

CHAPTER 2

ECOLOGY





CHAPTER 2 : ECOLOGY

2.1 Ecosystem Concept

2.2 Energy Flow Through Ecosystem

2.3 Biogeochemical Cycle

2.4 Conservation and Management

2.5 Population Ecology

2.1 Ecosystem Concept

At the end of this topic, students should be able to:

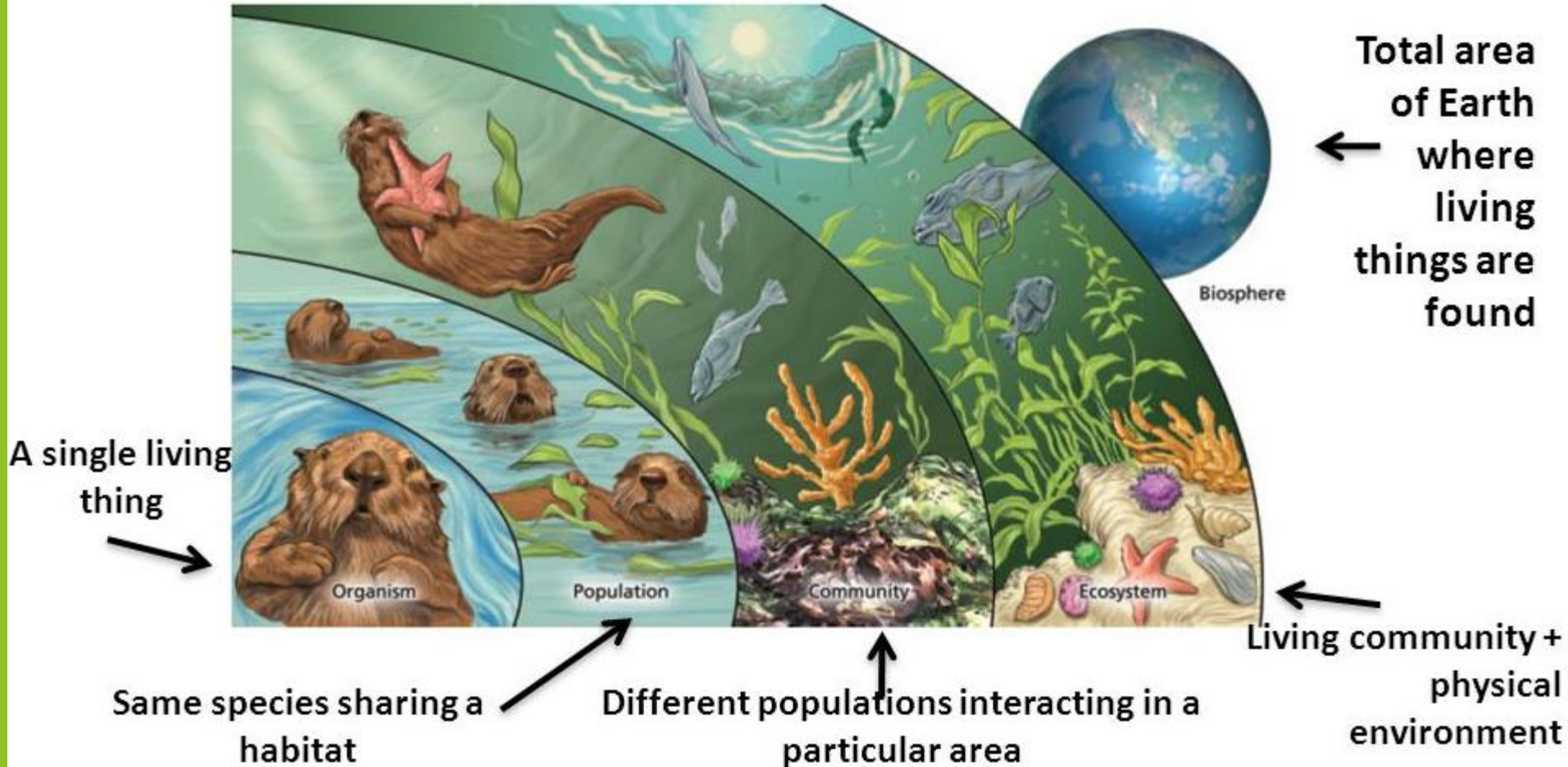
- a. Define ecosystem.
- b. Describe lake ecosystem based on:
 - i. light penetration (photic and aphotic)
 - ii. distance from shore and water depth (littoral, limnetic)
- c. Describe terrestrial ecosystem of tropical rainforest stratification. (emergent, canopy, understory, shrub, ground layer/forest floor)

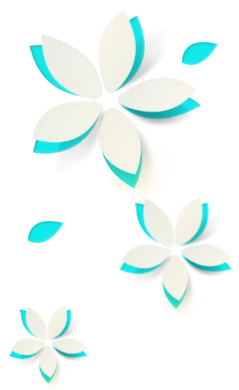


ECOLOGY

The study of how organism interact with each other and with their physical environment.

Ecologists organize their study into several levels (ecological hierarchy).

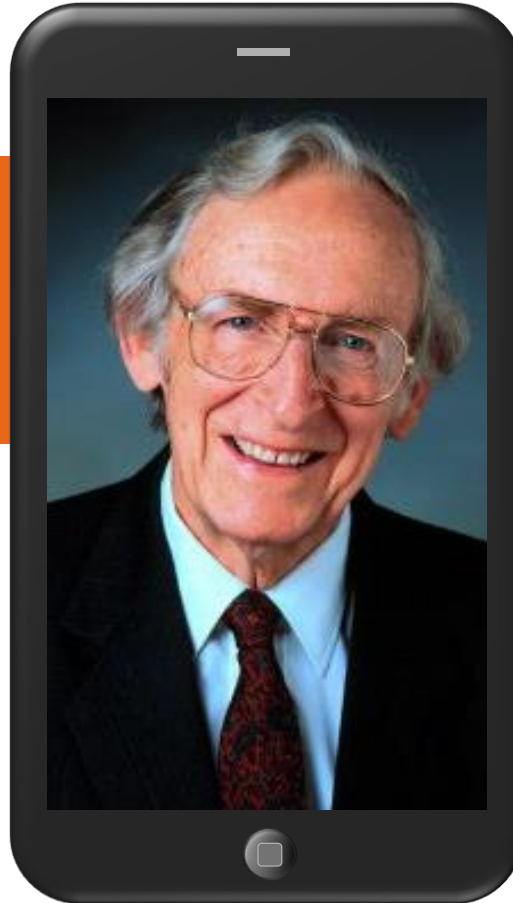




Definition of Ecosystem

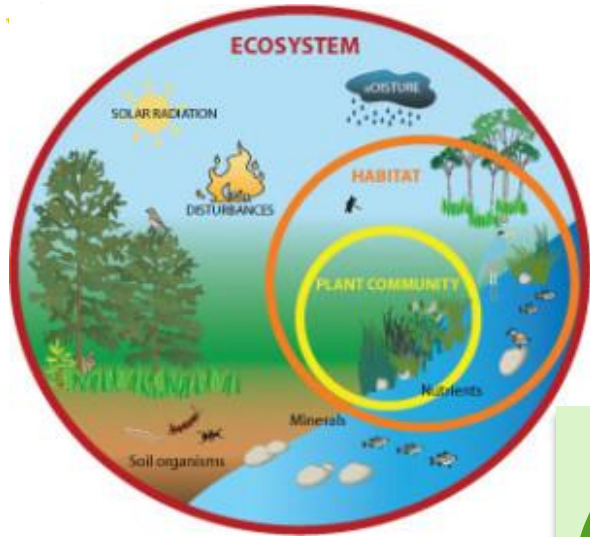
A basic functional unit of nature including both organisms and their non-living environment.

Eugene Odum
American Ecologist



Each interacting and influencing each other and necessary for maintenance and development of the system.

