Topic : ..... Date. : ..... Page No. : .....

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2000 35700 32 Khushal

Topic : ..... Date. : ..... Page No. : .....

ANSWER 5 :

- A living organism can't survive in an isolated environment. It's survival depends on both physical and other living components of environment for nutrition and energy. Thus, there is a need for living system, we call it as Ecosystem.

- The word ecosystem was first coined by Arthur Tansley in 1935. An ecosystem is the total of both the biotic (living) and abiotic (abiotic) components of a natural community. An ecosystem also involves the interaction between different living beings. For eg. - plants and animals eat each other to live, many animals pollinate flowers or spread their seeds to help plant reproduce.

- Energy, air, water, soil, soil minerals, and nitrogen are all important components of an ecosystem. External factors also matters in how an ecosystem exists and prospers. Climate, topography, time, biota and the parent material all affect the ecosystem in some way.

- The process of energy flows and nutrient cycles make it possible for both the biotic and abiotic elements to work together.

- The functioning of ecosystem majorly depends on two processes:
  1) Energy flow 2) Nutrient cycling

Energy is the capacity to do work and it is neither created nor destroyed. It can only be transferred from one system to another. So, the constant flow of energy is necessary in ecosystem. The energy flow in an ecosystem can be understood using food chains and food webs.

- **Food Chain:**

As energy transfers from one tropic level to the other tropic level through food chain.

Definition: A food chain is basically a sequence which shows transfer of energy from one organism to another through a series of actions, of eating and being eaten.

- **Working of Food Chain:**

Initially, the sun's radiant energy is stored in the producers during photosynthesis. The food produced by the producers is then eaten by primary consumers are eaten by secondary and tertiary consumers further, causing the energy to pass on from one level to another. Ultimately, when organism

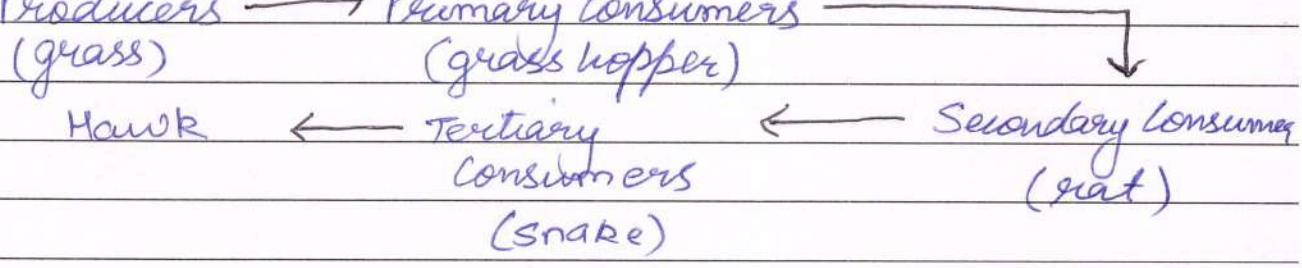
Topic : ..... Date. : ..... Page No. : .....

dies, it is decomposed by decomposers and it goes back to producers in the form of inorganic compounds. But at each level of transfer, most of the energy is lost in the form of heat energy.

- **Types of Food Chain:**

1) Grazing Food chain 2) Detritous Food chain

1) **Grazing Food chain:** It starts from green plants and other producers like algae. From there, the energy passes through various levels of consumers.
For eg.-

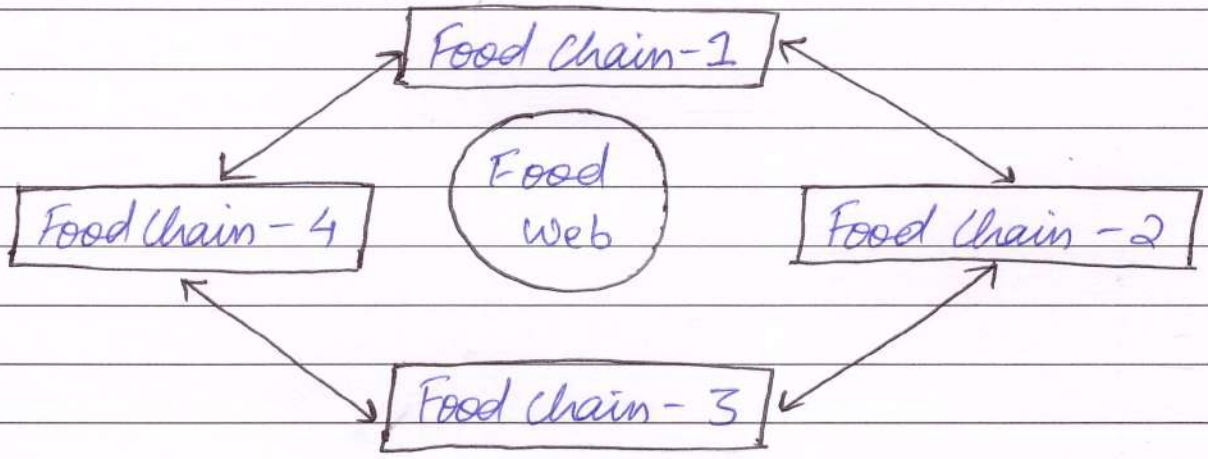


2) **Detritous Food Chain:** This chain starts from dead organic matter and goes to detritous feeding organisms (detritivorous) and then to their predators. These chains do not require sunlight, nor photosynthesis occurs in them. These food chains can be found

bottom of lakes / ocean. In grassland, when dead plants and leaves are present, this chain may start.
For eg. -

