycle in details.

a Hydrological Cycle

Hydrological is biogeochemical cycle.

Hydrological cycle interchange of water between living organisms and environment.

This cycle is the process of transfer of moisture from atmosphere to the earth.

The main components of cycle

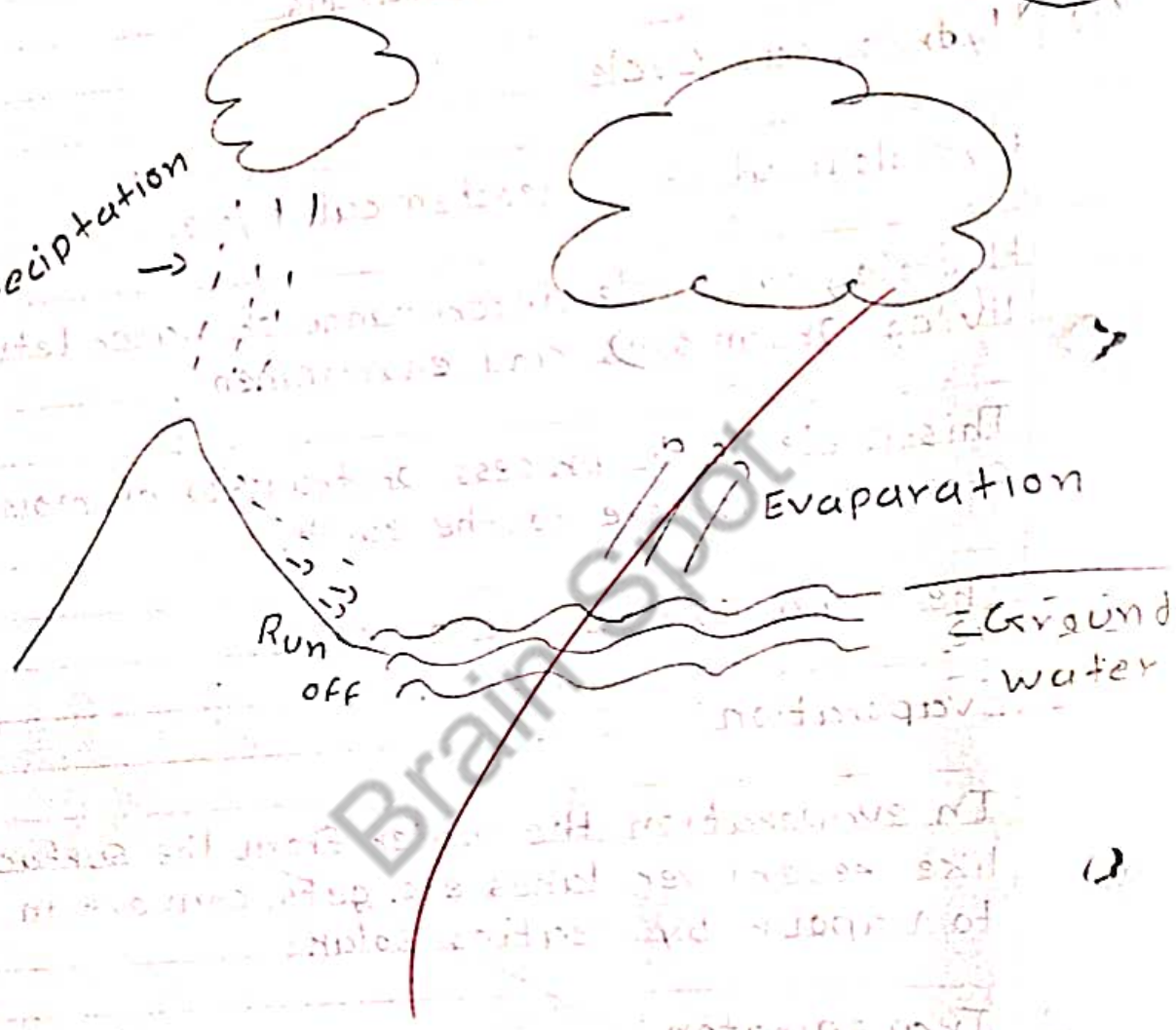
1 Evaporation:

In evaporation the water from the surfaces like river, lakes etc gets convert in to vapour by heating solar.