Components of Ecosystem



BIOTIC
COMPONENTS



01

ABIOTIC
COMPONENTS



02

INTERACTIONS
AMONG BIOTIC
COMPONENT



03

INTERACTION
BETWEEN BIOTIC &
ABIOTIC COMPONENT



04

Biotic vs Abiotic Components

BIOTIC COMPONENTS	ABIOTIC COMPONENTS
Involves all living organisms	Involves all non living things
Interaction between organisms: <ul style="list-style-type: none">• Competition• Parasites• Predation• Symbiosis	Components of biosphere: <ul style="list-style-type: none">• Air• Water• Light• Wind• Soil• pH• Temperature• Salinity• Humidity

Lake Ecosystem : Zonation

1. Photic Zone

- Upper part of lake or marine environment.
 - Light is sufficient for photosynthesis.

2. Aphotic Zone

- The deep open water.
 - Region that do not received light.

A. Light Penetration



B. Distance from shore and depth of water

1. Littoral

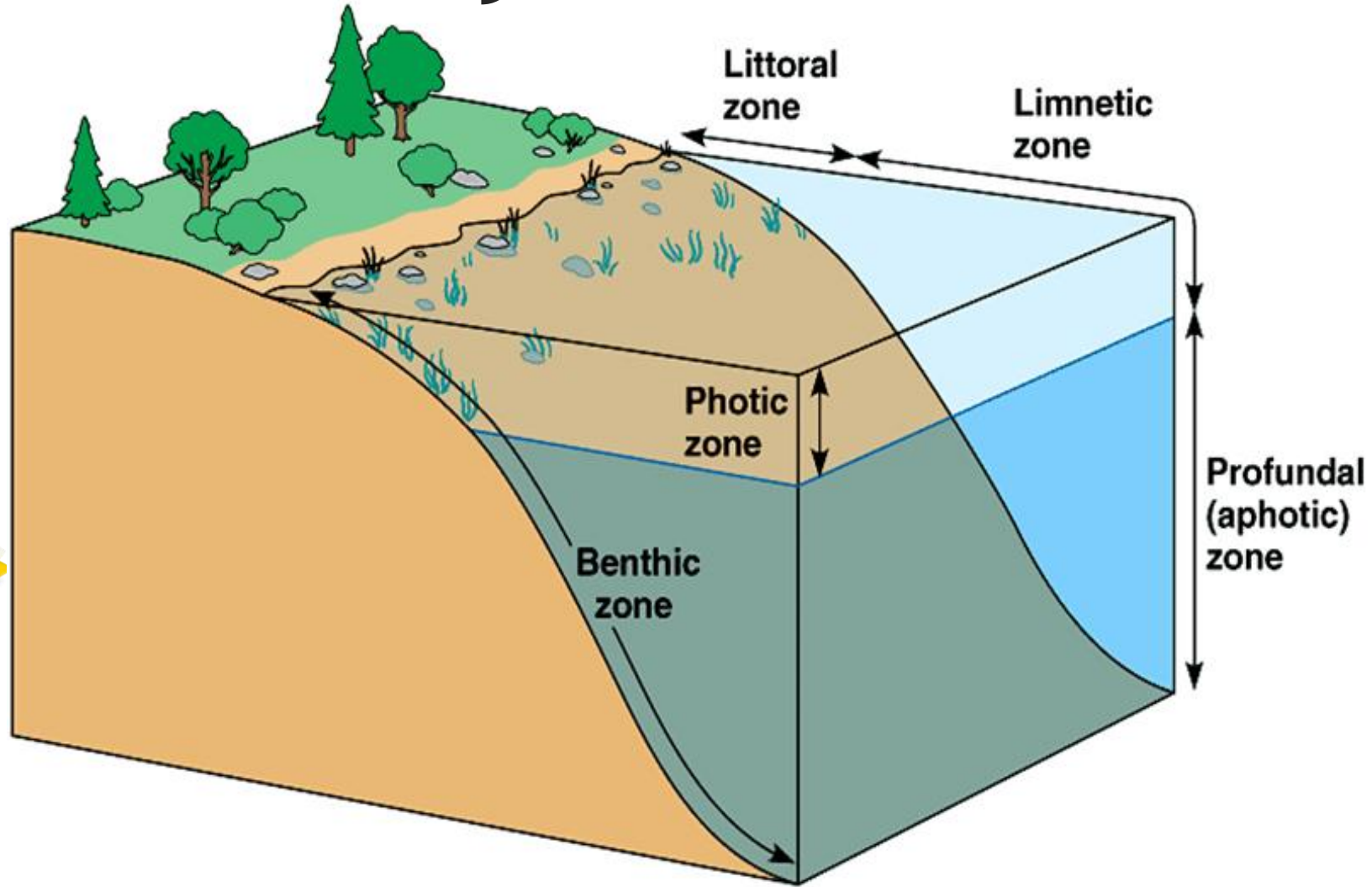
Area near the shore that receives sunlight, extending down to the depth where rooted plants stop growing

2. Limnetic

Open surface waters , away from the shore.