Dead leaves ⟶ soil mites ⟶ Birds ⟶ Snakes

- Generally, the food chains are not found in isolation. 5-6 food chains operates simultaneously in an ecosystem. These food chains are interlinked with one another to form a food web. The interlocking pattern formed due to interaction of various food chains is known as food web. This provides stability to ecosystem.



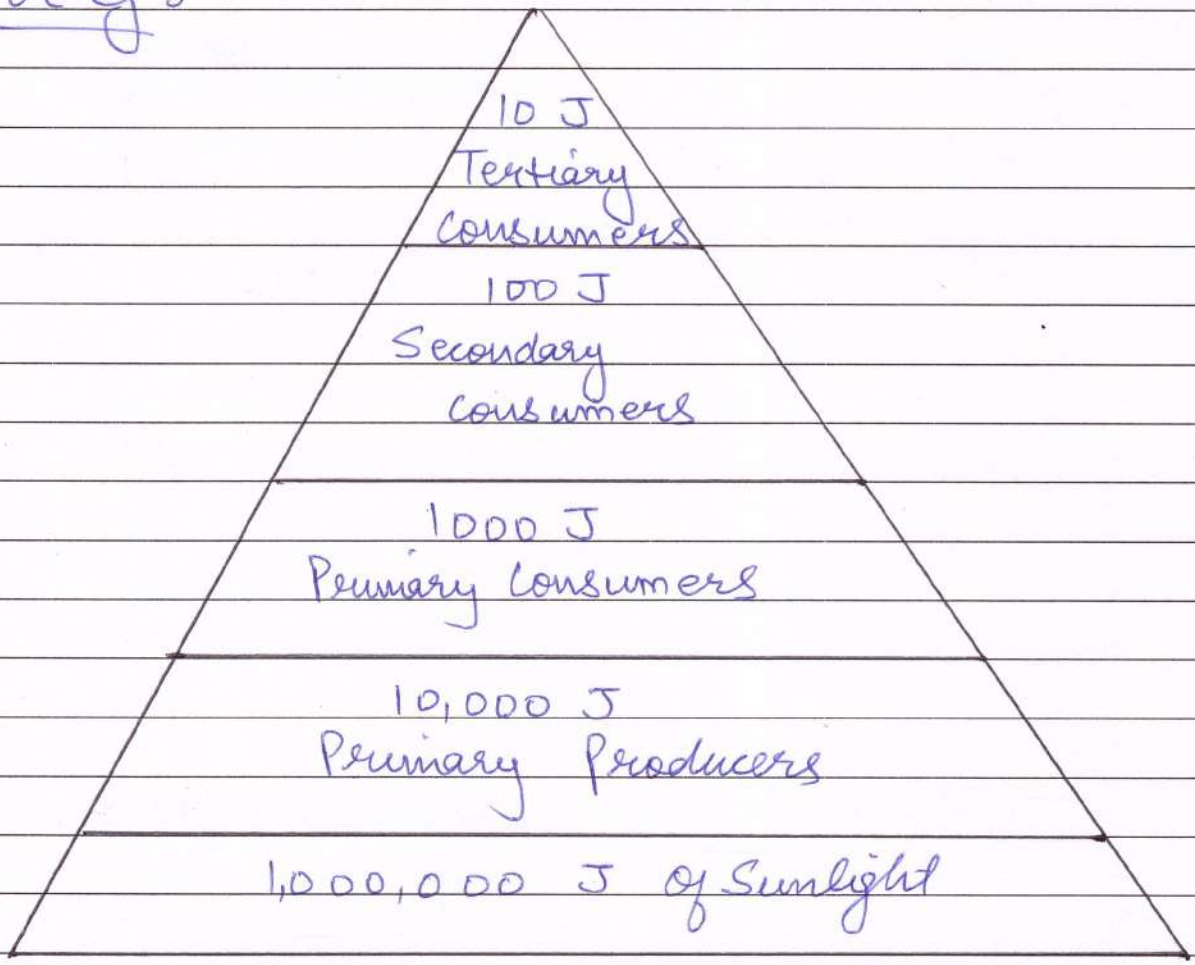
2000357 0032 Khushal

Topic : ..... Date. : ..... Page No. : .....

- The graphic representation of energy flow through food chain can be done through ecological pyramids. These are of 3 types :

1) Pyramid of number
2) Pyramid of biomas
3) Pyramid of energy

For eg :



2000357 00032 Khushal

Topic : ..... Date. : ..... Page No. : .....

• Nutrient / Biogeochemical Cycles :

- The food chains shows that the solar energy is converted by producers to chemical energy as carbohydrates, fats and proteins is transfered to primary consumers, then to secondary consumers and finally to tertiary consumers. The decomposers convert them into simpler forms which are used as nutrients by autotrophs.