2 Transpiration:

Some vapour is converted in ice at the peak of mountains. The ice melts in summer and meet sea etc.

Precipitation



Run off

Evaporation

Ground water

3 Precipitation:

The vapour convert in clouds. And temperature and pressure of fall and water come to the surface

4 Infiltration:

Some part of the water infiltrate in ground and join in ground water.

5 Runoff

Some water is flow in surface this is called runoff.

These process make a hydrological cycle.

The cycle is expressed by this equation.

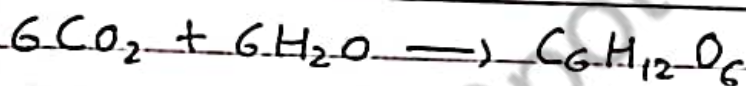
$$\text{Precipitation} = \text{Runoff} + \text{Evaporation}$$

$$P = R + E$$

b Carbon Cycle :

Carbon in the form of carbon dioxide in atmosphere.

Form of Carbon Dioxide is taken by Producers as raw material for photosynthesis process for green plant food making process.



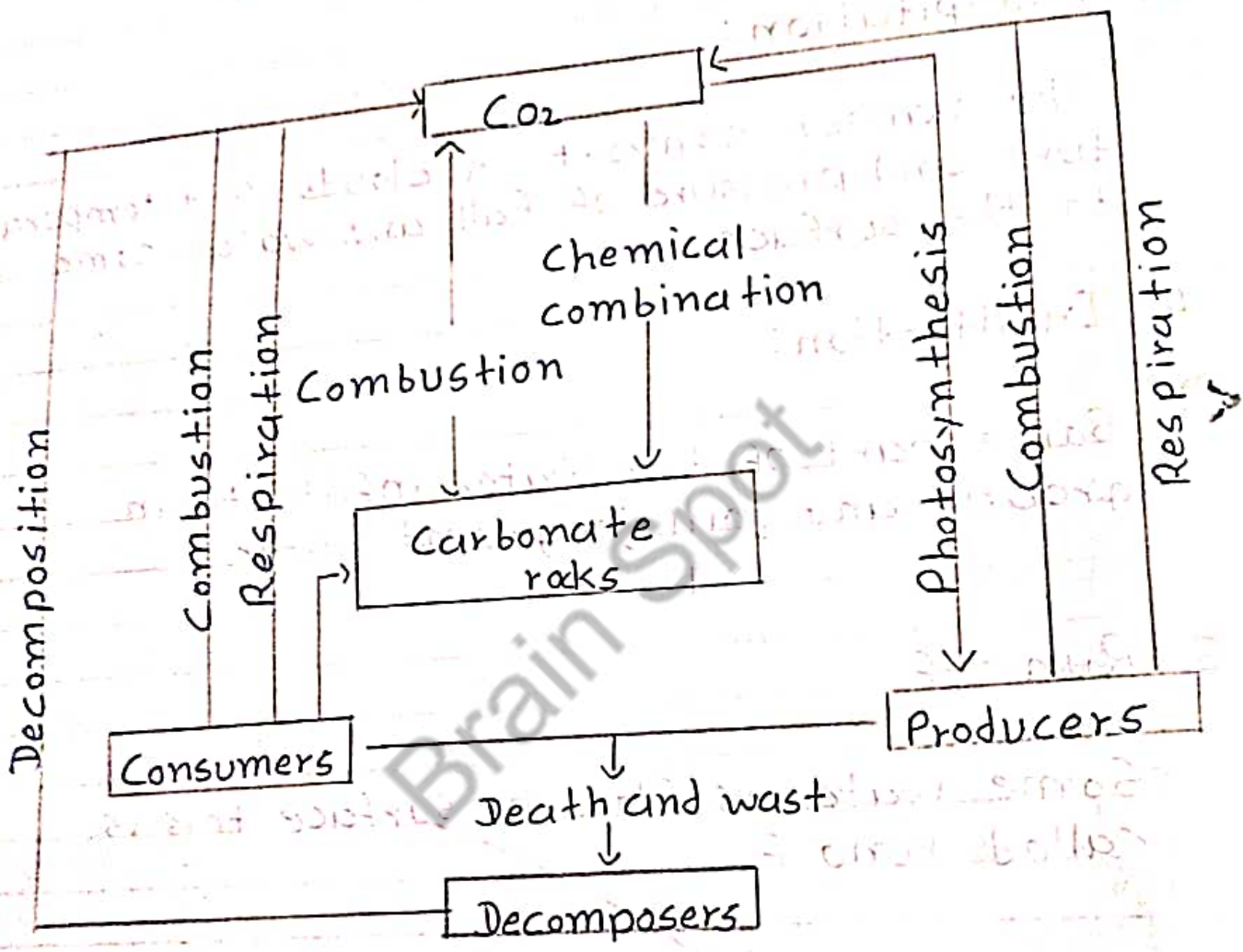
Producers pass carbon dioxide in atmosphere through Respiration Process.

