



BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT: BIOLOGY

CLASS X: CHAPTER: OUR ENVIRONMENT

Week: 5th October to 9th October, 2020

No of blocks: 1 or 2

TOPIC: ECOSYSTEM

GUIDELINES FOR STUDENTS:

Dear Students,

- Refer to the following content of the chapter.
- These notes will help you to understand the concept of the lesson.
- Do the assignment questions in the Biology notebook.
- Suitable Video links have been provided for better understanding of the concept.
- Do read NCERT too for better understanding of these concepts.

SUBTOPICS:

- WHAT HAPPENS WHEN WE ADD OUR WASTE TO THE ENVIRONMENT?
- ECOSYSTEM
- FOOD CHAINS and FOOD WEBS

Instructional Aids /Resources:

- NCERT LINK FOR THE CHAPTER:
http://ncertbooks.prashanthellina.com/class_10.Science.Science/CHAP%2015.pdf
- YouTube Links

LEARNING OUTCOMES:

Learners will be able to:-

- identify the various components of the environment
- classify the components as biotic and abiotic
- illustrate various food chains in nature
- draw simple Food webs in nature

ACTIVITIES:

You might have seen an aquarium. Let us try to design one. What are the things that we need to keep in mind when we create an aquarium?

- The fish would need a free space for swimming (it could be a large jar), water, oxygen and food.
- We can provide oxygen through an oxygen pump (aerator) and fish food which is available in the market.
- If we add a few aquatic plants and animals it can become a self sustaining system. Can you think how this happens? An aquarium is an example of a human-made ecosystem.
- Can we leave the aquarium as such after we set it up? Why does it have to be cleaned once in a while? Do we have to clean ponds or lakes in the same manner? Why or why not?
- While creating an aquarium did you take care not to put an aquatic animal which would eat others? What would have happened otherwise?
- Discuss how each of the above groups of organisms are dependent on each other.
- Write the aquatic organisms in order of who eats whom and form a chain of at least three steps:-



- Would you consider any one group of organisms to be of primary importance? Why or why not?

LESSON DEVELOPMENT:

Ecosystem

<https://youtu.be/k-pH7yRk8SI>

- Includes both biotic and abiotic components.
- In a given area, all the living things such as plants, animals and organisms interact with each other, and also with their non-living environments, i.e., weather, earth, sun, soil, climate, atmosphere.

Abiotic Components

Nonliving chemical and physical components of the environment like the soil, air, water, temperature, humidity, minerals, light, topographical features, etc.

Biotic Components

They include the living organisms of the environment like the **producers, consumers and decomposers**.

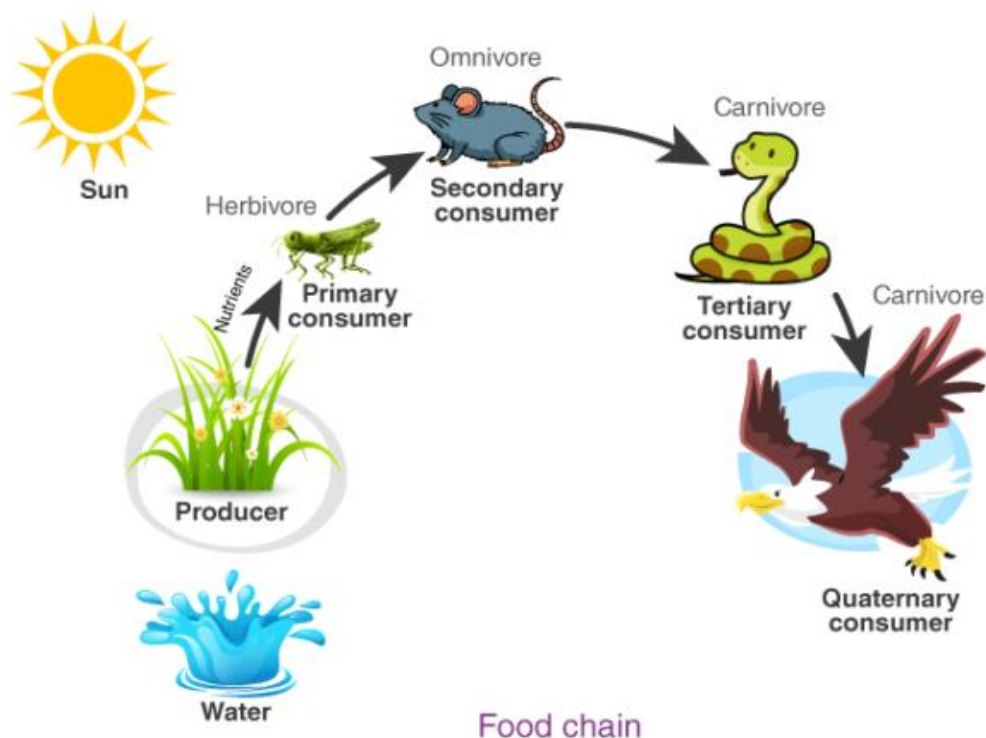
Decomposers as “Nature’s Cleansers”

