



# Introduction to Ecology

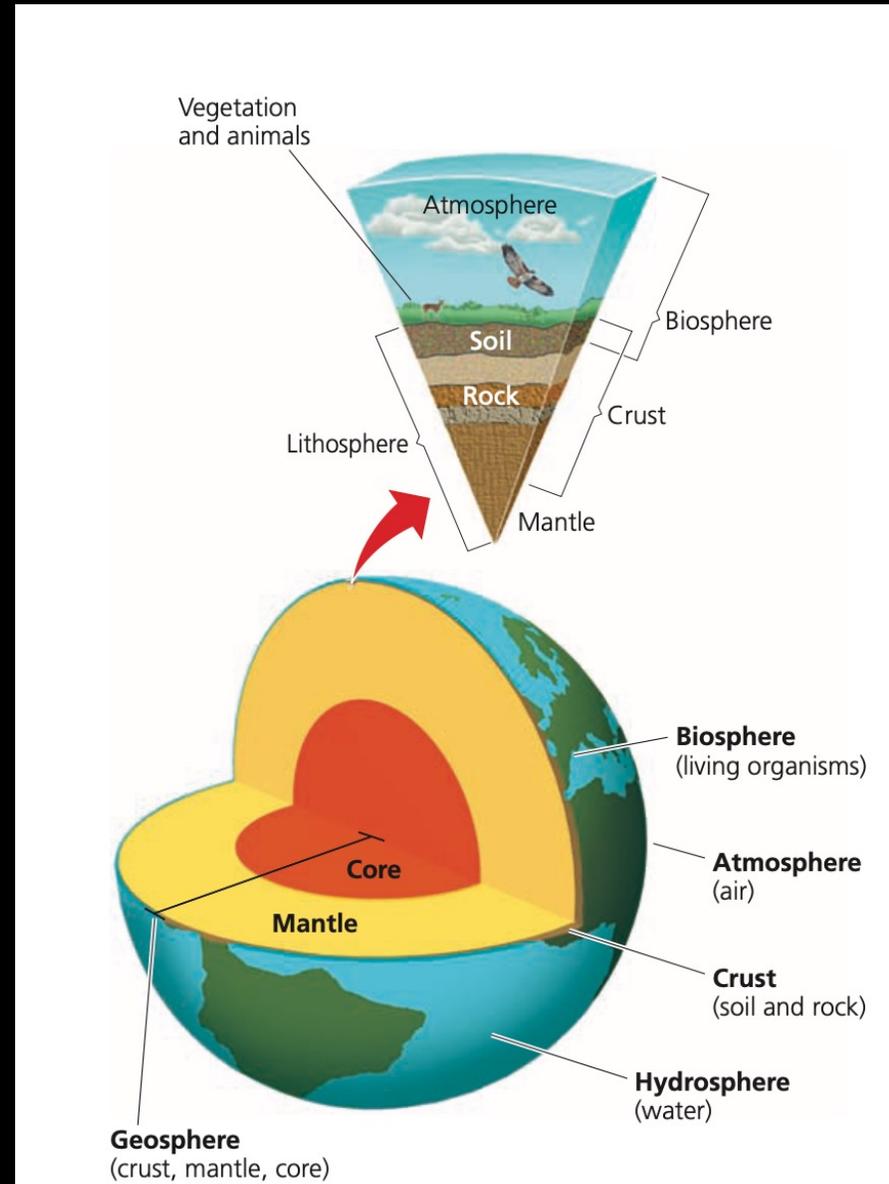
An introduction to key concepts



Section 1

# Key Terms & Concepts

# The Earth System



# Core Concepts

## Ecology

**Derived from:** Greek words 'Oikos' (home) and 'logos' (study).

Study of organisms, their habitats and the processes within and between

## 2 Main things to study

1. Organisms
2. The environment of the organisms
  - a. Biotic: Living
  - b. Abiotic: Non-living habitat factors (Air, Water, Light, Temperature, Wind etc.)