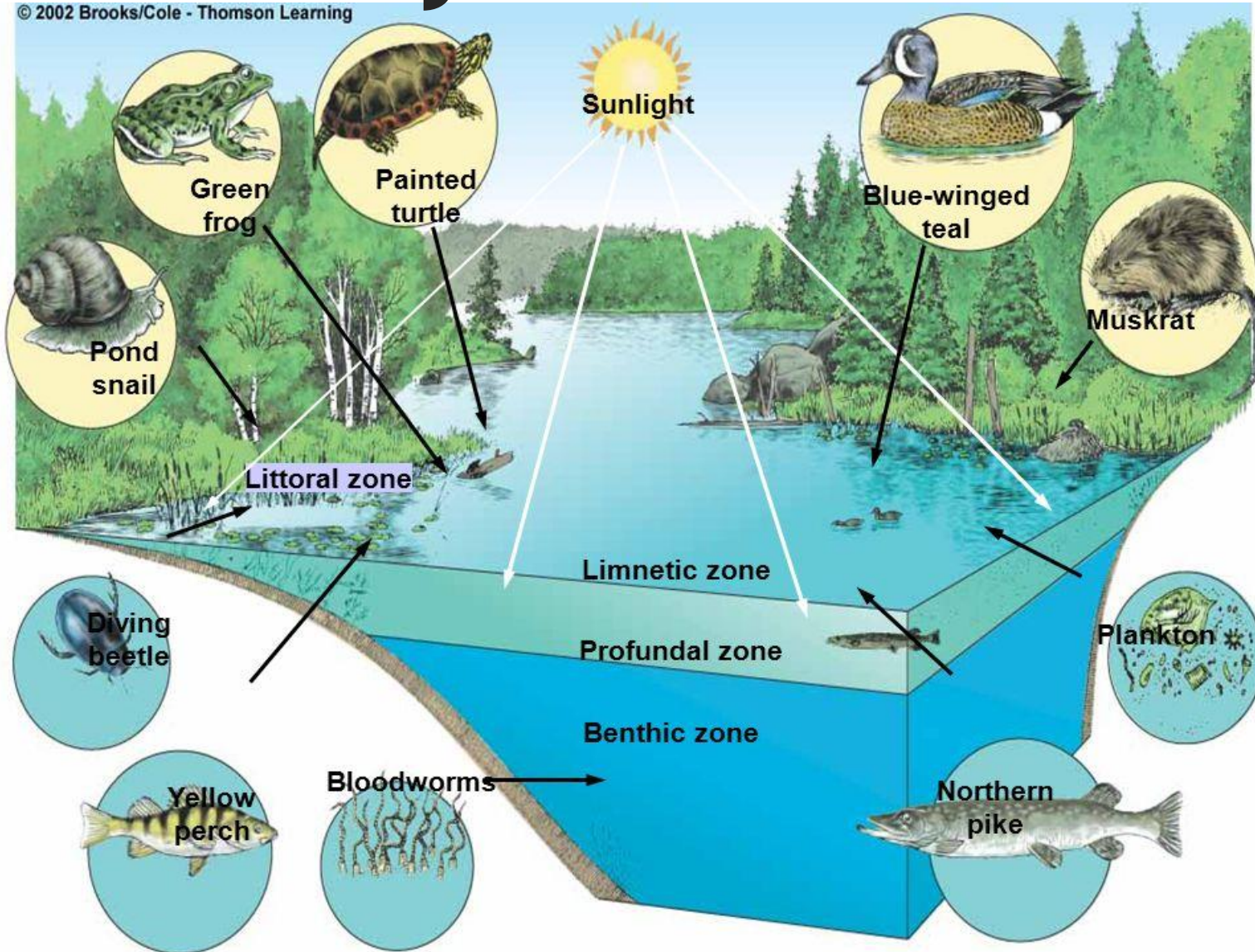


Lake Ecosystem : Zonation

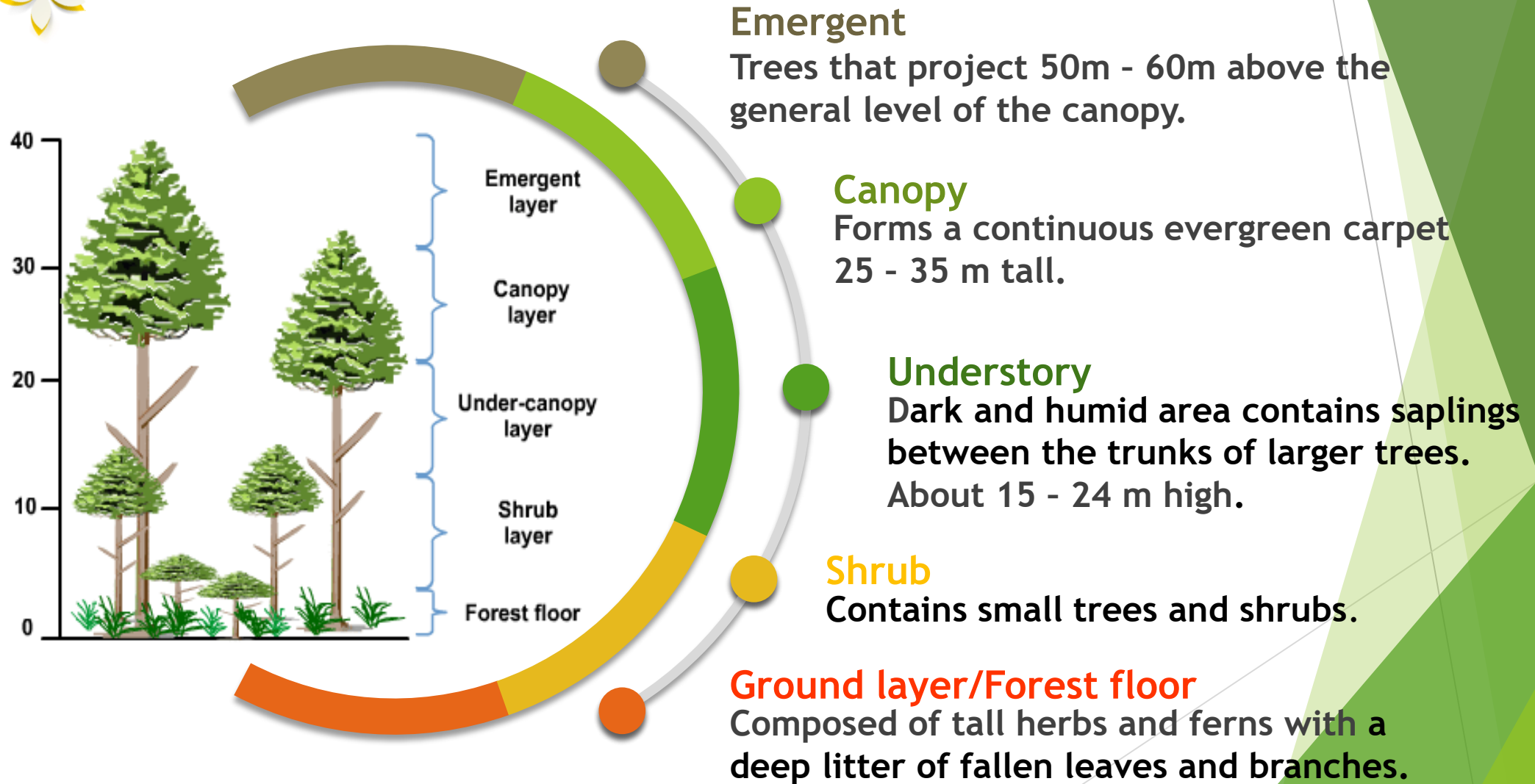


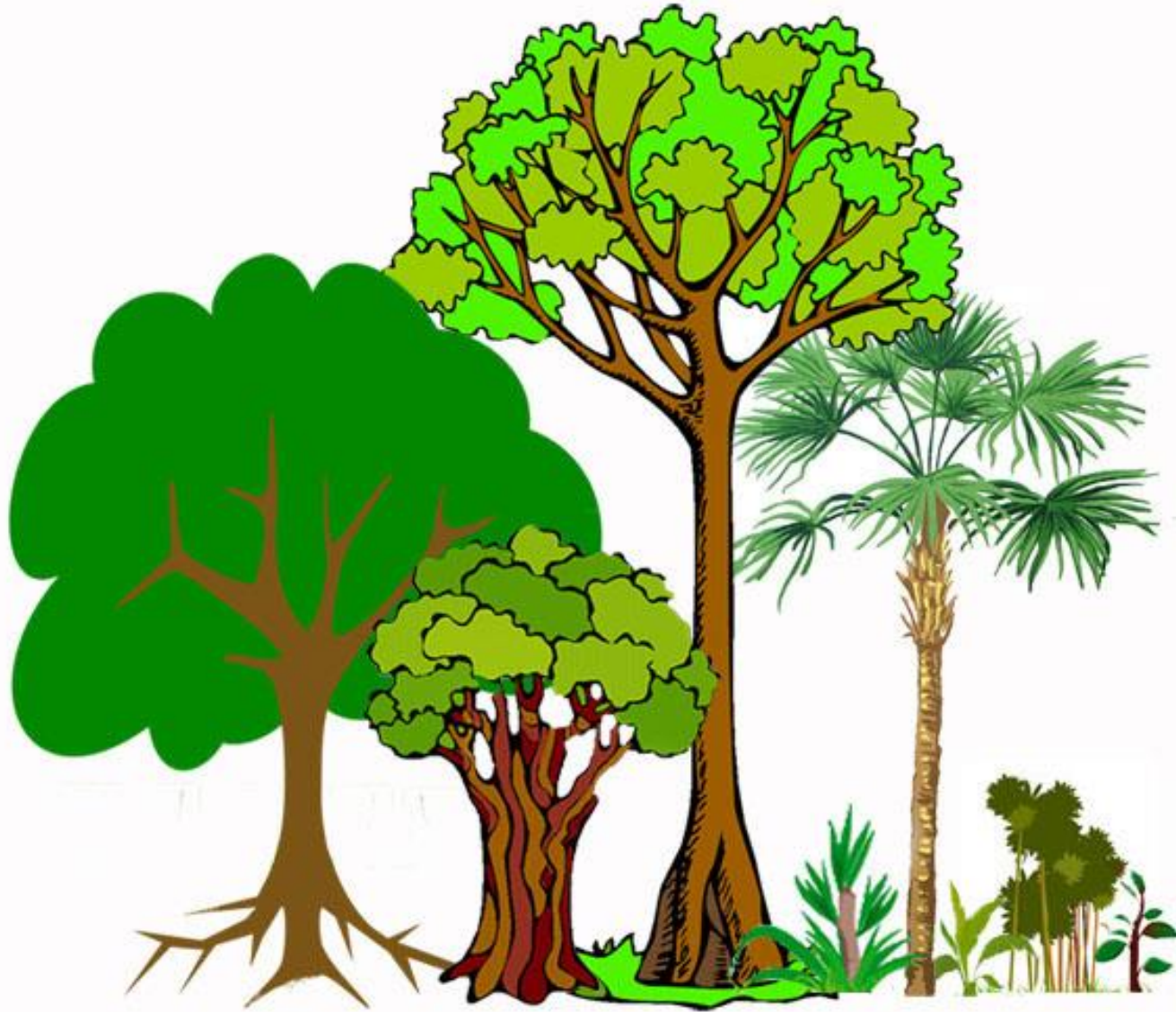
Lake Ecosystem : Zonation

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Tropical Rainforest Stratification