Decomposers /Saprophytes are microorganisms that feed on the dead and decaying material. They break down the organic matter or waste material, clean the surface of earth and release nutrients into the soil. For example, bacteria, fungi.

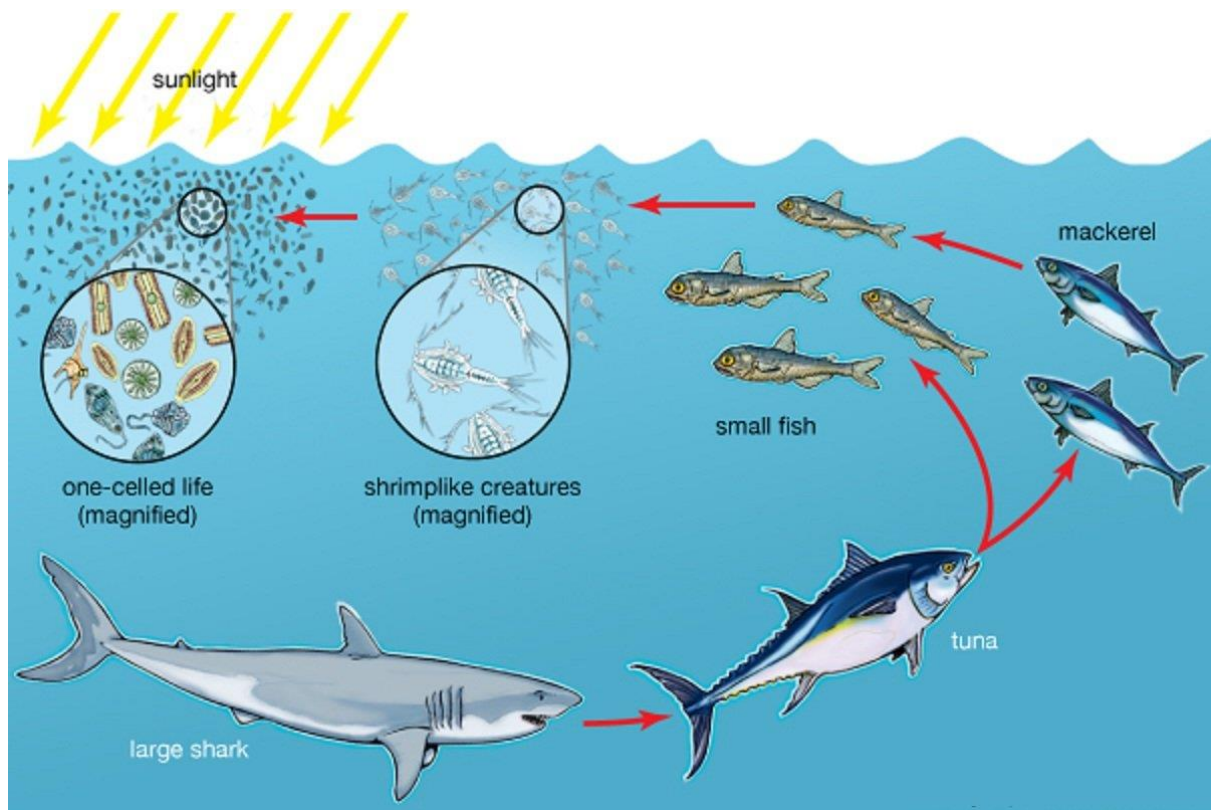
Food Chain

<https://youtu.be/VfhqthqiGgY>

- A series of organisms each dependent on the next as a source of food.
- It is a linear representation of ‘Who eats whom’ in an ecosystem.
- There can only be one Top consumer.
- The various steps of a food chain are called **Trophic levels**.
- The number of **Trophic levels** in a food chain is limited and cannot exceed 4-5 as thereafter the amount of energy reaching the top consumer is almost negligible.
- The flow of energy in a food chain is unidirectional.



TERRESTRIAL FOOD CHAIN



AQUATIC FOOD CHAIN

- The **green plants in a terrestrial ecosystem capture about 1% of the energy of sunlight** that falls on their leaves and convert it into food energy.
- When green plants are eaten by primary consumers, **a great deal of energy is lost as heat to the environment**, some amount goes into digestion and in doing work and the rest goes towards growth and reproduction. An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.
- **10% can be taken as the average value for the amount of organic matter** that is present at each step and reaches the next level of consumers.
- Since so little/negligible energy is available for the next level of consumers, **food chains generally consist of only three or four steps**. The loss of energy at each step is so great that **very little usable energy** remains after four trophic levels.
- There are generally a greater number of individuals at the lower trophic levels of an ecosystem, the **greatest number is of the producers**.
- The **length and complexity of food chains vary greatly**. Each organism is generally eaten by two or more other kinds of organisms which in turn are eaten by several other organisms. So instead of a straight line food chain, the relationship can be shown as a series of branching lines called a **food web**.