## 2 types of environmental factors

1. **Resources:** What can be consumed
2. **Conditions:** Affects the organisms but can not be consumed

## Habitat

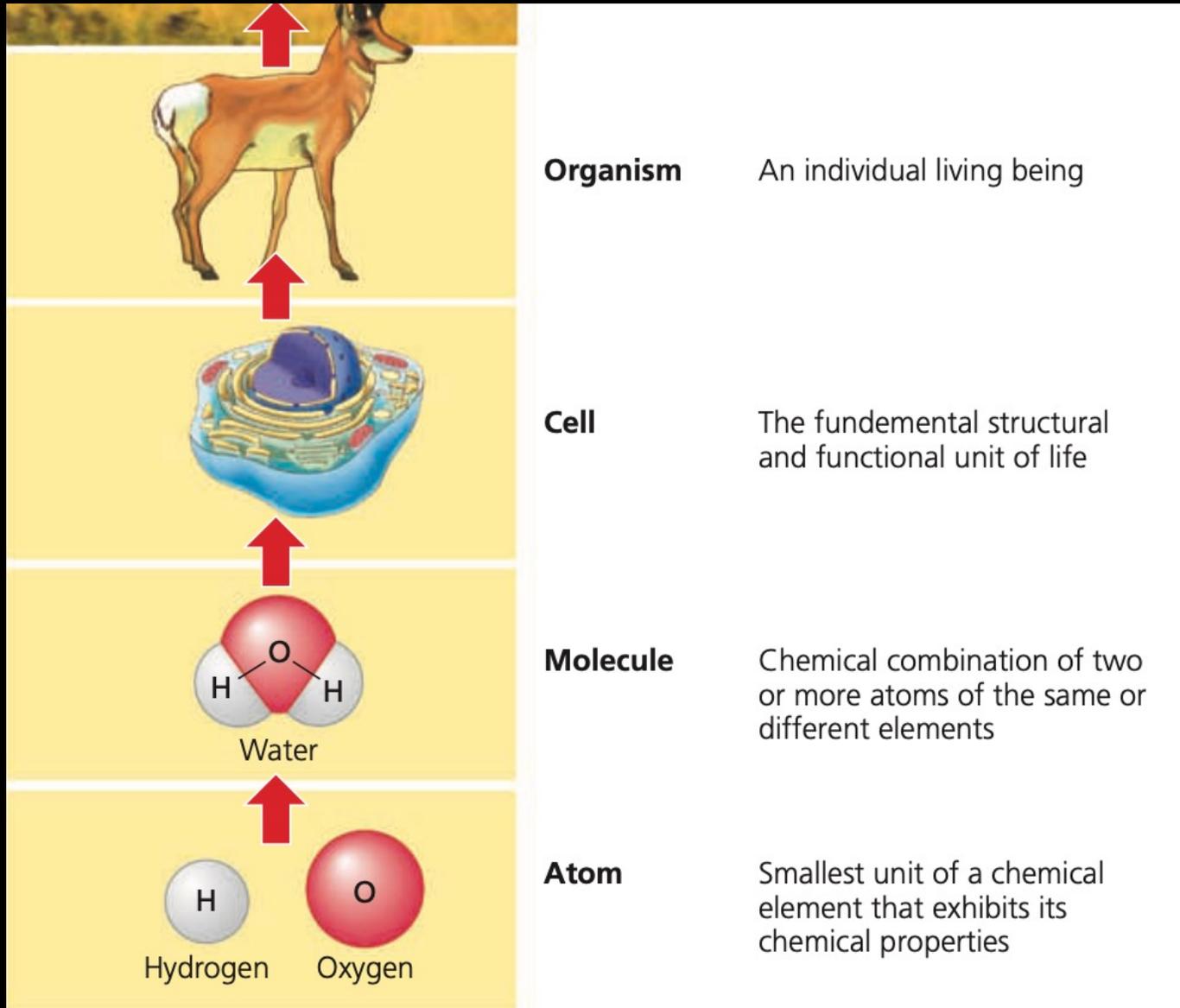
A location where a group of organisms find shelter because the resources and conditions offered by this location is what the organisms are adapted for



