CBSE Class 12 Biology Notes Chapter 14: These notes on Chapter 14 Ecosystem are important for students preparing for their CBSE Class 12 board exams. They provide a detailed overview of ecosystems, emphasizing the intricate relationships between living organisms and their physical environment.

By studying these notes students will gain valuable insights into ecological principles which will not only help in their exam preparation but also enhance their understanding of environmental issues, contributing positively to society and laying a solid foundation for their future studies in biology and related fields.

CBSE Class 12 Biology Notes Chapter 14 Ecosystem Overview

These notes on Chapter 14 Ecosystem are prepared by subject experts of Physics Wallah ensuring that students receive accurate and insightful information for their CBSE Class 12 board exams.

By using these notes students can develop a solid foundation in ecology which is important for both their exams and their future studies in biological sciences.

CBSE Class 12 Biology Notes Chapter 14 Ecosystem PDF

The PDF link for the CBSE Class 12 Biology Notes on Chapter 14 Ecosystem is available below. This resource provides a clear and detailed look at important ideas related to ecosystems such as how energy flows, how nutrients cycle and how different organisms interact in their environments.

Students can easily download the PDF to help them prepare for their exams. With well-organized content and simple explanations these notes are a great study resource for understanding the relationships in nature and improving knowledge of biology. Be sure to check out this helpful resource for your CBSE Class 12 biology studies.

CBSE Class 12 Biology Notes Chapter 14 Ecosystem PDF

CBSE Class 12 Biology Notes Chapter 14 Ecosystem

Below we have provided CBSE Class 12 Biology Notes Chapter 14 Ecosystem-

Ecosystem: Structure and Functions

An ecosystem is the functional unit of nature where living organisms interact with each other and their physical environment. Ecosystems can be divided into two main categories: terrestrial and aquatic.

Terrestrial Ecosystem: This includes forests, grasslands, deserts and other land-based environments.

Aquatic Ecosystem: This consists of ponds, lakes, rivers, estuaries, and other water-based environments.

The components of an ecosystem, both biotic (living organisms) and abiotic (non-living elements), work together to facilitate the flow of energy and create a unique physical structure for each ecosystem type. The vertical distribution of various species at different levels is known as stratification. For example, in a forest ecosystem, trees occupy the top layer, shrubs are found in the middle, and herbs and grasses are at the bottom.

The key functional components of an ecosystem are:

1. **Productivity**
2. **Decomposition**
3. **Energy Flow**
4. **Nutrient Cycling**

Productivity

Productivity refers to the amount of biomass or organic matter produced per unit area over a specific time period by plants during photosynthesis.

It is expressed in terms of g –2 yr –1 or (kcal m–2) yr –1. It can be divided into gross primary productivity (GPP) and net primary productivity (NPP).

Productivity can be divided into:

- **Gross Primary Productivity (GPP)**: The total rate of organic matter production during photosynthesis.
- **Net Primary Productivity (NPP)**: The remaining biomass after accounting for respiration (R), calculated as:
  GPP –R = NPP

NPP represents the available biomass for consumption by heterotrophs (consumers).

Secondary productivity refers to the rate of formation of new organic matter by consumers.

Decomposition

Decomposition is the breakdown of complex organic matter into inorganic substances such as carbon dioxide, water, and nutrients. Dead plant materials, including leaves, bark, and flowers, along with the remains of dead animals, make up detritus. Decomposition involves several steps:

1. **Fragmentation of Detritus**: Detritivores feed on detritus, breaking it down and increasing the surface area for microbial action.
2. **Leaching**: Soluble inorganic nutrients dissolve in water and percolate through the soil, a process known as leaching.
3. **Catabolism**: Decomposers, such as bacteria and fungi release enzymes that break down detritus into simpler inorganic compounds.
4. **Humification**: The simplified detritus is converted into humus, a dark amorphous substance that is highly resistant to microbial action and decomposes very slowly, acting as a reservoir of nutrients.
5. **Mineralization**: Humus is further degraded, releasing inorganic substances (CO_2, H_2O etc) and nutrients (Ca^{2+}, Mg^{2+},K^+ etc)

Factors Affecting the Rate of Decomposition:

1. **Chemical Composition**: Decomposition is slower in detritus rich in lignin and chitin, while it speeds up in materials high in nitrogen and water-soluble substances like sugars.
2. **Climatic Conditions**: Warm and moist environments favor decomposition, whereas low temperatures and anaerobic conditions inhibit it.

Energy Flow

All living organisms rely on producers for food, either directly or indirectly. Energy flows in a unidirectional manner from the sun to producers and then to consumers. Photosynthetically active radiation (PAR) is important for plants to synthesize food. Animals, which obtain their food from plants, are known as consumers. The process of energy transfer through consumption is represented by food chains, where energy flows from producers to consumers.