Producers to the consume by the herbivores.

During respiration process animal also back to surrounding medium take Carbon dioxide.

The Dead bodies plants and animal also release carbon dioxide in atmosphere.

Herbivores to the consume by the Carnivores and Carnivores also consume by the top Carnivores.



Carbon Cycle

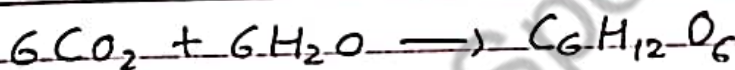
The cycle is expressed by the equation:
 Precipitation - Run off + Evaporation

B O B F E

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When top Carnivores death then decomposers during decomposition process decomposers release Carbon dioxide.

Consumers also release carbon dioxide during respiration process.

This is way to pass Carbon in atmosphere through the one medium to another medium.

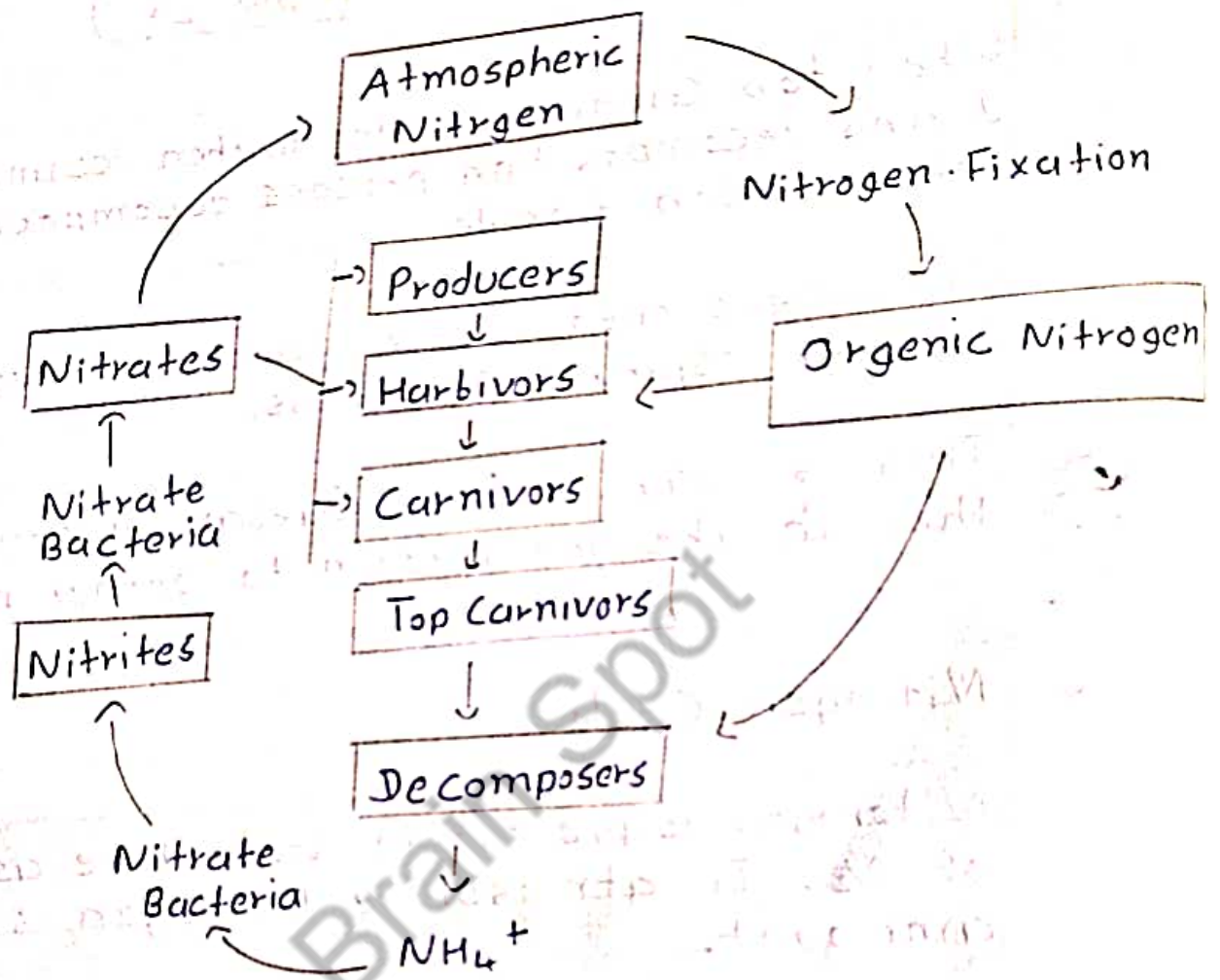
C Nitrogen Cycle:

Nitrogen is present in atmosphere as form of N_2 . In atmosphere Nitrogen is large amount.