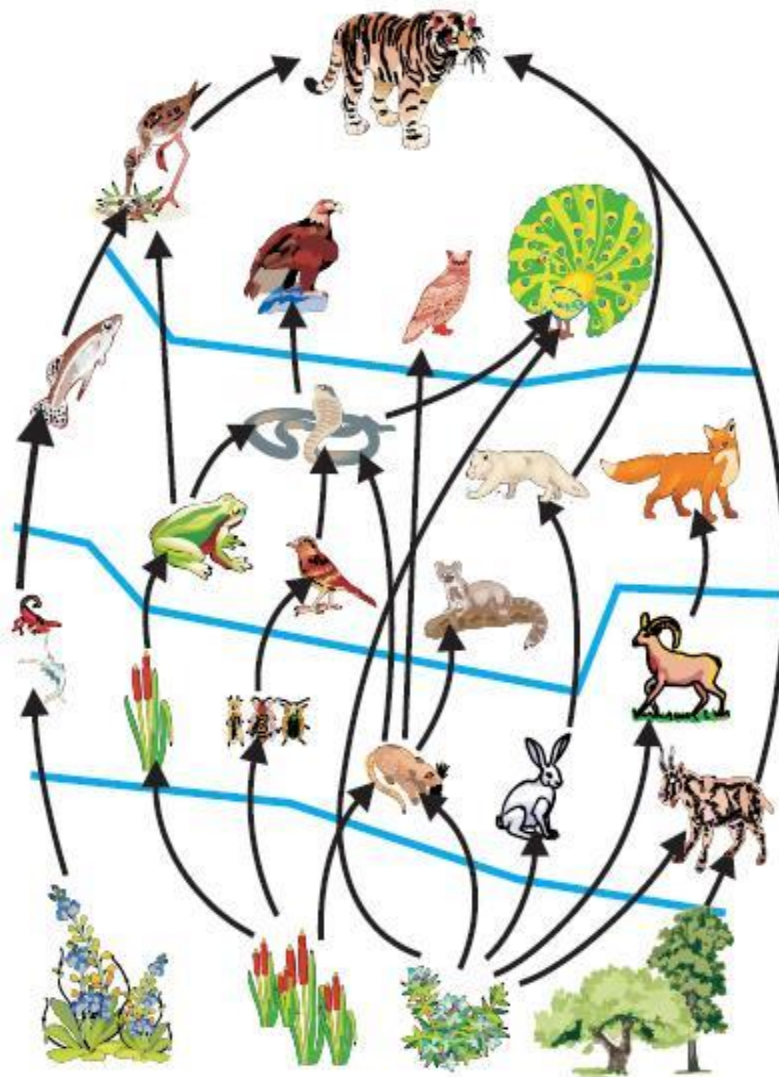
Trophic Levels

It refers to the various levels in a food chain and depicts the flow of food and energy. The different trophic levels are –

- Producers (T1)
- Primary Consumers (herbivores/omnivores-T2)
- Secondary Consumers (carnivores/ omnivores –T3)