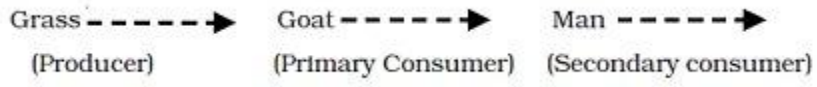
There are two types of food chains:

- **Grazing Food Chain (GFC)**: This starts with living plant material and progresses through herbivores to carnivores.
- **Detritus Food Chain (DFC)**: This begins with dead organic matter and consists of decomposers, which break down dead materials into simpler substances.

The natural connections among food chains create a complex food web.

Each organism occupies a specific position in the food chain known as a **trophic level**, and each trophic level has a specific amount of living material at a given time, referred to as the **standing crop**. This is measured as the biomass of living organisms or the number of organisms in a unit area.

The number of trophic levels in a grazing food chain is limited, as energy transfer follows the 10 percent law, meaning that only 10 percent of energy is transferred to each trophic level from the one below it. In a GFC, the possible trophic levels include: producer, herbivore, primary carnivore and secondary carnivore.

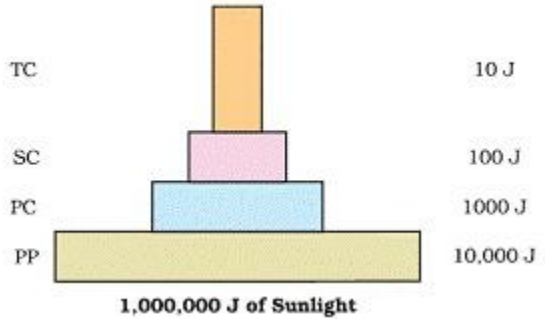


Ecological Pyramids

An ecological pyramid is a graphical representation of various ecological parameters—such as number, biomass and energy arranged in different trophic levels of a food chain. Producers are placed at the base, herbivores in the middle and carnivores at the top. Ecological pyramids can be upright, inverted or spindle-shaped.

There are three common types of ecological pyramids:

1. **Pyramid of Number**: This pyramid shows the number of individuals per unit area at different trophic levels, with producers at the base and consumers at successively higher levels. It is generally upright. However, in the case of a large tree, the pyramid of number can be inverted because the number of insects feeding on the tree exceeds the number of trees.
2. **Pyramid of Biomass**: This pyramid represents the biomass at various trophic levels. It is usually upright, except in aquatic food chains that involve short-lived organisms like plankton. In the sea the pyramid of biomass can be inverted because the biomass of fish can exceed that of phytoplankton.
3. **Pyramid of Energy**: This pyramid graphically represents the amount of energy captured by different trophic levels per unit area. The pyramid of energy is always upright and cannot be inverted. This is because energy is always lost as heat during each transfer from one trophic level to the next (e.g., during feeding, digestion, assimilation and respiration).



Ecological Succession

Ecological succession is the gradual and fairly predictable change in species composition in a specific area over time. During succession, some species establish themselves and increase in population, while others may decline and even disappear.

- The orderly and sequential changes that lead to a stable community are known as the **climax community**.
- The entire sequence of communities that successively change in a given area is referred to as a **sere**, while the individual transitional communities are called **seral stages** or **seral communities**.

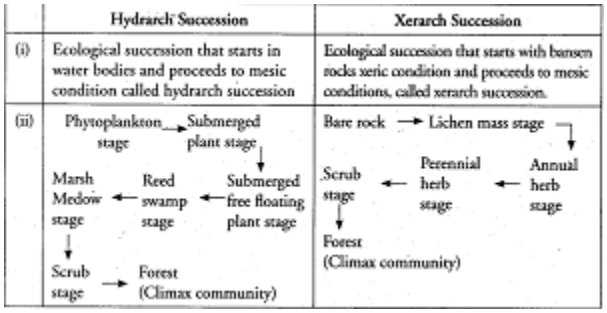
Types of Ecological Succession:

1. **Primary Succession**: This type of succession begins in an area where no organisms exist, such as on bare rocks or cooled lava from a volcano.
2. **Secondary Succession**: This occurs in areas where living organisms have been removed or destroyed due to disturbances like forest fires or earthquakes.

Succession of Plants

Based on the habitat's nature, plant succession can be categorized into:

- **Hydrach Succession**: This occurs in wetter areas, progressing from hydric (wet) to mesic (moderate) conditions.
- **Xerarch Succession**: This takes place in dry areas, moving from xeric (dry) to mesic (moderate) conditions.

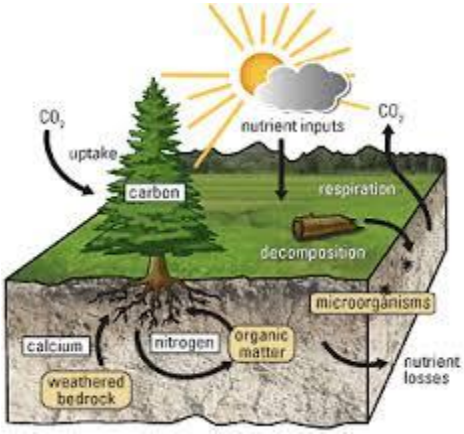


Pioneer Species: The species that invade bare areas are called pioneer species. For example, in primary succession on rocks, lichens act as pioneer species by secreting acids that help weather the rock to form soil. In aquatic environments, small phytoplankton serve as pioneer species before being replaced by free-floating angiosperms.