Emergent
layer

Canopy
layer

Understory
layer

Shrub
layer

Ground
layer

Tropical Forest Stratification



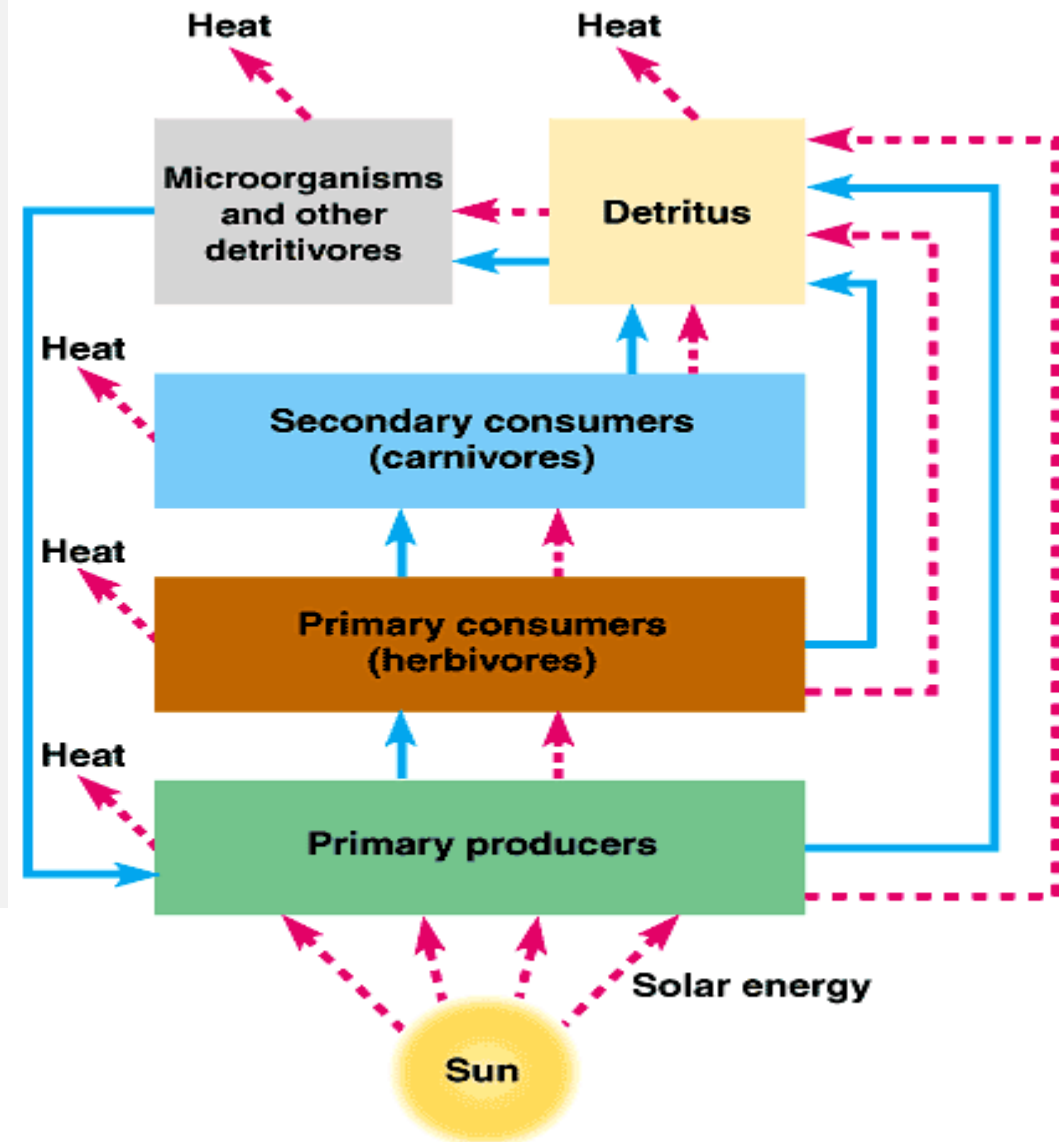
2.2 Energy Flow In An Ecosystem

At the end of this topic, students should be able to:

- a. Explain the energy transfer in ecological pyramids in relation to trophic level.
- b. Calculate energy loss in each trophic level.



2.2 Energy Flow in An Ecosystem

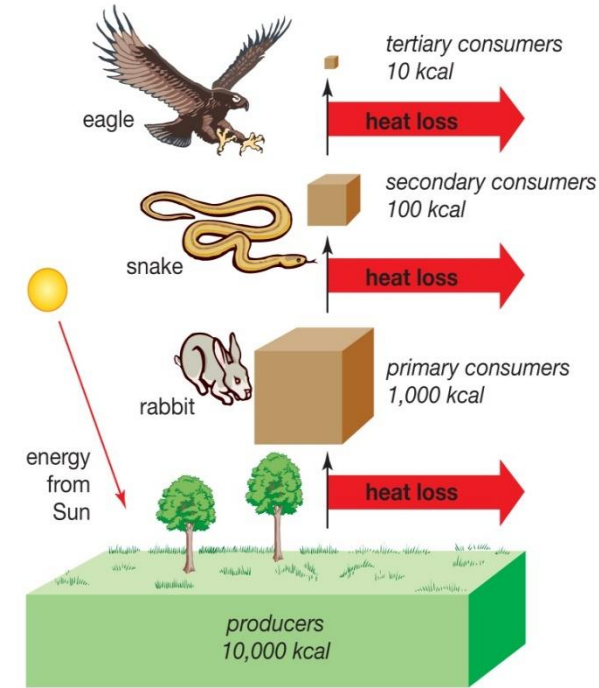


Only 10% of energy is transferred from one trophic level to another

The rest is lost as heat:

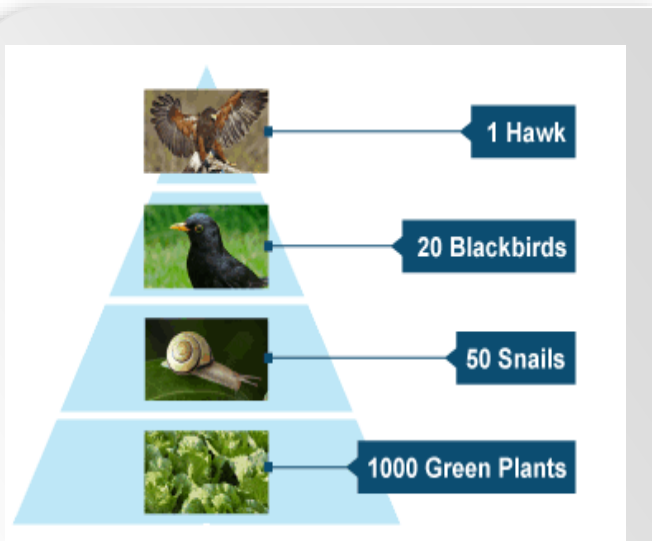
- Respiration
- Excretion
- Photosynthesis
- Movements
- Growth

