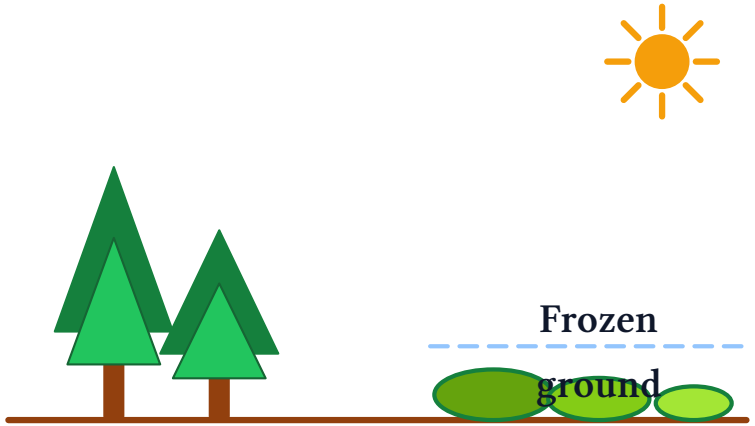
Biology 20

Unit A: Energy and matter in the biosphere

Productivity and atmospheric balance

Slow growth in the tundra

- Summer sun over tundra is strong, and the plants stay low to the ground.
- A taiga of spruce beside it builds a much larger standing mass of wood.



Same summer sun, different plant height

Limits on the biosphere

- Productivity compares biomass built in two regions under their energy and nutrient limits.
- Atmospheric equilibrium compares photosynthetic gas exchange with respiratory gas exchange.
- Stromatolites record a long rise in oxygen produced by ancient microbes.

Key terms

ecosystem productivity

The biomass producers build in a place over time, set by energy, water, and nutrients.

atmospheric equilibrium

A steady mix of gases when photosynthetic release and respiratory use of oxygen and carbon dioxide balance.

stromatolite

A layered rock formed by microbial mats, evidence that ancient photosynthesis changed the air.

closed ecological system

A habitat that must recycle its matter while still receiving an energy input.

Energy plus nutrients set the biomass

- Tropical rain forest is highly productive because light, water, and rapid recycling coincide.
- Desert productivity stays low where water is scarce, even under strong sun.
- Nutrient-rich polar seas can outproduce nutrient-poor tropical surface water.

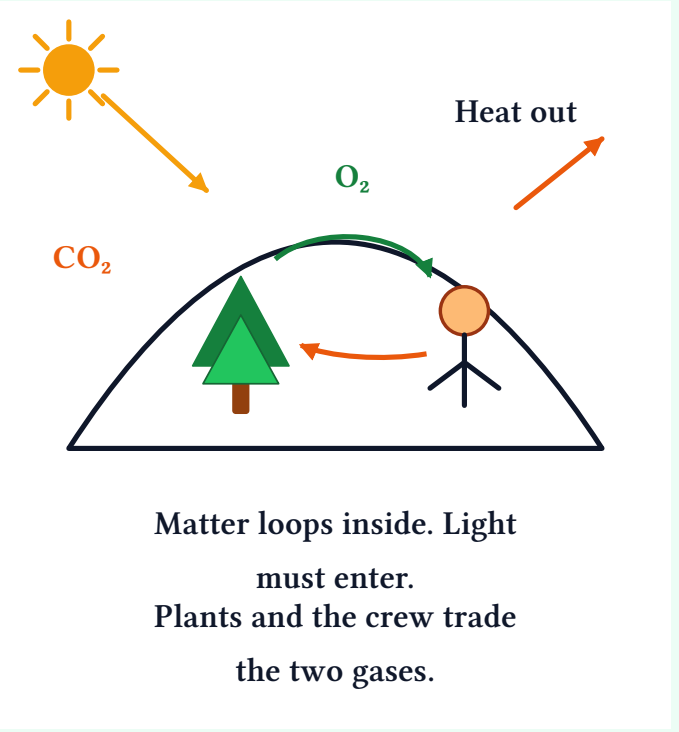


Tracking oxygen and carbon dioxide

- Photosynthesis removes carbon dioxide and releases oxygen.
- Cellular respiration and combustion do the reverse.

Closed habitats and ozone

- In the station drawing, plants and the crew trade oxygen and carbon dioxide.
- Water stays in the loop, and sunlight still has to come in from outside.



Matter loops inside. Light must enter.
Plants and the crew trade the two gases.

Limits and gases

- Explain one productivity pair with energy and a nutrient or water limit.
- State the gas result of forest loss and the role of stromatolites.

Limits become habitats

- Unit B: Ecosystems and population change asks which species can live under the limits you named here.
- Niches and abiotic factors start from productivity, water, and climate.

Image credits

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