Primary succession is a slow process since soil is initially absent for pioneer species, whereas secondary succession is comparatively faster due to the availability of soil and nutrients. A climax community is reached much more quickly in secondary succession than in primary succession.

Primary succession	Secondary succession
Initiates in area where organisms never existed, i.e. bare areas.	Initiate in areas where communities are recently destroyed.
The absence of the soil, humus and reproductive structures of organisms.	The presence of the soil, humus and reproductive structures from organisms of previous communities.
Takes a long time, i.e. several hundred to thousands of years to reach climax stage.	Takes comparatively lesstime (50-200 years) to reach climax or stable stage.

Nutrient Cycling

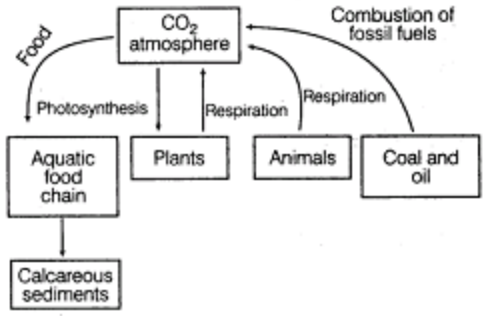


Nutrient cycling refers to the movement of nutrient elements through various components of an ecosystem. This process is also known as biogeochemical cycling. There are two main types of nutrient cycles:

- **Gaseous Cycles**: These nutrients exist in the atmosphere.
- **Sedimentary Cycles**: These nutrients are found in the Earth's crust.

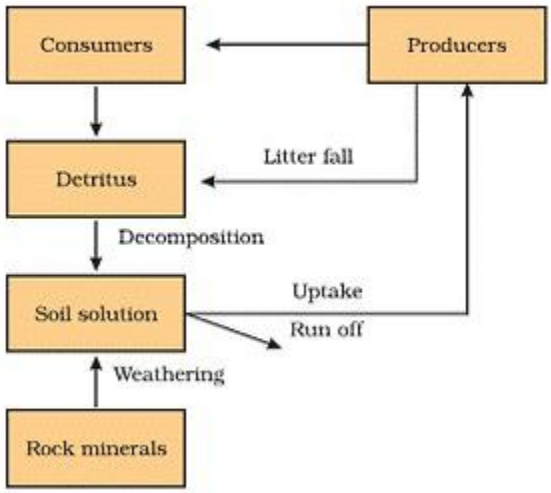
Environmental factors such as soil type, moisture, pH, and temperature play a significant role in regulating the rate at which nutrients are released into the atmosphere. Reservoirs help balance the supply and demand of nutrients by compensating for any imbalances between the rates of influx (input) and efflux (output).

Carbon Cycle



The carbon cycle involves the movement of carbon through the atmosphere, oceans, and living and dead organisms. Most carbon is fixed by plants through photosynthesis, where they convert carbon dioxide (CO_2) from the atmosphere into organic matter. This carbon returns to the atmosphere during respiration by living organisms. Carbon is released into the atmosphere through various activities such as burning wood, forest fires, the combustion of organic matter and fossil fuels, and volcanic eruptions.

Phosphorus Cycle



The natural reservoir of phosphorus is found in rocks, where it exists in the form of phosphates. When rocks weather, small amounts of phosphates dissolve in soil and are absorbed by plant roots. The waste products from dead organisms are decomposed by bacteria, which release phosphorus back into the environment. Unlike carbon, the gaseous exchange of phosphorus between organisms and the environment is minimal.

Ecosystem Services

Ecosystem services are the benefits provided by ecosystem processes. These services include:

- Purifying air and water in healthy forest ecosystems

- Mitigating floods and droughts
- Cycling nutrients
- Generating fertile soil
- Providing habitats for wildlife
- Maintaining biodiversity

Researchers estimate that the average annual value of these fundamental ecosystem services is around **$33 trillion**. This value is often overlooked because these services are typically considered free, even though it amounts to twice the total global gross national product (GNP).

Benefits of CBSE Class 12 Biology Notes Chapter 14 Ecosystem

- **Comprehensive Understanding**: These notes provide a detailed overview of ecosystems, covering essential concepts such as energy flow, nutrient cycling and ecological pyramids.
- **Exam Preparation**: With clear explanations and structured content these notes are an effective study resource for board exams, ensuring that students can revise efficiently and confidently.
- **Real-World Relevance**: Understanding ecosystems and their functions helps students appreciate the importance of biodiversity and the role of humans in maintaining ecological balance.
- **Integration of Concepts**: The notes emphasize the interconnectedness of biological concepts, allowing students to see how different topics in biology are related enhancing their overall understanding of the subject.
- **Boosts Analytical Skills**: By studying ecosystems, students develop critical thinking and analytical skills as they learn to interpret ecological data and understand complex environmental issues.