Energy flow and trophic levels

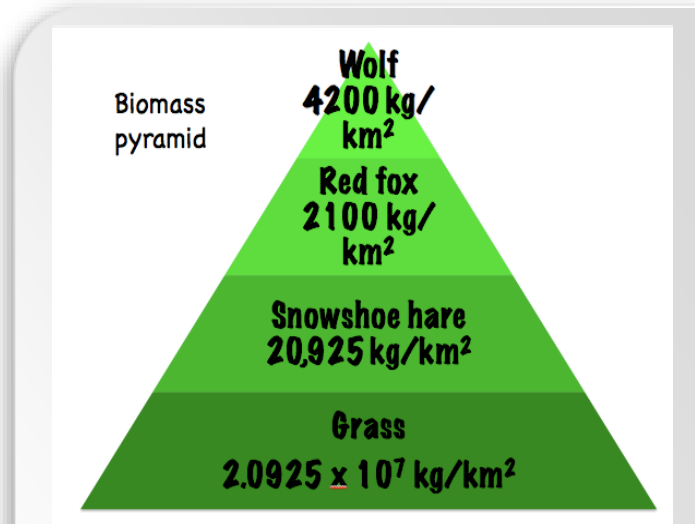


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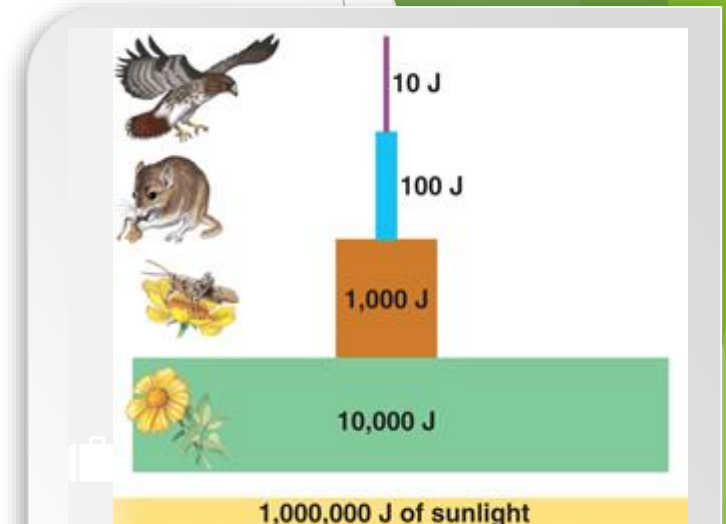
Ecological Pyramid



Pyramid of Number
Based on counting the numbers of organisms at each trophic level.

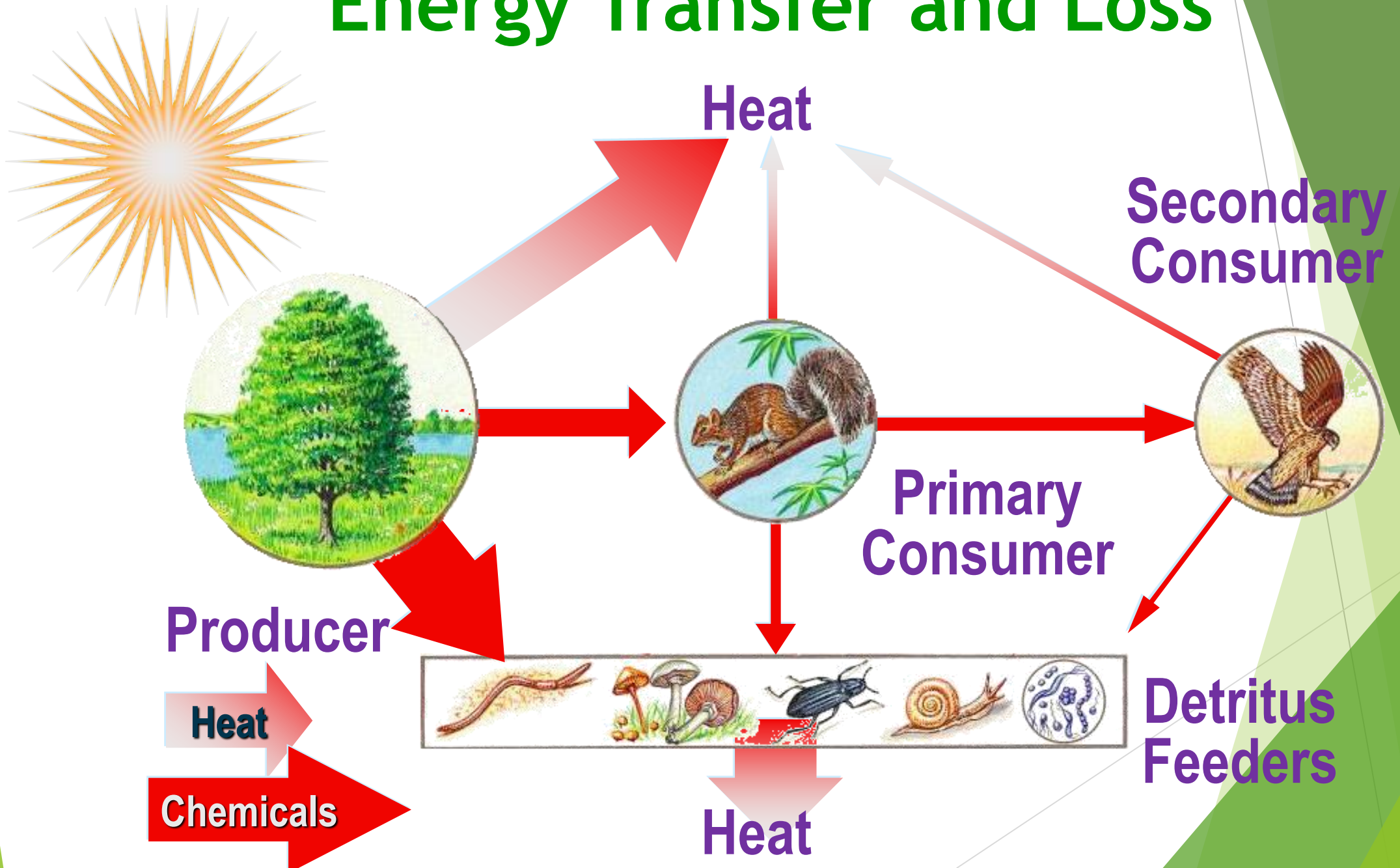


Pyramid of Biomass
Shows weight (usually dry weight) of organisms at each trophic level.