- In this way complete cycle of essential nutrients take place in the ecosystem. It flows in a uni-directional manner and can never be returned to the Sun.

- Every ecosystem is controlled by nutrients cycle and energy flow but in each ecosystem the activities involved in cycling of materials include biological, geological and chemical processes. Therefore, nutrient cycle is also called as biogeochemical cycles.

• Types of Biogeochemical Cyles :

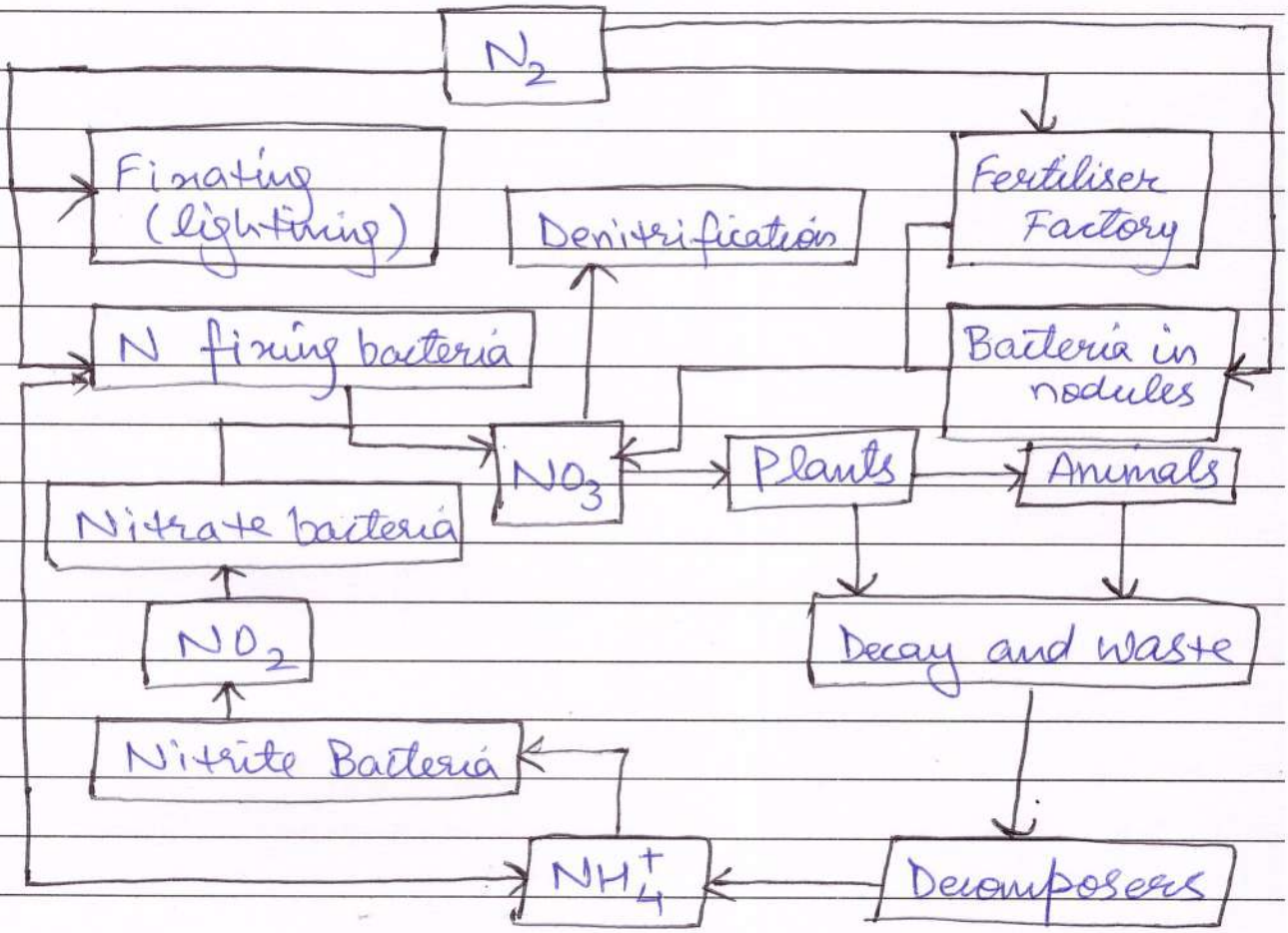
1) Gaseous - In these atmosphere is the reservoir
Eg - C, O_2, N cyles

→ In N-cycle, N enters the ecosystem via Nitrogen fixation and through atmosphere

2000357 0032 Khushal

Topic : ..... Date. : ..... Page No. : .....

Nitrogen Cycle:



2) Sedimentary Rocks: Eg- Sulphur and Phosphorous cycle.

→ There is no atmospheric phase in these cycle

→ Weathering of rocks add phosphate to soil which is absorbed by plants and used in the synthesis of organic compounds.

3) Water Cycle: This depends on the rainfall

→ The water moves through various components of ecosystem such as hydrosphere, lithosphere and biosphere.