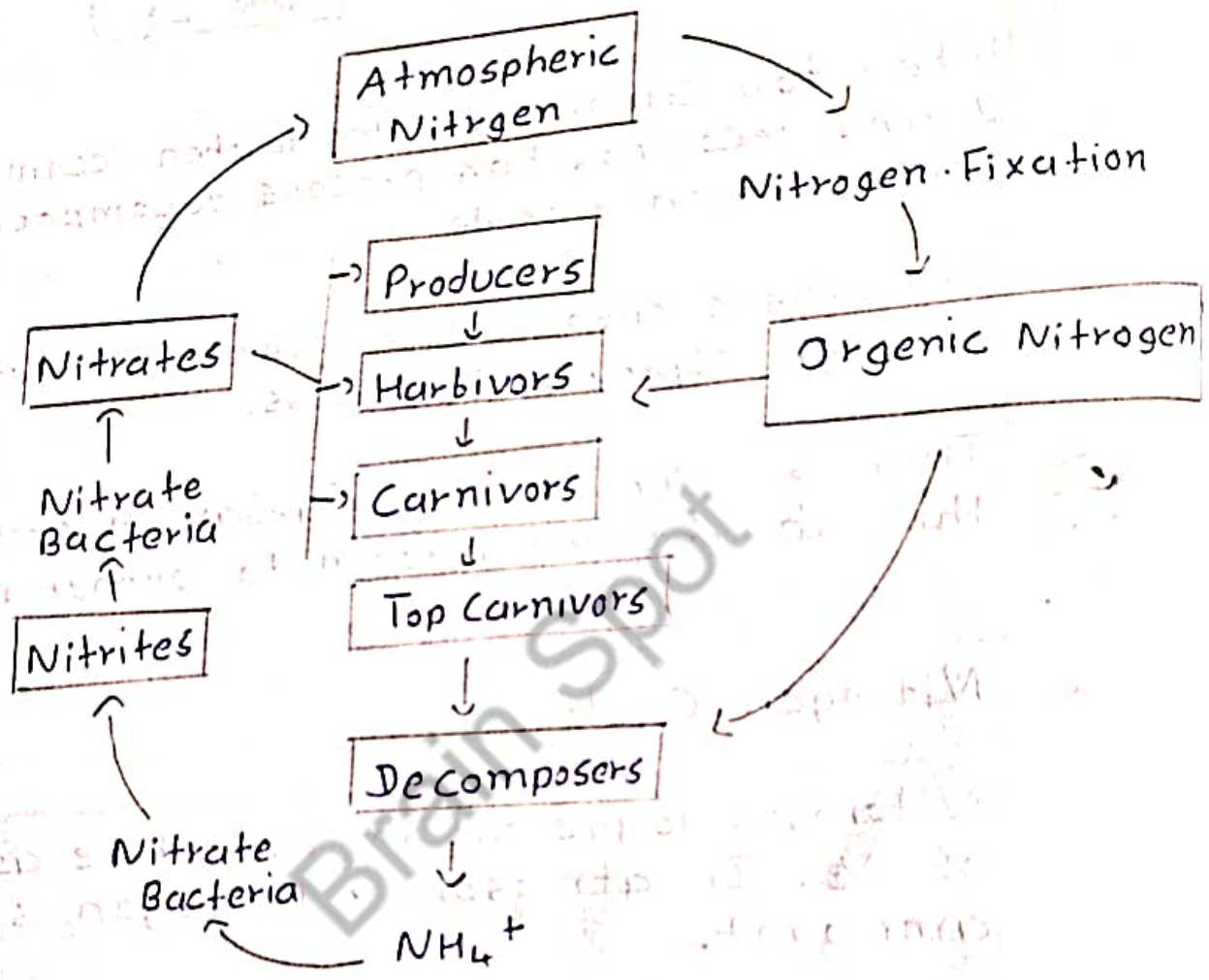
It is Fixed nitrogen fixation either physical process like lightening or biologically by some bacteria.

These microorganism converts elemental nitrogen in to nitrates.

The biological fixation of Nitrogen is approximate 20 times more than by non biological method.



Nitrogen Cycle



Nitrogen Cycle

Nitrogen is taken up by plants and used in metabolism for amine acids, proteins, vitamins etc.

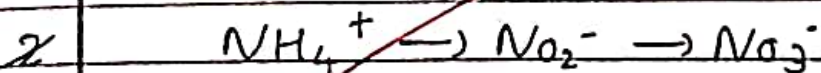
Nitrogen is passed through the Food chain. Plants pass nitrogen to herbivores.

Herbivores pass nitrogen to Carnivores and Carnivores also pass nitrogen to top carnivores.

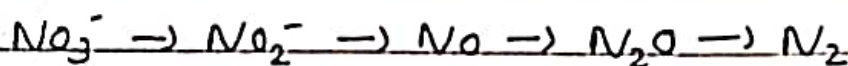
After death of plants and animals and during decomposition process decomposers release Nitrogen in soil or atmosphere.

Nitrogen is also released by some processes.

1) **Nitrification**: bacteria like microorganisms convert Ammonia to Nitrite and convert to nitrate



2) **Denitrification**: In denitrification bacteria convert nitrate to nitrogen gas.



d Sulphur Cycle:

Sulphur occurs both in free state as well as form of sulphides and sulphates.

The burning of fuels releases the sulphur in atmosphere form of H_2S , SO_2 etc.

