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CHAPTER NOTES

Ecosystem Class 12 Notes — CBSE Biology Chapter 14

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Ecosystem Class 12 Notes — CBSE Biology Chapter 14

Chapter 14 — **Ecosystem** — covers energy flow, food chains, nutrient cycling, ecological pyramids, and succession. Carries **6-8 marks**. Focus on energy flow diagrams and nutrient cycles.

Key Concepts

Components of Ecosystem

Component	Description	Examples
Producers (Autotrophs)	Make food via photosynthesis	Plants, algae, cyanobacteria
Primary consumers (Herbivores)	Eat producers	Deer, grasshopper, rabbit
Secondary consumers (Carnivores)	Eat herbivores	Frog, small fish, snake
Tertiary consumers (Top carnivores)	Eat secondary consumers	Lion, eagle, shark
Decomposers (Saprotrophs)	Break down dead matter	Bacteria, fungi

Energy Flow

10% Law (Lindeman, 1942): Only 10% of energy is transferred from one trophic level to the next. 90% is lost as heat (respiration).

Energy flow is **unidirectional** (cannot flow backwards in food chain)

Sun → Producers (1% of sunlight captured) → Herbivores (10%) → Carnivores (10%) → Top carnivores (10%)

Food Chain Types

- **Grazing food chain (GFC):** Starts with green plants → herbivore → carnivore (most ecosystems)
- **Detritus food chain (DFC):** Starts with dead organic matter → decomposers → detritivores (dominant in forests — 80% energy flows through DFC!)

Ecological Pyramids

Pyramid	Usually	Exception
Pyramid of Number	Upright (grassland)	Inverted in tree ecosystem (1 tree supports many insects)
Pyramid of Biomass	Upright (terrestrial)	Inverted in aquatic (phytoplankton biomass < zooplankton)
Pyramid of Energy	Always upright	No exceptions! (10% law always applies)

Pyramid of energy is ALWAYS upright — this is a universally true statement and a favourite exam question.

Nutrient Cycling

Carbon Cycle

- CO_2 fixed by photosynthesis → enters food chain
- Returned by respiration, combustion, decomposition
- Fossil fuels: ancient organic matter → burning releases CO_2 → global warming
- Oceans are the largest reservoir of carbon

Phosphorus Cycle

- No gaseous phase — purely sedimentary cycle
- Rocks → weathering → soil → plants → animals → decomposition → soil
- Phosphorus is often a limiting nutrient in ecosystems

Ecological Succession

Type	Starts On	Example
Primary Succession	Bare/lifeless area	Newly formed rock, lava, sand dune
Secondary Succession	Previously colonised but disturbed area	Abandoned farmland, burnt forest

Primary succession on rock (Xerosere):

Lichens (pioneers) → Mosses → Herbs → Shrubs → Trees (climax community)

Primary succession in water (Hydrosere):

Phytoplankton → Submerged → Free-floating → Reed-swamp → Marsh → Forest (climax)

Ecosystem Services

According to Robert Costanza (1997): ecosystem services worth **\$33 trillion/year**

- O₂ production, CO₂ absorption, nutrient cycling, pollination, water purification, soil formation

Quick Revision Points

- 10% Law: only 10% energy transferred per trophic level (Lindeman)
- Energy flow: unidirectional; Nutrient cycling: cyclic
- Pyramid of energy: ALWAYS upright
- GFC: plants → herbivore → carnivore; DFC: dead matter → decomposers (80% in forests)
- Carbon cycle: photosynthesis fixes, respiration/combustion releases
- Phosphorus: sedimentary cycle (no gaseous phase)
- Primary succession: bare area → lichens first; Secondary: disturbed area → faster
- Climax community: final stable community in succession

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