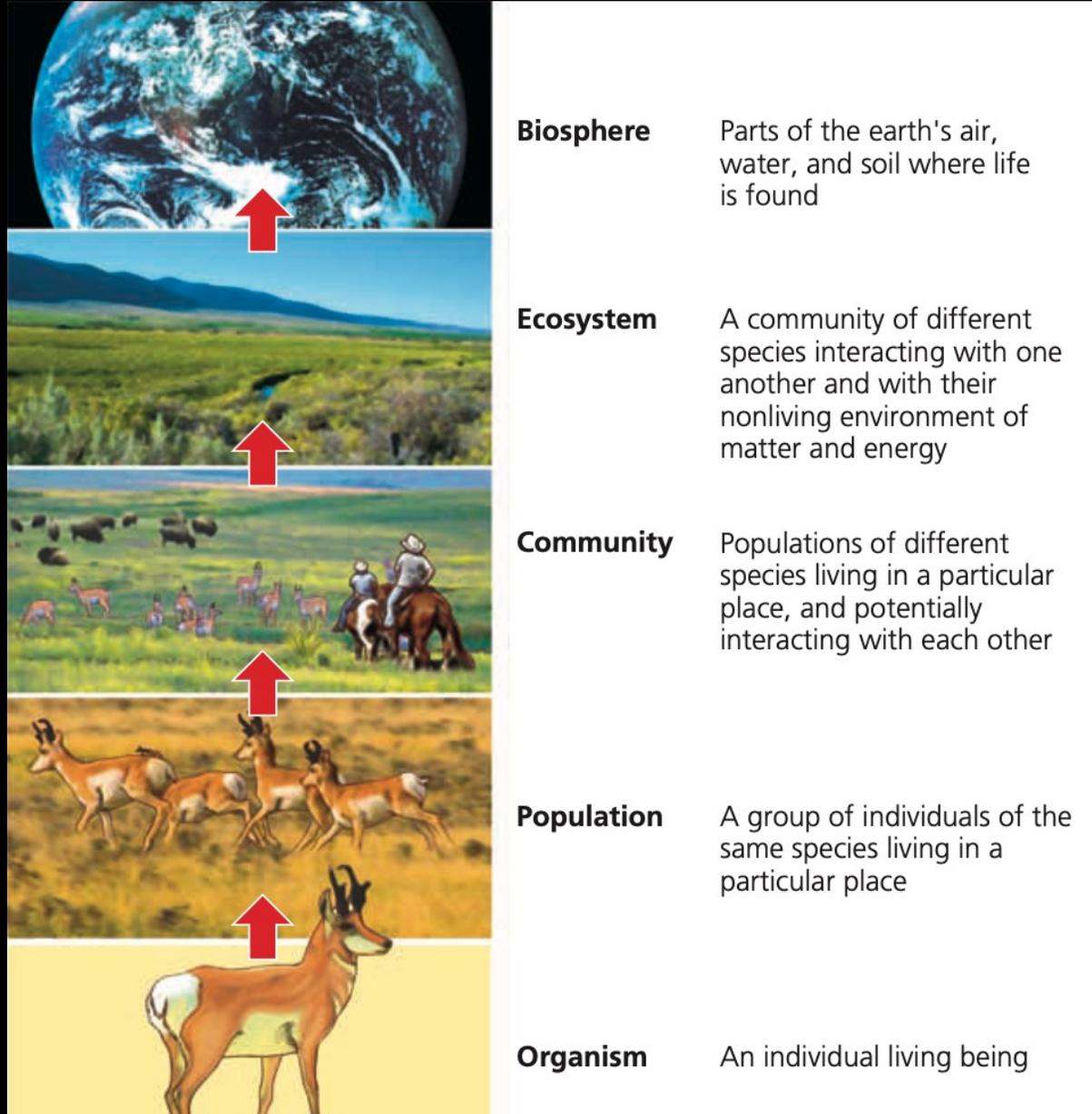
Section 2

# Levels of Ecological Organisations

# Levels of Organisation-1



# Levels of Organisation-2



# Levels of Ecological Organisation

- **Individual and Species**

An organism is an independent living entity. Species refers to a group of similar organisms capable of interbreeding, such as humans denoted as *Homo sapiens*.

- **Population**

A population consists of organisms of the same species that interbreed and live in the same area at the same time. Population changes are influenced by factors like births, deaths, immigration, and emigration.

- **Community**

Communities are groups of various species, located in the same habitat with interaction among themselves.

# Levels of Ecological Organisation

- **Ecosystem**

An ecosystem comprises interacting organisms and their environment, facilitating energy and matter exchange within and between biota and abiota.

- **Biome**

A biome is a large area characterized by specific plant and animal groups adapted to the region's climate.

- **Biosphere**

The biosphere encompasses all living beings and the organic matter they produce on Earth.



Section 3

# 8 Ecological Maxims

1 **Interconnectivity in Nature:** Organisms interact with their physical environment and each other, causing interconnected events; what affects one can affect others.

3 **Resource Trade-offs:** Inputs into one function (like reproduction) necessitate trade-offs, reducing other functions (like growth).