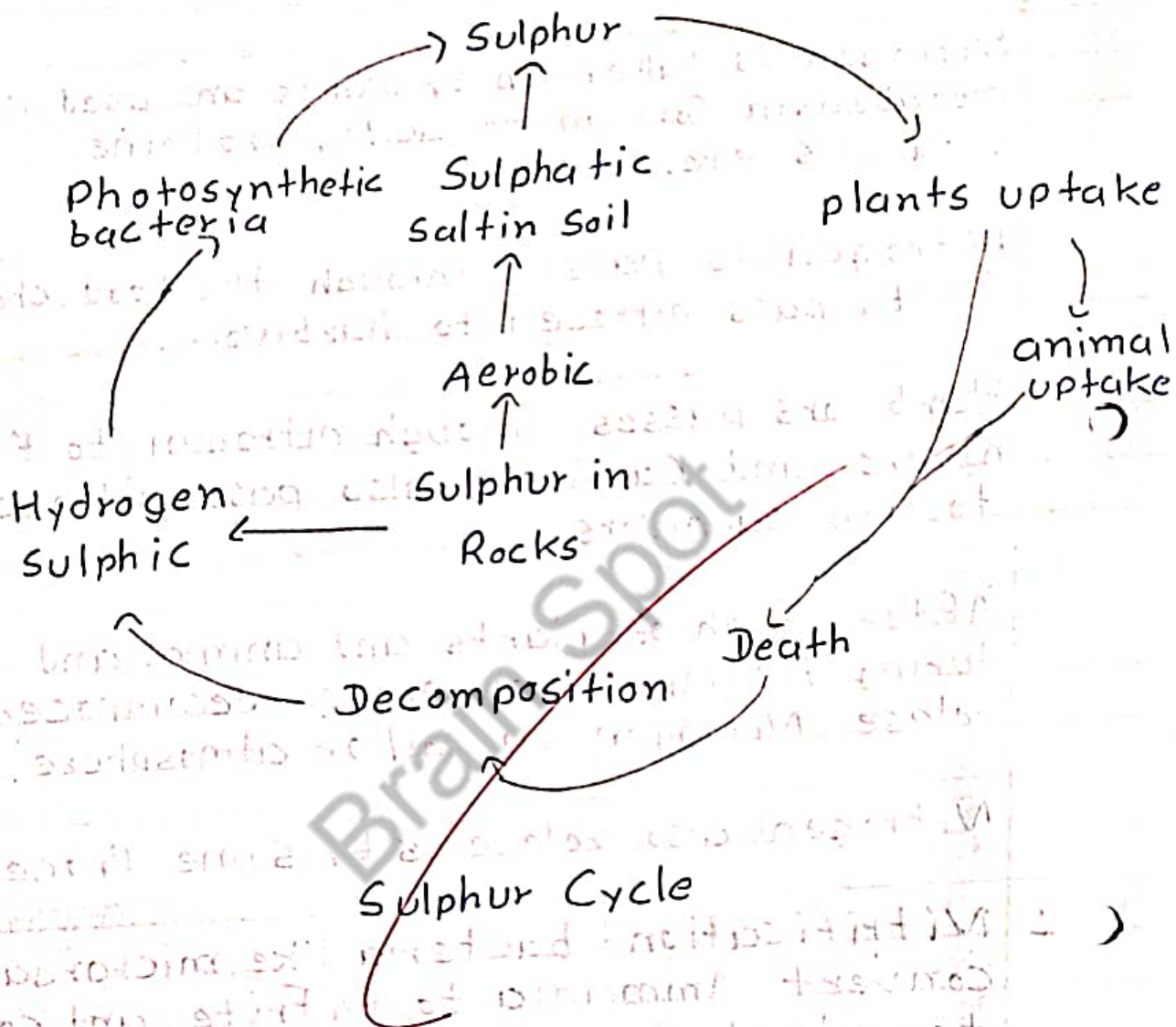
⇒ Sulphur in the form of SO_4^{2-} is absorbed by plants.

The plants pass sulphur through the herbivores and herbivores pass sulphur to carnivores.

Carnivores pass sulphur to top carnivores. After death the decomposers during decomposition process release sulphur in form of sulphates.

⇒ Sulphates bacteria is again utilized by plants and cycle goes on.

