4.1- Species, Communities, and Ecosystems

What is the difference between a species, a population, a community, and an ecosystem?

- A species is a group of organisms that interbreed to produce offspring.
- A population is a group of the same species, living in the same area at the same time.
- A community is a group of populations living and interacting with each other in a given area,
- An ecosystem is a community and its abiotic factors.

Describe how producers, consumers, saprotrophs, and detrivores obtain nutrition and how they affect the ecosystem.

- Producers (autotrophs): synthesizes its own organic materials from inorganic substances, uses photosynthesis, OR oxidization from inorganic materials.
- Consumers (heterotrophs): obtain molecules from other organisms, cannot produce their own organic materials
- Saprotrophs: release digestive enzymes and absorb external products (decomposers)
- Detrivores: ingest organic molecules found nonliving remnants of organisms

What are the features that make ecosystems sustainable?

- **Energy availability:** light from the sun provides initial energy source
- **Nutrient availability:** saprotrophic decomposers ensure constant recycling of inorganic materials
- **Recycling of wastes:** certain bacteria can detoxify harmful wastes

4.2- Energy Flow

Explain the movement of energy in an ecosystem?

- Energy enters as sunlight -> converted into chemical energy by producers -> energy is stored in **carbon compounds** -> transferred to heterotrophs via feeding

Explain the movement of nutrients in an ecosystem.

- Food chains show linear feeding relationships between species. Energy is released from carbon compounds by respiration as is used in living organisms and converted to heat.

Outline energy flow through a food chain.

- Food chain shows transfer of energy in an ecosystem by arrows from one trophic level to the next.

- Producers -> Primary Consumers -> Secondary Consumers -> Tertiary Consumers

State multiple reasons why biomass decreases along food chain.

- Higher trophic levels have less energy as carbon compounds
- Loss of carbon dioxide
- Loss of water
- Loss of waste products

4.3- Carbon Cycling

Describe how peat forms.

- Organic matter digested by bacteria -> obtain oxygen for respiration -> soil becomes waterlogged and anaerobic -> matter is not fully decomposed

What role does bacteria play in the carbon cycle?

- They break down dead organisms, which releases **carbon dioxide.**

4.4- Climate Change

What gases are considered greenhouse gases?

- **CO2, water vapor, methane, and nitrogen oxides.**

Describe the Greenhouse Effect.

- The Greenhouse Effect traps heat within the atmosphere, which prevents rapid temperature fluxions.
- Surface of Earth absorbs short-waves -> re-emits as longer wavelength -> gases absorb and re-radiate longer wave and retain heat

What are the consequences of climate change?

- If the Greenhouse Gases did not absorb the wavelength emitted by the sub and re-emit them into the atmosphere, the Earth's temperature would decrease rapidly and would not be adequate for life.