2 **Population Limits:** No population can increase indefinitely due to resource limits.

4 **Continuous Evolution:** Organisms evolve continually, responding to new challenges from both living and nonliving components of their environment.

5 **Influence of Time:** Ecosystems change over time, influenced by past events and impacting future conditions.

7 **Species Interdependence:** Species interactions are crucial for acquiring energy, nutrients, and habitats, making life possible.

6 **Spatial Variation:** Environmental conditions vary over distances, influencing organisms at local, regional, and global scales.

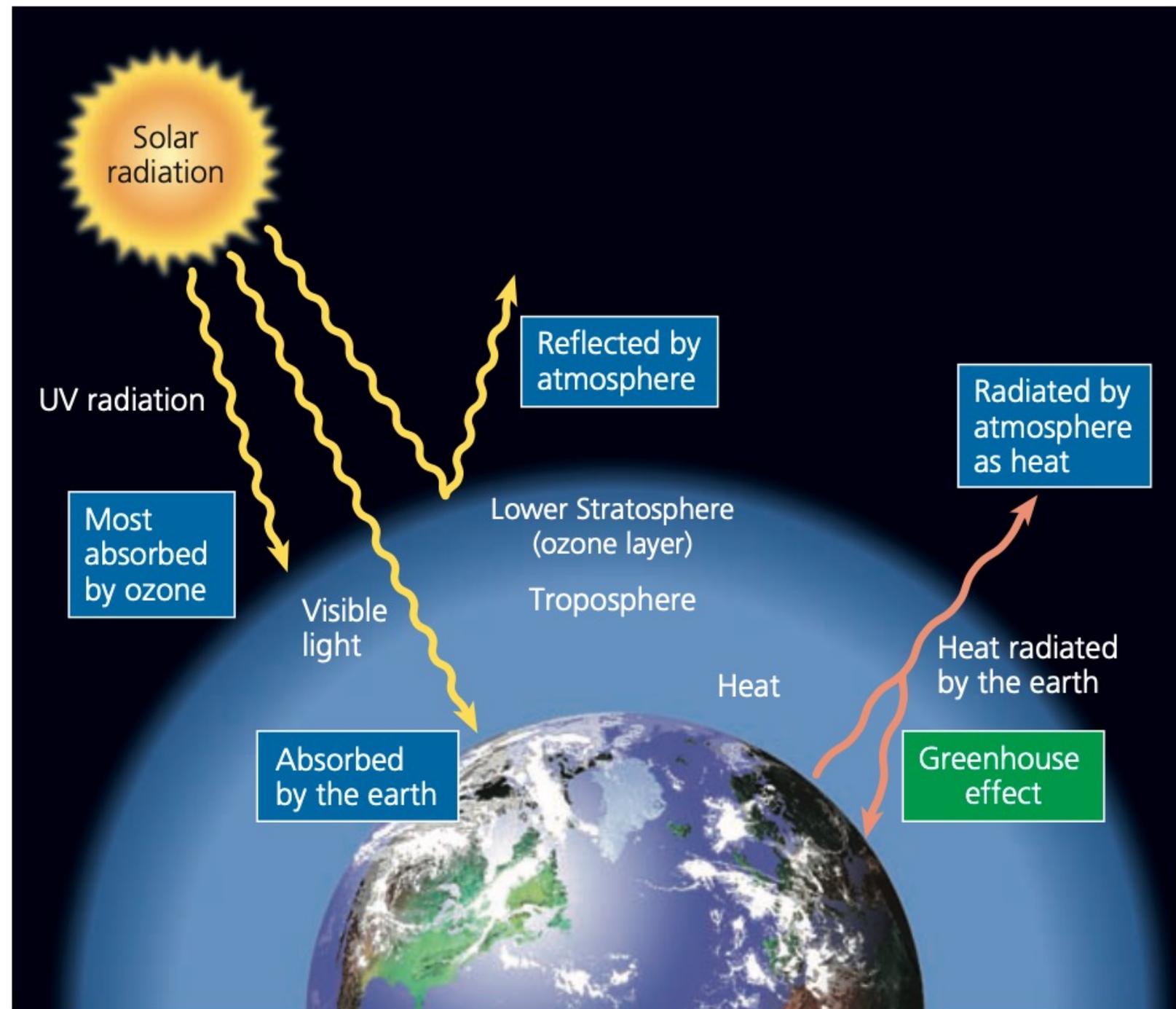
8 **Persistence of Waste:** Waste materials do not disappear but go somewhere, as there is no "away".



