The Living World

1. Ecosystems

Ecosystem A community of plants and animals interacting with each other and their non-living environment.

Biotic Living e.g. plants **Abiotic** Non-living e.g. water

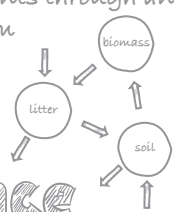| Producers	Primary Consumers	Secondary Consumers
Produce energy through photosynthesis.	Herbivores that consume producers.	Feed on primary consumers. Can be omnivores.

Decomposers Break down organic materials e.g. fungi

Nutrient cycle Movement of nutrients through an ecosystem

Food chain Flow of energy through an ecosystem

Grass ⟹ Rabbit ⟹ Fox ⟹ Wolf

Food web Complex network of interconnected food chains

2. Epping Forest

What?: Small-scale ancient **deciduous** woodland with high biodiversity

Location: NE of London in SE England

Producers	Primary Consumers	Secondary Consumers	Decomposers
Lichen, mosses, grasses, herbs, ferns, deciduous trees	Insects, worms, caterpillars, beetles, rabbits	Fox, owl, sparrow hawk	Fungi (700 species), bacteria

Interdependence*:
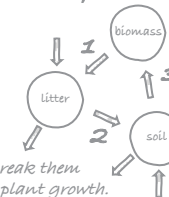
*1. Trees shed leaves in autumn; 2. decomposers break them down, returning nutrients to the soil; 3. supports plant growth.

Sustainable Management: Designated car parks, paths, and Forest Keepers ensure sustainable use. Volunteers and grazing cattle maintain biodiversity, protecting the forest for future generations.

3. Balance

Changes to one component of an ecosystem can have significant knock-on effects:
- Removing predators can lead to overpopulation of herbivores, damaging vegetation.
- Adding fertilisers to water can cause algal blooms, reducing oxygen and harming aquatic life.
- Deforestation disrupts nutrient cycles and habitats, leading to biodiversity loss.

Epping Forest
- **Interdependence:** Trees depend on decomposers for nutrient recycling; herbivores rely on vegetation.
- **Impact of Change:** Loss of trees reduces habitat for animals, while overgrazing damages plant regeneration.

Yellowstone National Park (USA)
- **Interdependence:** Wolves reintroduced in 1995 controlled elk populations, reducing overgrazing.
- **Impact of Change:** Vegetation regenerated, stabilising riverbanks and improving biodiversity.

6. Interdependence

Interdependence All the biotic and abiotic parts of the rainforest rely on each other.

Examples:
- Plants and Animals: Many animals depend on plants for food and shelter, while plants rely on animals for pollination and seed dispersal.
- Soil and Vegetation: The nutrient-rich soil supports plant growth, while decomposing plant material replenishes soil nutrients.
- Climate and Rainforest: Rainforests generate their own microclimate by releasing moisture through transpiration, contributing to high rainfall levels which sustain the forest.
- Human Activity and Rainforests: Human activities like deforestation disrupt these interdependent relationships, leading to soil degradation, loss of biodiversity, and climate change impacts.

5. Rainforests

☀ Hot (average 27°C) 🌧 Wet (over 2000mm of rain)
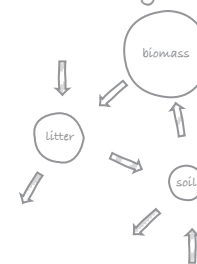
Soil is nutrient poor (concentrated in the top layer)
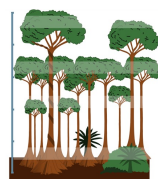
Emergents – tallest trees (50m+)
Canopy – high biodiversity 50%+ of wildlife
Under canopy – bare trunks and lianas
shrub layer – shrubs, ferns and saplings
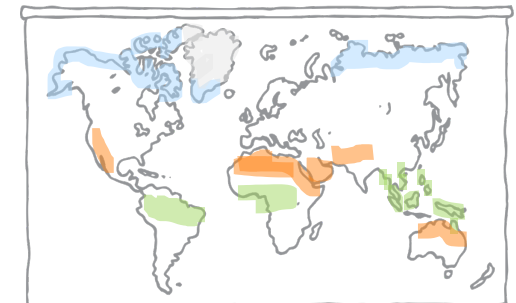
Nutrient cycle

4. Biomes

Biome A large-scale ecological area e.g. tropical rainforest, desert, tundra. The distribution is affected by factors such as climate, altitude, and soil.

Tropical rainforest - Equatorial regions (hot, wet).

Hot desert - Around 15-30° latitude (hot, dry).

Tundra - Arctic regions, 60°N in Northern Europe, Alaska and Russia (cold, dry).

Polar – Permanent or semi-permanent layer of ice (very cold, dry).

7. Adaptations

Layers – emergents grow tall to reach sunlight; drip tips - channel water from leaves (reduce standing water); buttress roots - support tall trees and absorb nutrients from top layer of the soil; epiphytes grow on trees and get moisture and nutrients from the air.

Poison dart frog – bright colours to deter predators; sloth – long arms and claws to climb trees, prolonged metabolism to stay in safety of trees; Spider monkey – prehensile tail to grasp tree branches and swing; Jaguar – camouflaged fur for hunting and large claws for climbing.

8. Deforestation

Highest rates: South America (Brazil in particular), Indonesia, and Democratic Republic of Congo.