- Tertiary Consumers(carnivores/ omnivores –T4)
- Quaternary Consumers (carnivores / omnivores T5)

Food Web

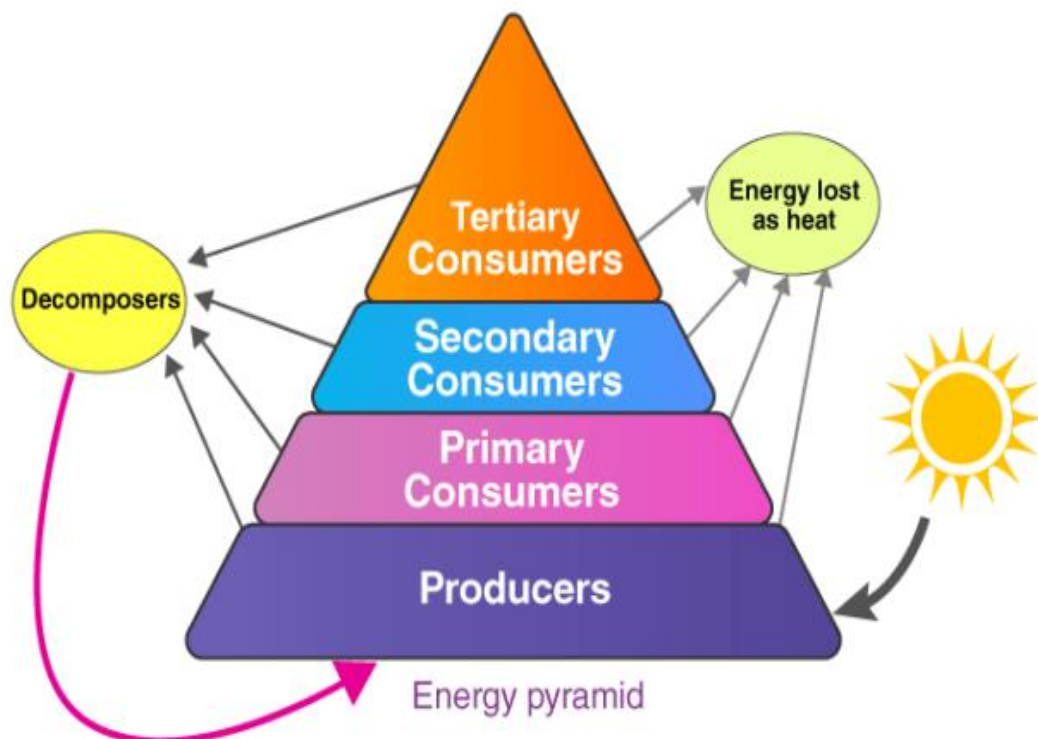
- Is formed by interlinking of different food chains in nature.
- There can be multiple Top consumers.