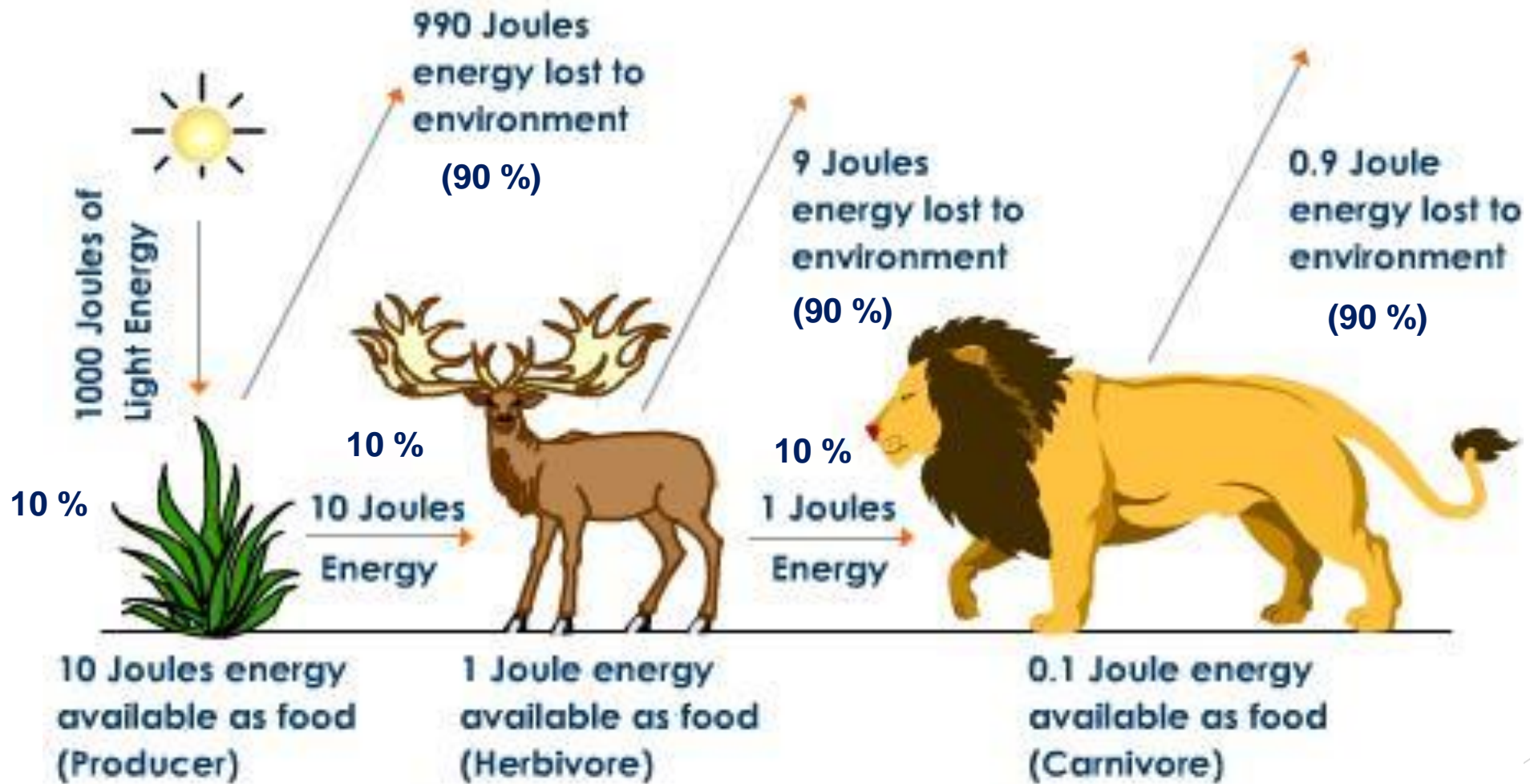


Pyramid of Energy
Indicates total amount of energy present in each trophic level.

Energy Transfer and Loss



Energy Loss Calculation



Progressive Loss of Energy in Food Chain

2.3 Biogeochemical Cycle

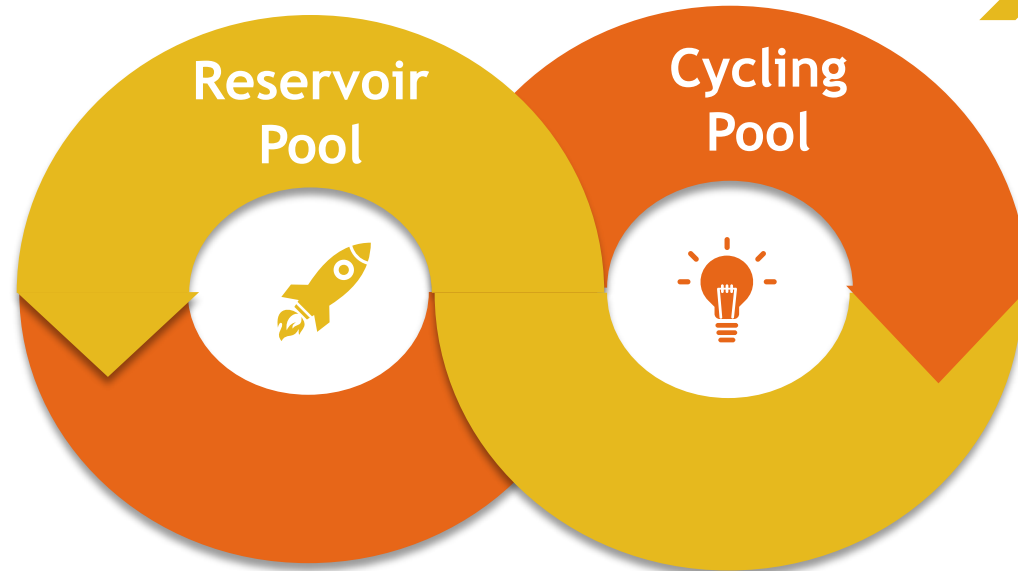
At the end of this topic, students should be able to:

- a. Describe biogeochemical cycle components (cycling pool and reservoir pool) in carbon and nitrogen cycles.
- b. Illustrate phosphorus cycle.



Biogeochemical Cycle

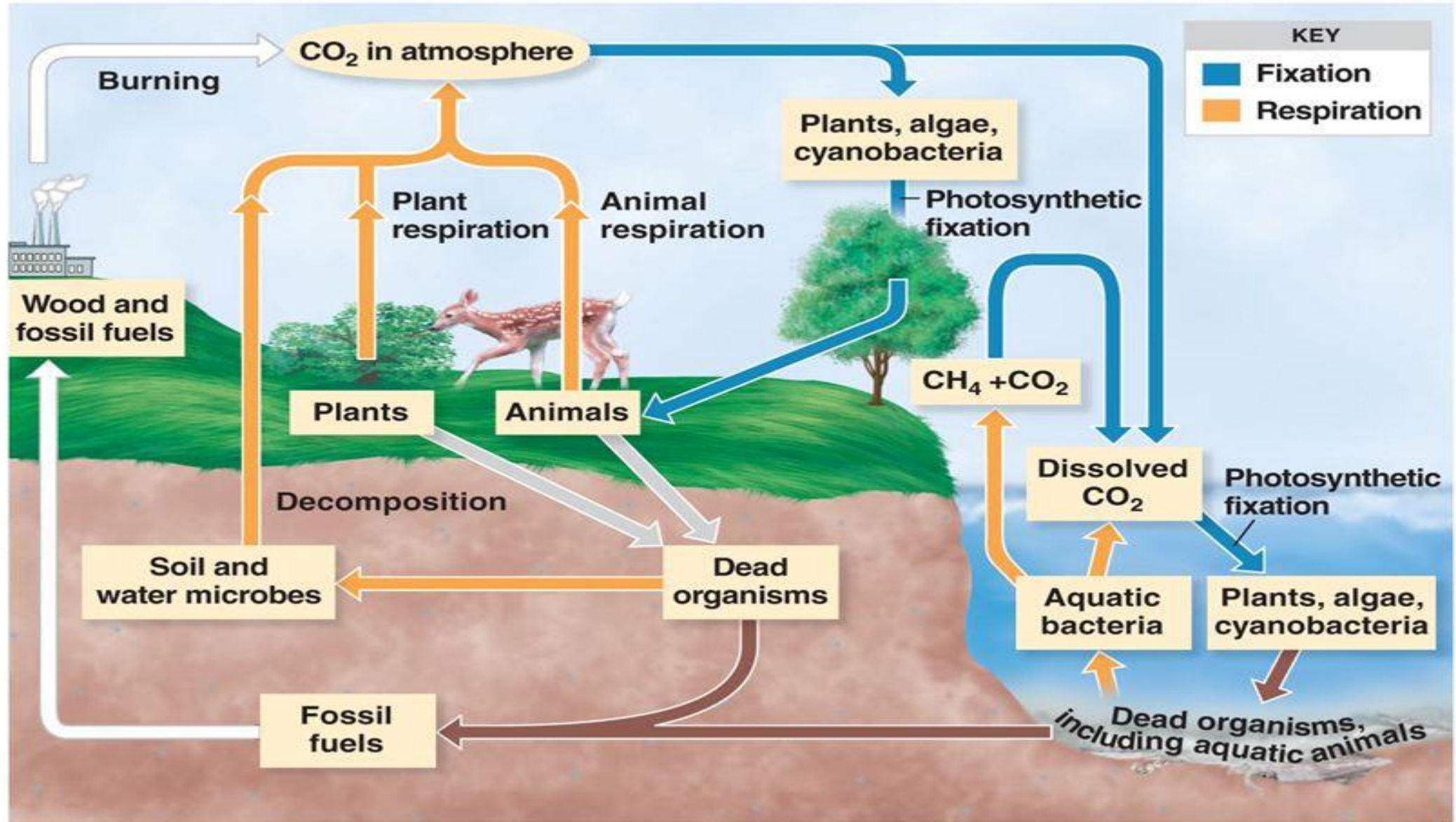
Biogeochemical is the relation between biological and geological/ earth components and chemical changes.