Trends: Declining in some regions (e.g., Brazil); increasing elsewhere (e.g., Southeast Asia). Between 2002 and 2022 there has been an increase in the rates of tropical rainforest deforestation globally. 60 hectares per minute lost globally.
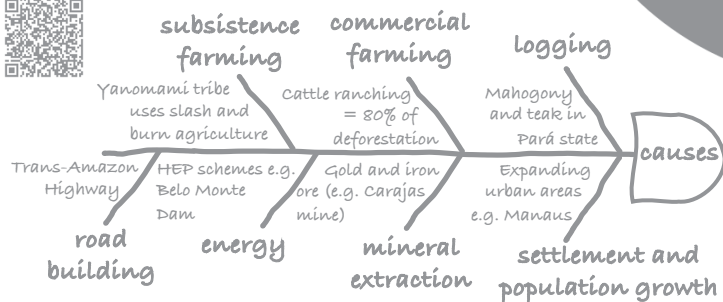
Notes Quizzes

🌍 **internet geography**

The Living World

9. Amazon

Deforestation: Causes and Impacts

Causes (fishbone diagram):

- **subsistence farming** — Yanomami tribe uses slash and burn agriculture
- **commercial farming** — Cattle ranching = 80% of deforestation; HEP schemes e.g. Belo Monte Dam; Gold and iron ore (e.g. Carajas mine)
- **logging** — Mahogany and teak in Pará state
- **road building** — Trans-Amazon Highway
- **energy**
- **mineral extraction**
- **settlement and population growth** — Expanding urban areas e.g. Manaus

→ **causes**

Economic Impacts	Environmental impacts
Income from exports; tax revenue from profits and wages; employment opportunities.	Soil erosion; loss of biodiversity; local climate change; global climate change (loss of carbon sink).

10. Rainforest Value

To people

- Medicine: Source of over 25% of modern medicines.
- Resources: Provides food, timber, and raw materials.
- Indigenous communities: Supports traditional lifestyles and cultures.

To the environment

- Carbon storage: Acts as a carbon sink, mitigating climate change.
- Oxygen production: Generates around 20% of the world's oxygen.
- Biodiversity: Home to millions of plant and animal species.

11. Management

Sustainable Strategies:

- **Selective Logging**: Removes only mature trees.
- **Replanting**: Ensures continuity of forest cover.
- **Conservation**: Reserves and education.
- **Ecotourism**: Low-impact tourism.
- **International Agreements**: Promote sustainable use of hardwoods e.g. FSC.
- **Debt Reduction**: Countries conserve rainforests in exchange for debt relief.

12. Hot Deserts

- Hot days; Cold nights (high diurnal range)
- Dry <250mm rainfall annually
- Shallow, sandy, infertile, salty
- Sparse, xerophytes

Map: Western, Sahara, Arabian, Thar
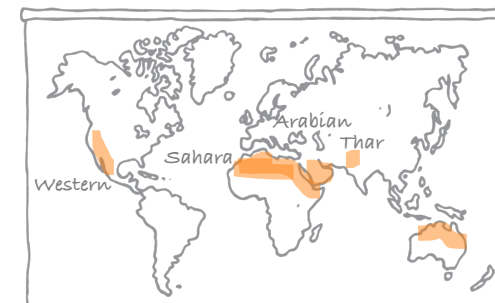
Located around 20° and 30° north and south of the Equator; High atmospheric pressure = arid; Temperatures above 40°C during the day; rocky and sandy; xerophytes e.g. cacti; shallow soil; little litter and humus; animals have adapted to the environment.

Interdependence - Vegetation stabilises the soil, preventing erosion; animals depend on plants for food and shade; humans rely on vegetation and water resources for survival and agriculture.

13. Hot Desert Adaptations

Flora (plants)

- Cacti store water in stems; spines reduce water loss and protect against herbivores; widespread surface roots to collect water.
- Acacia trees have deep roots access groundwater; small leaves reduce water loss; wide canopy provides shade slowing evaporation.

Fauna (animals)

- Camels store fat in humps for energy; tolerate dehydration; thick fur insulates from heat; large eye lashes protect eyes in sandstorms.
- Fennec fox has large ears dissipate heat; light fur reflects sunlight; nocturnal to avoid daytime heat.

14. The Sahara

- North Africa – 9.2 million km²
- Hot – daily temp >50°C – cold at night – 0°C
- Vast sand dunes, rocky plateaus, and oases.

Opportunities:

- Mineral Resources: Phosphate mining in Morocco; oil and gas in Algeria.
- Energy: Solar power e.g. Noor, Morocco.
- Agriculture: Irrigation from the Nile.
- Tourism: Unique landscapes; extreme sport; Star Wars sets in Tunisia; multiplier effect.

Challenges:

- Climate: Extreme temperatures make it challenging to work.
- Water Supply: Scarcity; depleted aquifers; high evaporation rates.
- Accessibility: Vast, remote areas; expensive to transport energy and water to remote areas.

15. Desertification

Desertification → The process by which fertile land becomes desert.

Causes:

- Climate Change: Reduced rainfall and higher temperatures accelerate land degradation.
- Population Growth: Increased demand for food, water, and resources leads to overuse of land.
- Removal of Fuel Wood: Vegetation cover removed exposing the soil.
- Overgrazing: Overgrazing damages vegetation and exposes soil to erosion.
- Over-Cultivation: Intensive farming exhausts nutrients, reducing fertility.
- Soil Erosion: Wind and water erosion remove topsoil, preventing plant growth.

16. Reducing Desertification

Strategies to reduce desertification:

- Water Management: Efficient irrigation e.g. drip irrigation; contour trapping; planting pits (zai).
- Soil Management: Crop rotation to vary nutrient removal and soil recovery; production of compost to add nutrients to the soil.
- Planting Trees (afforestation): Supply of nutrients through litter; roots bind the soil from erosion and protect from wind erosion; shade reduces evaporation.
- Appropriate Technology: Simple, low-cost tools (e.g., stone lines or bunds).

Notes

Quizzes