

AP BIOLOGY CHEAT SHEET

Unit 8: Ecology

Quick Overview

- **Focus:** how organisms interact with each other and their environments, energy transfer across trophic levels, and population/community dynamics.
- **Exam lens:** expect data-based questions on population graphs, energy pyramids, and ecosystem disruptions.

Ecosystem Organization

- **Levels:** Organism → Population → Community → Ecosystem → Biome → Biosphere

Mnemonic: "Old People Can Eat Big Burgers."

Energy Flow

- **Producers (autotrophs):** convert solar → chemical energy.
- **Consumers (heterotrophs):** eat others for energy.
- **Decomposers:** recycle nutrients.
- **10% Rule:** only ~10% of energy passes to next trophic level.

Mnemonic: "Energy decreases up the chain – 10% train."

Trophic Levels

- **Producers (plants)** → **Primary consumers (herbivores)** → **Secondary consumers (carnivores)** → **Tertiary consumers (top predators)**.
- **Energy pyramid:** wider at the bottom because energy is lost as heat each step.

Common exam pitfalls

- Forgetting energy flows, matter cycles.
- Confusing exponential and logistic growth.
- Ignoring abiotic factors in population questions.
- Mixing up primary and secondary succession.

Mini formula box

- **Energy transfer efficiency:** ~10%.
- **Population growth equation:** $\Delta N/\Delta t = rN$.
- **Carrying capacity symbol:** K.

Integrated Tutor Tip

Always connect graphs to real-world examples, the AP exam loves asking about population data, carrying capacity, and human impacts.

Explain why a curve levels off or a population crashes to earn reasoning points.

Population Ecology

Key Terms:

- **Population density:** number per unit area.
- **Carrying capacity (K):** max sustainable population size.
- **Exponential growth:** J-shaped, unlimited resources.
- **Logistic growth:** S-shaped, limited resources.
- **Density-dependent factors:** competition, disease.
- **Density-independent factors:** natural disasters.

Formula:

$$\Delta N/\Delta t = rN$$

(change in population = growth rate × population size)

Mnemonic: "J before S – growth slows as space shrinks."

Community Interactions

- **Competition (-/-)**
- **Predation (+/-)**
- **Mutualism (+/+)**
- **Commensalism (+/0)**
- **Parasitism (+/-)**

Mnemonic: "Crazy Predators Make Clever Parasites."

Ecological Succession

- **Primary succession:** begins on bare rock (no soil).
- **Secondary succession:** follows disturbance but soil remains.
- **Pioneer species:** first colonizers (lichens, mosses).

Biogeochemical Cycles

- **Carbon:** photosynthesis & respiration balance CO₂.
- **Nitrogen:** fixed by bacteria → used by plants.
- **Phosphorus:** cycles through soil and rock (no gas phase).
- **Water:** powered by evaporation & precipitation.

Mnemonic: "Can Never Pass Water – Carbon, Nitrogen, Phosphorus, Water."

Human Impact

- **Climate change:** due to CO₂ buildup.
- **Eutrophication:** nutrient pollution → algal blooms.
- **Deforestation:** reduces biodiversity.
- **Invasive species:** disrupt native populations.

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