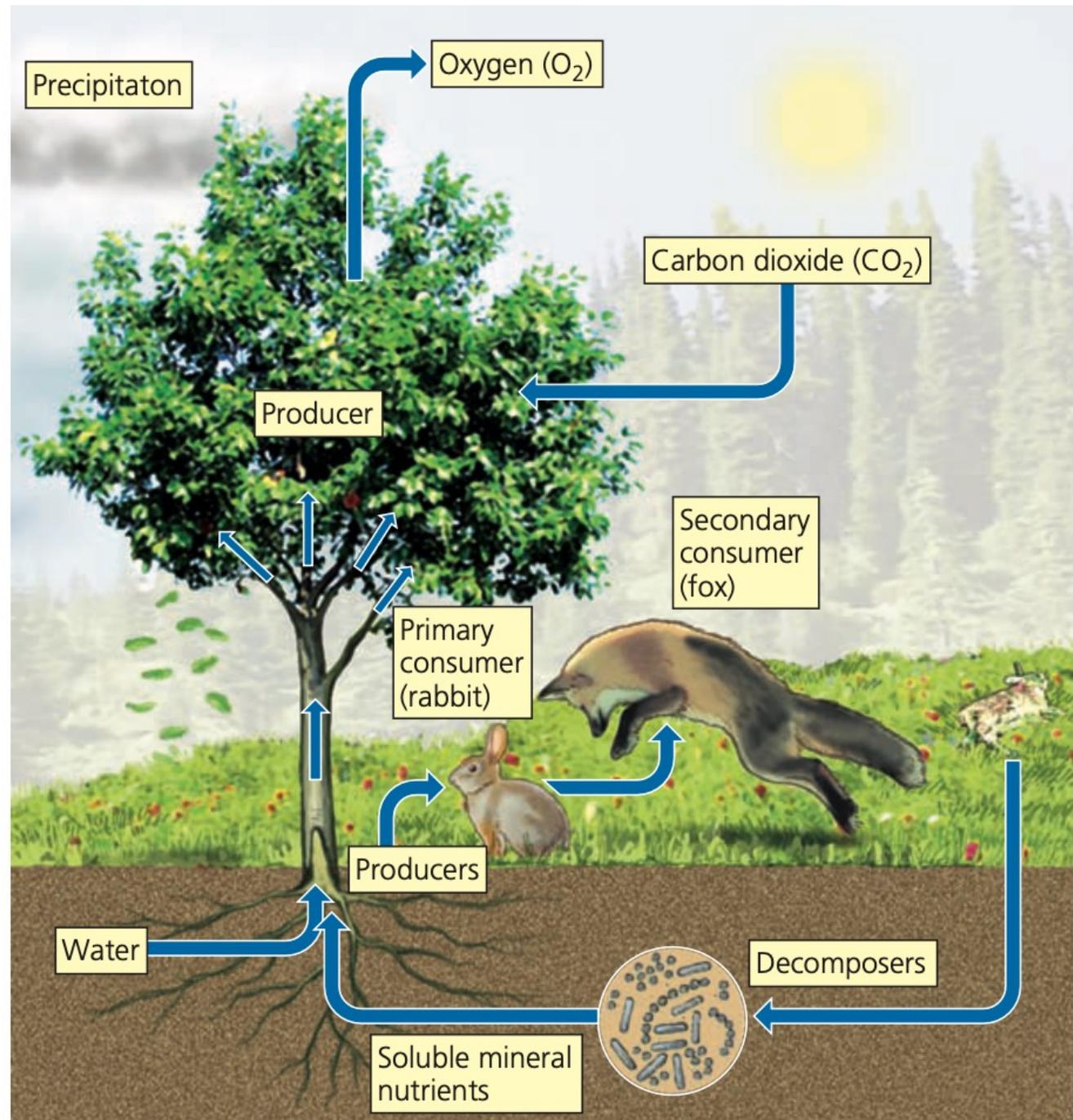
Section 4

# Ecological Flow of Matter & Energy

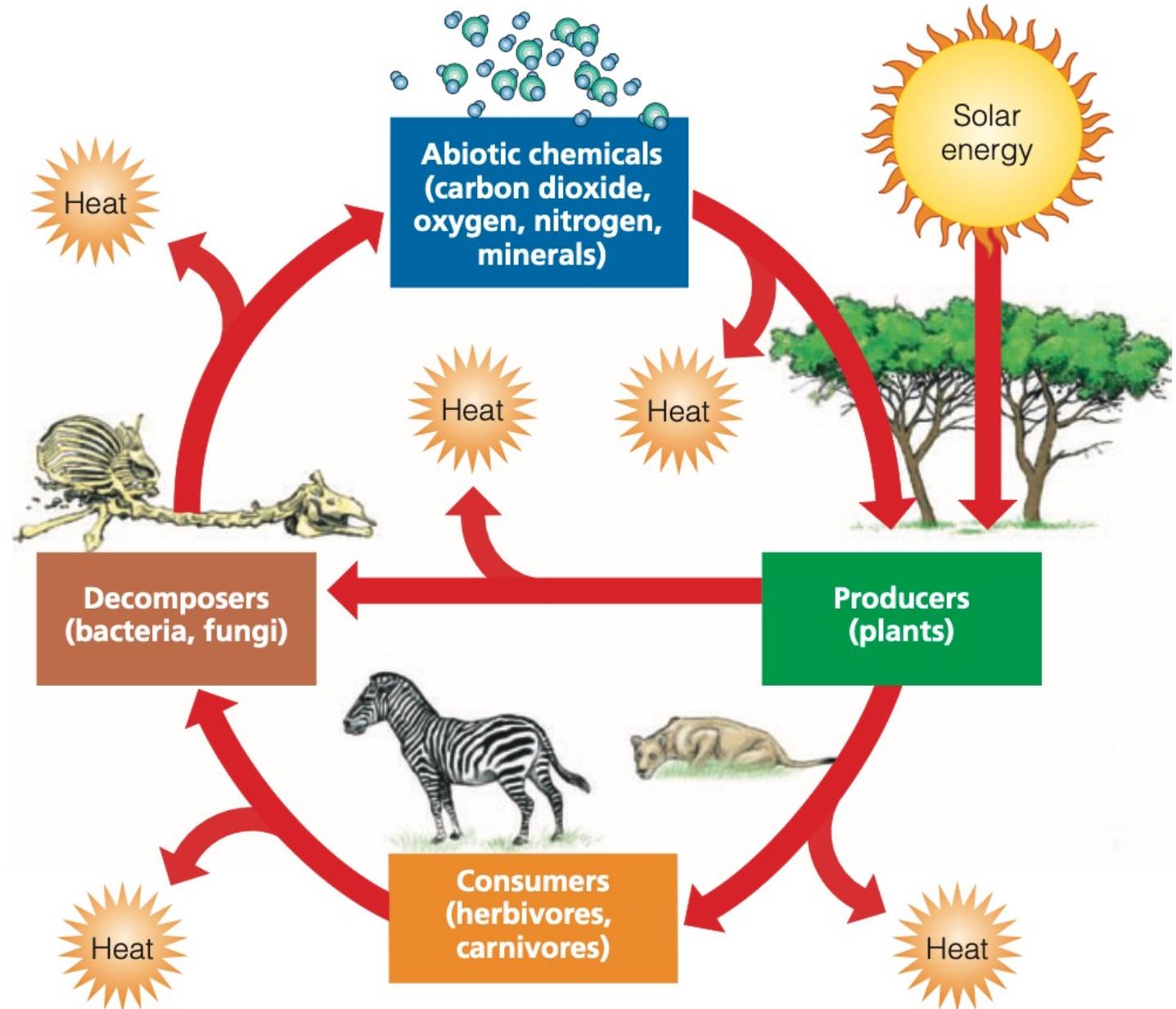
# Solar Energy Flow



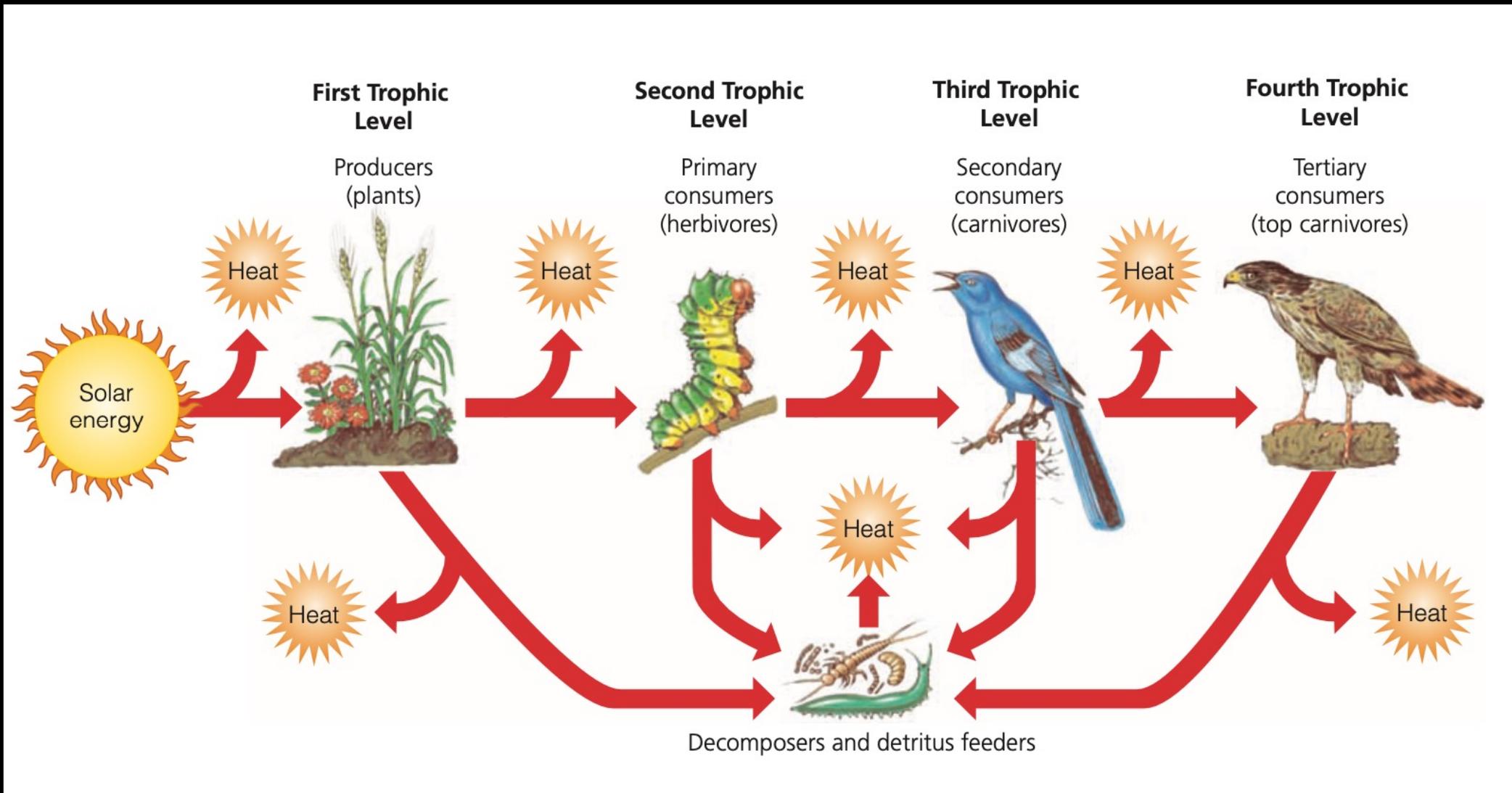
# Ecosystem Flow of matter & energy



# Ecosystem Flow of matter & energy



# Trophic Levels





Section 4

# Mass Extinctions change the biota

# Mass Extinction Events

● 444-416 Million Years Ago  
Ordovician-Silurian Extinction: Up to 85% of species wiped out, likely due to glaciation and climate change.

● 251 Million Years Ago  
Permian-Triassic Extinction: The most severe mass extinction, eliminating 96% of marine species and 70% of terrestrial vertebrates, caused by volcanic activity and global warming.

● 66 Million Years Ago  
Cretaceous-Paleogene Extinction: Dinosaurs and other species wiped out, likely caused by an asteroid impact.

● 372-359 Million Years Ago  
Late Devonian Extinction: Around 75% of species extinct, potentially linked to an asteroid impact.

● 200 Million Years Ago  
Triassic-Jurassic Extinction: Around 80% of species lost, possibly due to massive volcanic eruptions.

● Present Day  
Holocene or Sixth Mass Extinction: Ongoing rapid extinction of species, driven primarily by human activities like habitat destruction and climate change.