

6. ECOSYSTEM

Single Page Simple Synopsis

An **ecosystem** is a functional unit of nature where living organisms interact with each other and with their surrounding physical environment. It encompasses both the biological community and the non-living factors they depend on, ranging in size from a small desert puddle (pool) to an entire ocean.

FOUR CORE COMPONENTS:

1. Every ecosystem is composed of two main interacting elements:

- i) **Biotic Components:** All living organisms, grouped into producers (plants), consumers (animals), and decomposers (bacteria and fungi).
- ii) **Abiotic Components:** Non-living physical and chemical factors, such as sunlight, air, water, soil, and climate.

2. **Key Functions:**

Ecosystems are sustained by two primary processes:

- i) **Energy Flow:** The transfer of energy through the food chain, beginning with plants converting sunlight into food.
- ii) **Nutrient Cycling:** The continuous recycling of matter (like carbon, nitrogen, and water) between the living organisms and the environment.

3. **Types of Ecosystems**

- i) **Terrestrial:** Land-based systems such as forests, grasslands, tundras, and deserts.
- ii) **Aquatic:** Water-based systems including oceans, coral reefs, lakes, and rivers.
- iii) **Artificial:** Human-created or managed environments like agricultural crop fields or aquariums.

4. **Ecosystem Services:**

Healthy ecosystems provide essential, life-sustaining benefits to the planet, including climate regulation, water purification, pollination, and carbon storage.

ROOT POINTS

1. **Ecosystem:** A functional unit of nature where living organisms interact with each other and with the surrounding physical environment.
2. **Biotic Components:** The living components of an ecosystem such as producers, consumers, and decomposers.
3. **Abiotic Components:** The non-living components of an ecosystem such as air, water, soil, and nutrients.
4. **Productivity:** The rate of production of biomass or organic matter per unit area over a period of time.
5. **Gross Primary Productivity (GPP):** The total rate of production of organic matter by plants during photosynthesis.
6. **Net Primary Productivity (NPP):** The amount of biomass remaining after subtracting respiration losses from GPP; available to consumers. Formula: $NPP = GPP - R$
7. **Fragmentation:** The process in which detritivores break down detritus into smaller particles.
8. **Leaching:** The process by which water-soluble nutrients are washed down into the soil and become unavailable.
9. **Food Web:** A network of interconnected food chains in an ecosystem.
10. **Producers:** Autotrophic organisms that synthesize food using sunlight (e.g., plants, algae).
11. **Consumers:** Heterotrophic organisms that depend on other organisms for food.
12. **10% Law:** Only about 10% of energy is transferred from one trophic level to the next higher level.
13. **Ecological Pyramid:** A graphical representation of the relationship between trophic levels in terms of number, biomass, or energy.
14. **Pyramid of Number:** An ecological pyramid showing the number of organisms at each trophic level.
15. **Pyramid of Biomass:** An ecological pyramid showing the biomass at each trophic level.
16. **Pyramid of Energy:** An ecological pyramid showing the flow of energy at each trophic level (always upright).
17. **Nutrient Cycling:** The continuous movement and recycling of nutrients between biotic and abiotic components of ecosystems.

18. Increase in concentration of the toxicant at successive trophic levels is known as **biomagnification**. [NEET-2015]
19. **Lichens** are most suitable indicators of SO_2 pollution in the environment. [NEET-2015]
20. Eutrophication of water bodies leading to killing of fishes is mainly due to non-availability of **oxygen**. [NEET-2015]
21. Acid rain is caused by increase in the atmospheric concentration of SO_2, NO_2 where no human activity is allowed is known as **core zone**. [NEET-2015]
22. The highest DDT concentration in aquatic food chain shall occur in **seagull**. [NEET-2016]
23. Biochemical Oxygen Demand (BOD) may not be a good index for pollution for water bodies receiving effluents from **petroleum industry**. [NEET-2016]
24. Depletion of **Ozone** gas in the atmosphere can lead to an increased incidence of skin Cancers [NEET-2016]
25. **Thiobacillus** is a group of bacteria helpful in carrying out **Denitrification**. [NEET-2019]
26. The protocol that aimed for reducing emission of chlorofluorocarbons in the atmosphere is **Montreal protocol** [NEET-2019]
27. **Group of biocontrol agents:** Trichoderma, Baculovirus, Bacillus Thuringiensis [NEET-2019]
28. Equipment that is essentially required for growing microbes on a large scale, for industrial production of enzymes is **Bioreactor**. [NEET-2019]
29. The amount of nutrients, such as carbon, nitrogen, phosphorus and calcium present in the soil at any given time, is referred as **standing state**. [NEET-2021]
30. **Electrostatic precipitator** can remove particulate matter present in the exhaust from a thermal power plant. [NEET-2022]
31. In an ecosystem the equation $\text{GPP} - \text{R} = \text{NPP}$, **R** indicates **Respiratory loss**. [NEET-2023]
32. **Ramdeo Misra** was known as father of Ecology in India. [NEET-2025]
33. $(\text{kcal m}^{-2})\text{gr}^{-1}$ is the unit of productivity of an ecosystem. [NEET-2025]
34. **Zoos & Botanical Gardens** are examples of ex-situ conservation. [NEET-2025]