*This is the **Higher Separate** version — includes all Higher Tier content (marked ★) and all Separate Science content.*

Matter is recycled continuously through ecosystems. The same atoms cycle through organisms and the environment indefinitely.

- Carbon cycle: photosynthesis removes CO■; respiration, decomposition and combustion return it
- Only photosynthesis removes CO■ from atmosphere
- Water cycle: evaporation → condensation → precipitation → runoff

★ **HT** Nitrogen cycle: fixation (N■→ammonia), nitrification (ammonia→nitrates), assimilation (plants), decomposition (organic→ammonia), denitrification (nitrates→N■)

- Decomposers (bacteria and fungi): essential for releasing mineral ions from dead matter
- Eutrophication: fertiliser run-off → algal bloom → O■ depletion → aquatic life dies

Key Terms

Decomposer	Organism breaking down dead matter — releases nutrients
Eutrophication	Nutrient enrichment of water → algal bloom → O■ depletion
Nitrogen fixation	Converting atmospheric N■ into usable forms (ammonia/nitrates) — by bacteria

■ **Exam Tip:** Nitrogen cycle bacteria: FOUR types — nitrogen-fixing, nitrifying, denitrifying, decomposers. Each has a specific role. This is a 4-mark question target.