A FOOD WEB IN NATURE

Ecological Pyramids

- It is a graphical representation of a food chain.
 - Can be the pyramid of numbers, pyramid of biomass or pyramid of energy.
 - All the pyramids start with producers.
 - Top consumers are placed at the top of the pyramid.
- a) **Pyramid of numbers:** gives the number of organisms present at each trophic level. It can be upright or inverted.
- b) **Pyramid of biomass:** gives the biomass of each trophic levels and could be upright or inverted.
- c) **Pyramid of energy:** is always upright as it shows the flow of energy from one trophic level to the next trophic level.



Law of Conservation of Energy

- Energy can neither be created nor destroyed; rather, it transforms from one form to another.
- In biological systems, it gets passed from one organism to another at various trophic levels.
- According to the **Ten percent law**, at each trophic level, only 10% of energy reaches the next higher trophic level and the remaining 90% is lost to the environment in the form of heat.

Energy Flow

- Transfer of energy from one trophic level to another depicting its direction and amount.
- Can be represented by the pyramid of energy.
- In any food chain, only 10% of the energy is transferred from one trophic level to another.

Sample Question. In a food chain, if 10,000 joules of energy is available to the producer, how much energy will be available to the secondary consumer to transfer it to the tertiary consumer?

Answer:-

Producer. Energy available = 10,000 J

$$\therefore \text{Energy transfer to producer} = 1\% \text{ of } 10,000 = \frac{1}{100} \times 10,000 = 100 \text{ J}$$

Primary consumer. Energy available = 100 J

$$\therefore \text{Energy transfer from producer to primary consumer} = 10\% \text{ of } 100 \text{ J} = \frac{10}{100} \times 100 = 10 \text{ J}$$

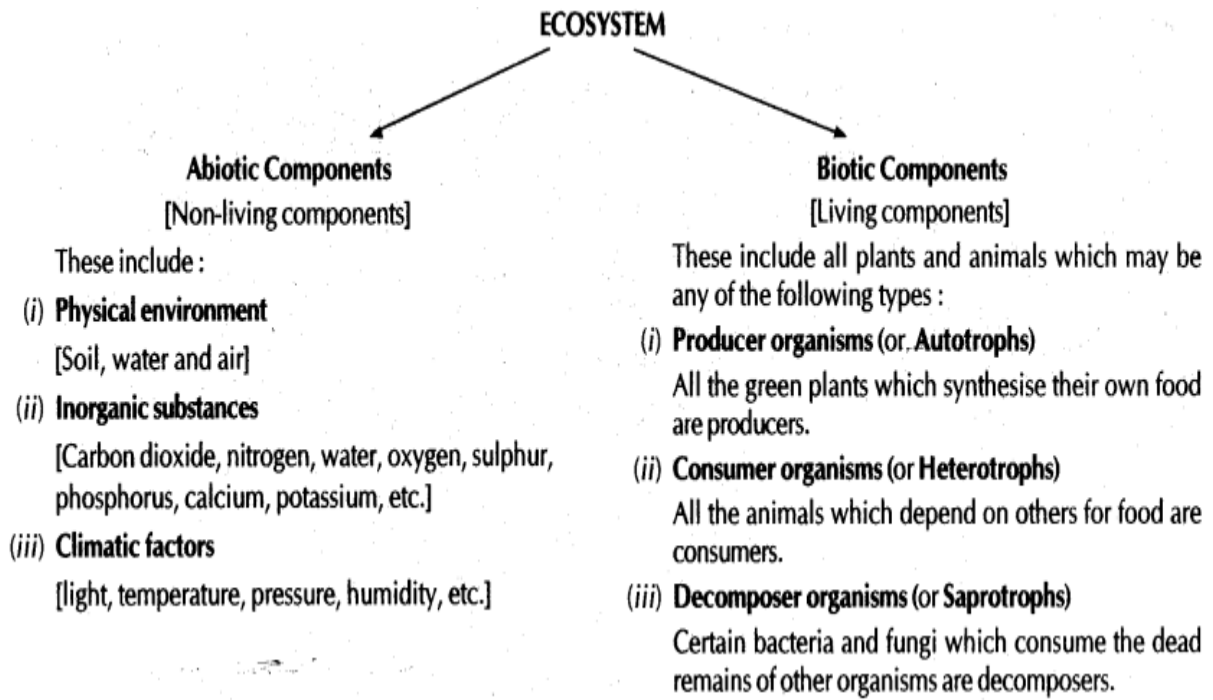
Secondary consumer. Energy available = 10 J