This is way to sulphur pass through the atmosphere.



Sulphur Cycle

Brain Spot

e Phosphorus Cycle:

Phosphorus is the main constituent of ATP and ADP.

Phosphorus is very essential for the growth of plants as well as animals.

→

Many Rocks contain phosphorus usually PO_4^{-3} form is ~~r~~. Due to weathering PO_4^{-3} is released into soil and becomes available to the plants.

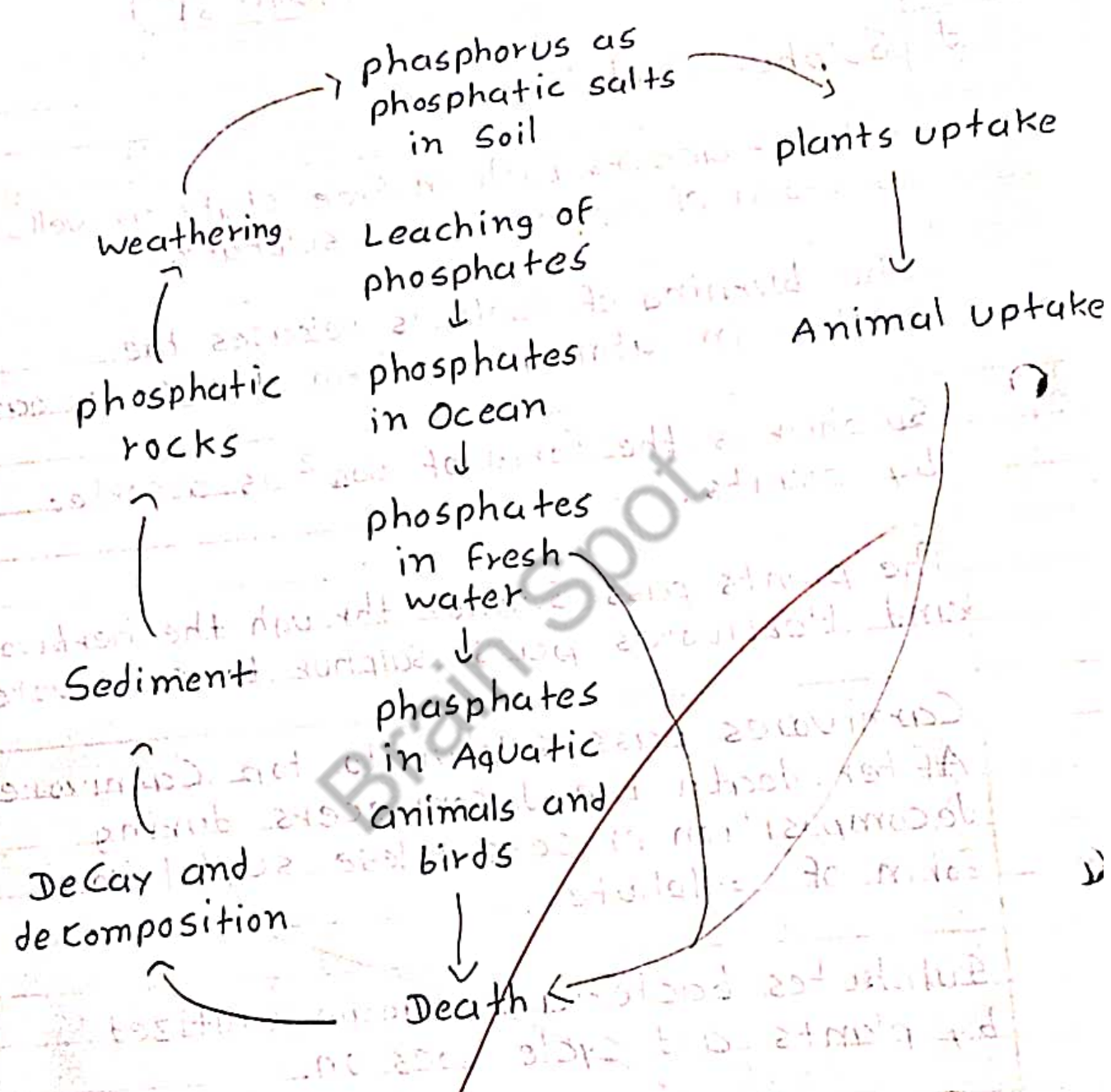
The phosphates PO_4^{-3} are utilized by the plants in metabolism and passed on to heterotrophic organisms through the Food chain.