➤ Portion of the environment from which the plants & animals take the abiotic component from reservoir

➤ Portion of the earth that acts as a **storehouse** for the element

The Carbon Cycle



Nitrogen Cycle

3. Assimilation

2. Nitrification

Ammonification

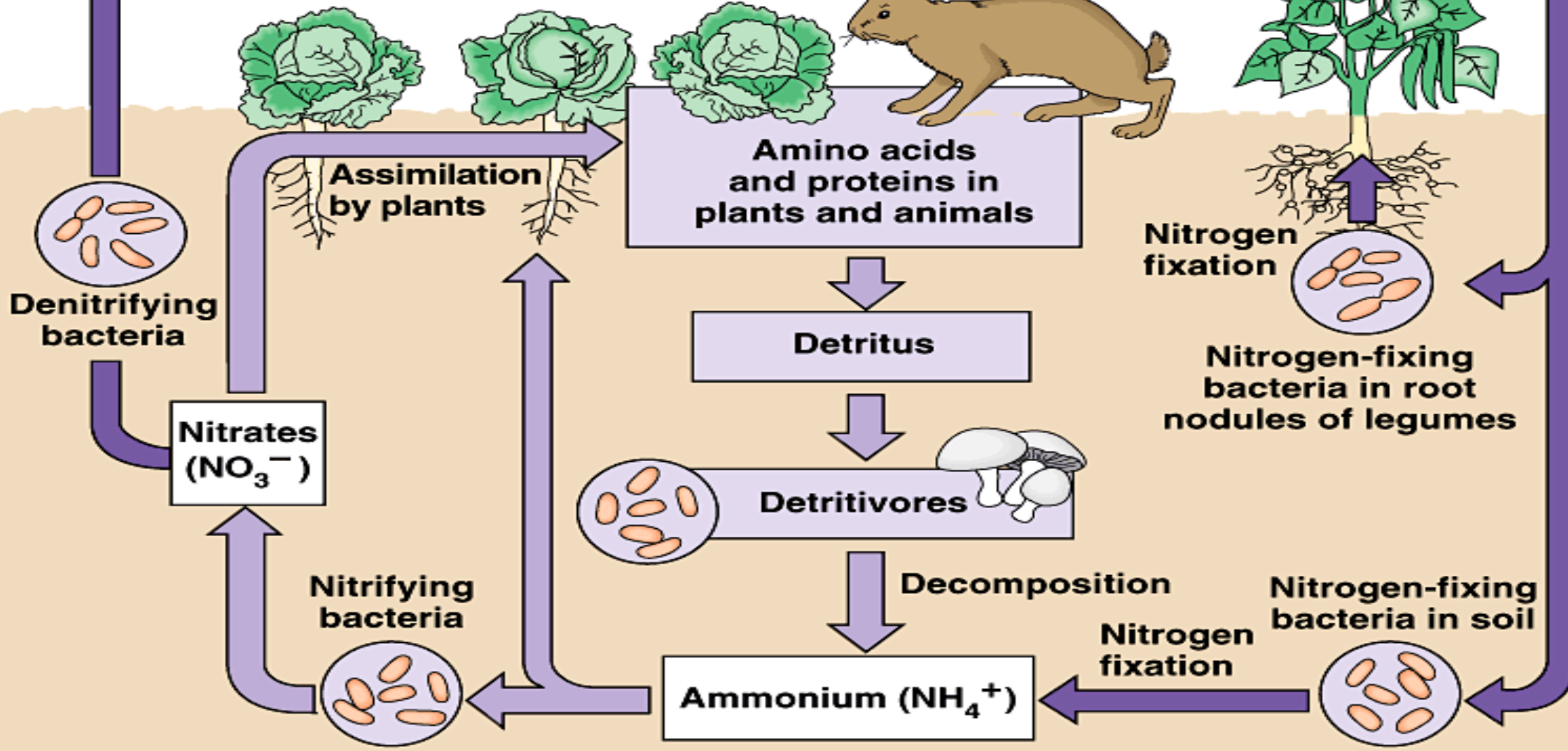
1. Nitrogen Fixation

5. Denitrification

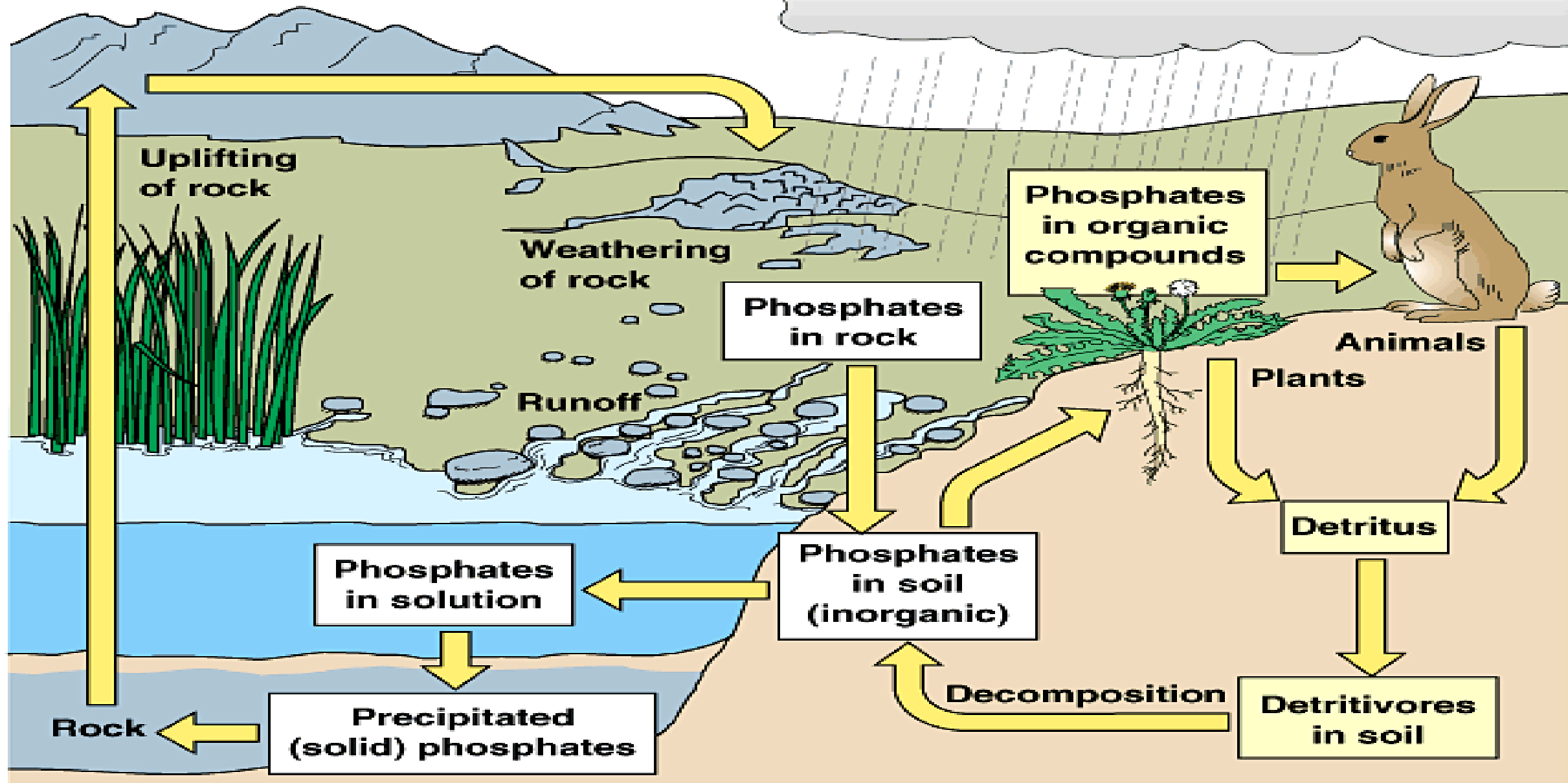


Nitrogen Cycle

Nitrogen (N_2) in atmosphere



Phosphorus Cycle



2.4 Conservation and Management

At the end of this topic, students should be able to:

- a. Describe sustainable development.
- b. Explain threats to biodiversity in Malaysia.
- c. Illustrate conservation of diversity in Malaysia.