$$\begin{aligned} \therefore \text{Energy transfer from primary consumer to secondary consumer} &= 10\% \text{ of } 10 \text{ J} \\ &= \frac{10}{100} \times 10 = 1 \text{ J} \end{aligned}$$

Tertiary consumer. Energy available = 1 J

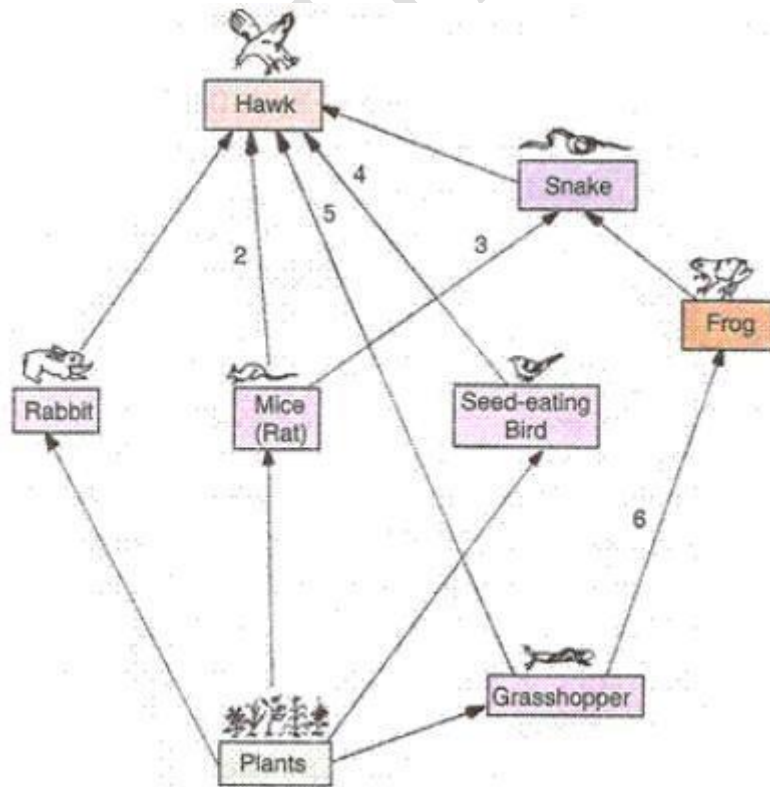
$$\begin{aligned} \therefore \text{Energy transfer from secondary consumer to tertiary consumer} &= 10\% \text{ of } 1 \text{ J} \\ &= \frac{10}{100} \times 1 = 0.1 \text{ J} \end{aligned}$$

LET'S SUMMARISE



For recapitulation, please watch the video with the given link:-

<https://youtu.be/MWPj2IkekII>



This is a food web.

LET'S DO AN ASSIGNMENT

Q1. Suggest a food chain in which one of the trophic levels is occupied by human beings.

Q2. Draw the conclusion for if all the herbivores are removed from the grassland.

Q3. In an ecosystem, rats feed on grains. Name the trophic level to which the rats belong.

Q4. List two human-made (artificial) ecosystems.

Q5. What will happen if all the deer are removed in the given food chain?

Plants → deer → tigers

BBPS, PITAMPURA