→

After death the bodies of plants and animal as well their waste are decomposed.

During Decomposition process micro-organism releasing phosphorus in the form of phosphates into soil.

This is way to phosphorus pass through the atmosphere.



phosphorus Cycle

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9 Explain these Ecosystem.

a Pond Ecosystem

Pond Ecosystem is a small Fresh water stagnant

There are communities of organisms that are dependent on water environment.

The pond is a small body of standing water.

The pond ecosystem is complex interactions between its biotic and abiotic components.

→ Abiotic Component

Light, temperature, water, Soil, O_2 , CO_2 , N_2 , All the Organic Components etc.

→ Biotic Component

Producers: Aquatic Green plants, etc

Consumers: Insects, Fishes, Large Fishes, Water snake, water birds etc.

Decomposers: Bacteria, Fungi etc.

b Marine Ecosystem

Marine ecosystem is complex of living organisms in the ocean environment.

Marine waters cover two-thirds of the surface of the earth.

These ecosystem are different from Fresh-water ecosystem because of its salty water.

Water covering approximately 71% of the earth's surface and 97% water in oceans.

Marine Ecosystem are the largest types of ecosystems on the planet.

- → Abiotic Components

High Na, Ca, Mg, K salt concentration, light and temperature

→ Biotic Components

Producers - large seaweeds, Carapa etc.

Consumers - Fish, Herring, Cod etc.

Decomposers - Bacteria, Fungi etc

C Forest Ecosystem

Forest covering approximately 40% of the land area.

In India Forest Ecosystem is covering approximately 1/10th of the total land in area.

These are the ecosystems having of trees with large number of species of herbs, shrubs and wide variety of wild animals and birds.

There are many layers of plants and different types of animals are found in these forest.

→ Abiotic Components :

These are the organic substances which present in soil and atmosphere

Conditions of light are different at canopy, sub canopy, middle zone, ground zone, little litter zone.

→ Biotic components:

(i) Producers: The trees are of different kinds depending upon the kind of Forest discussed above.

(ii) Consumers:

(a) Primary Consumers:

These are herbivores feeding on trees leaves like ants, flies, spiders etc

Large animals taking fruits of producers are elephants, deer etc.

(b) Secondary Consumers:

These are carnivores like snakes, birds, Fox feeding on herbivores

(c) Tertiary Consumers:

These are top carnivores like lion, tiger etc. eating secondary consumers.

(iii) Decomposers:

These are the fungi, bacteria etc decomposers.

D Grassland Ecosystem

The grassland Ecosystem covers about 10% of the earth's surface.

About 4.6×10^7 km² of the earth surface is covered with grasslands.

Grassland soils are highly fertile and contains large amount of organic matter.

Grassland soils are generally subjected to higher temperature.

Temperate grasslands receiving 25-100 cm of annual precipitation.

Tropical grasslands receiving up to 100 cm of annual precipitation.

Polar grasslands where severe cold, strong winds along with ice.

→ Abiotic Components :

These include nutrients present in soil and the atmosphere like C, H, O, N etc.

-> Biotic Components :

(i) Producers : These are grasses, Few forbs and shrubs.

(ii) Consumers :

(a) Primary Consumers :

These are herbivores which feed on grasses, insects which feed on the leaves of grasses.

(b) Secondary Consumers :

These are snakes, birds etc. and feed on herbivores.

(iii) Decomposers :

Decomposers are fungi, bacteria which decompose the dead organic matter.