Sustainable Development



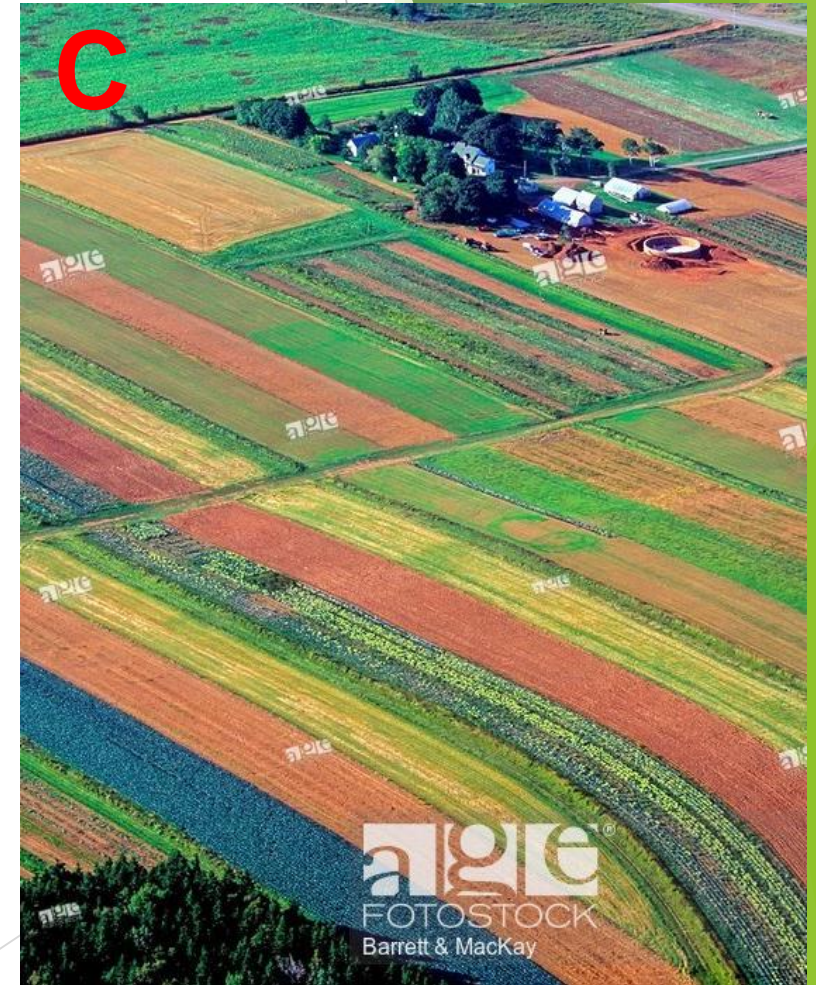
Development that meets the needs of the present,



without compromising the ability of future generations to meet their own needs.



A. Crop Rotation
B. Contour Farming
C. Strip Farming



Sustainable Agriculture

Sustainable Forestry



Reforestation

The natural or intentional restocking of existing forests and woodlands that have been depleted, usually through deforestation



Cutting Limits

The practice of harvesting all merchantable trees above a specified diameter



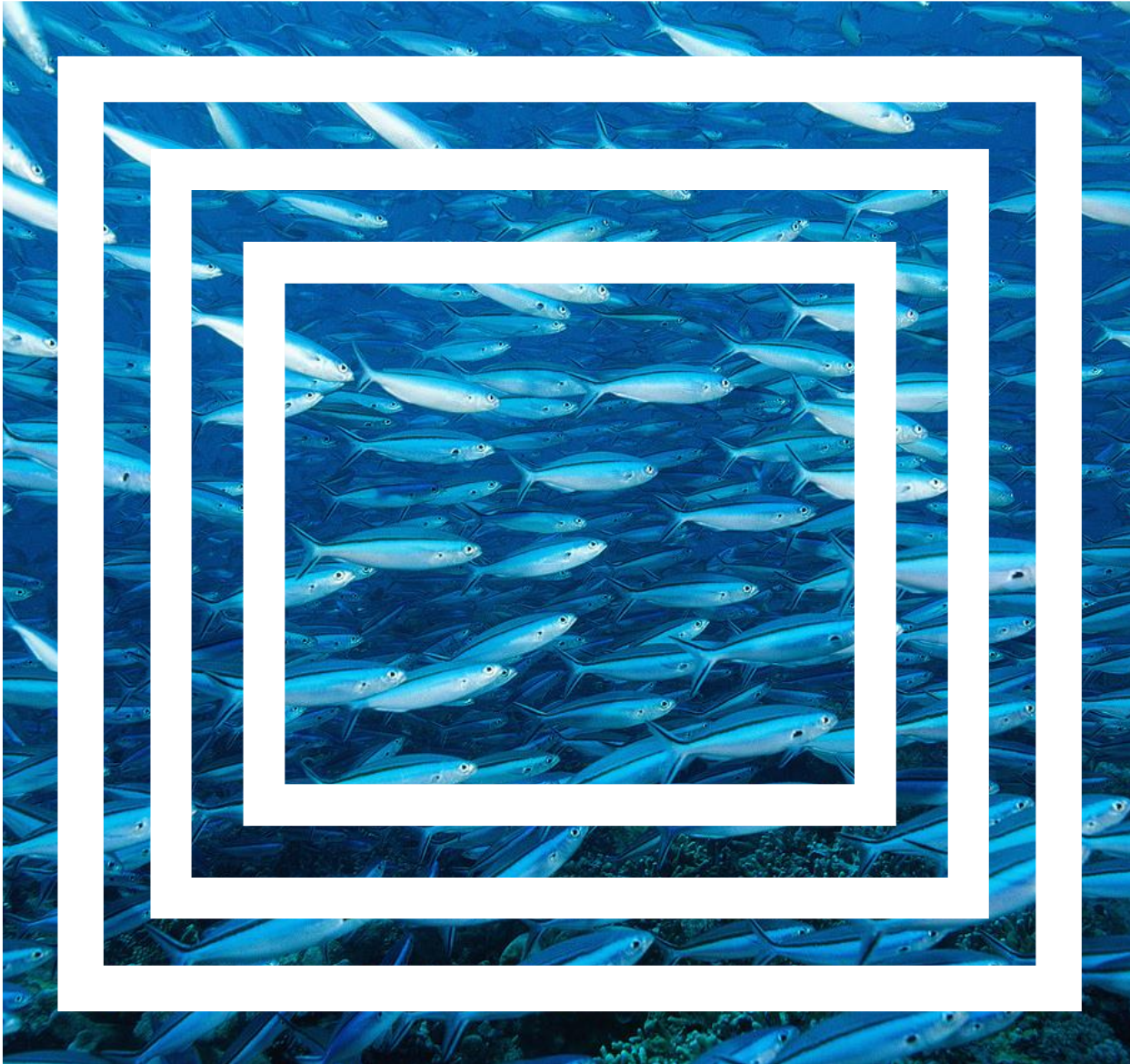
Forest Reserves

A specific term for designating forests and other natural areas, which enjoy judicial and / or constitutional protection under the legal systems of many countries.

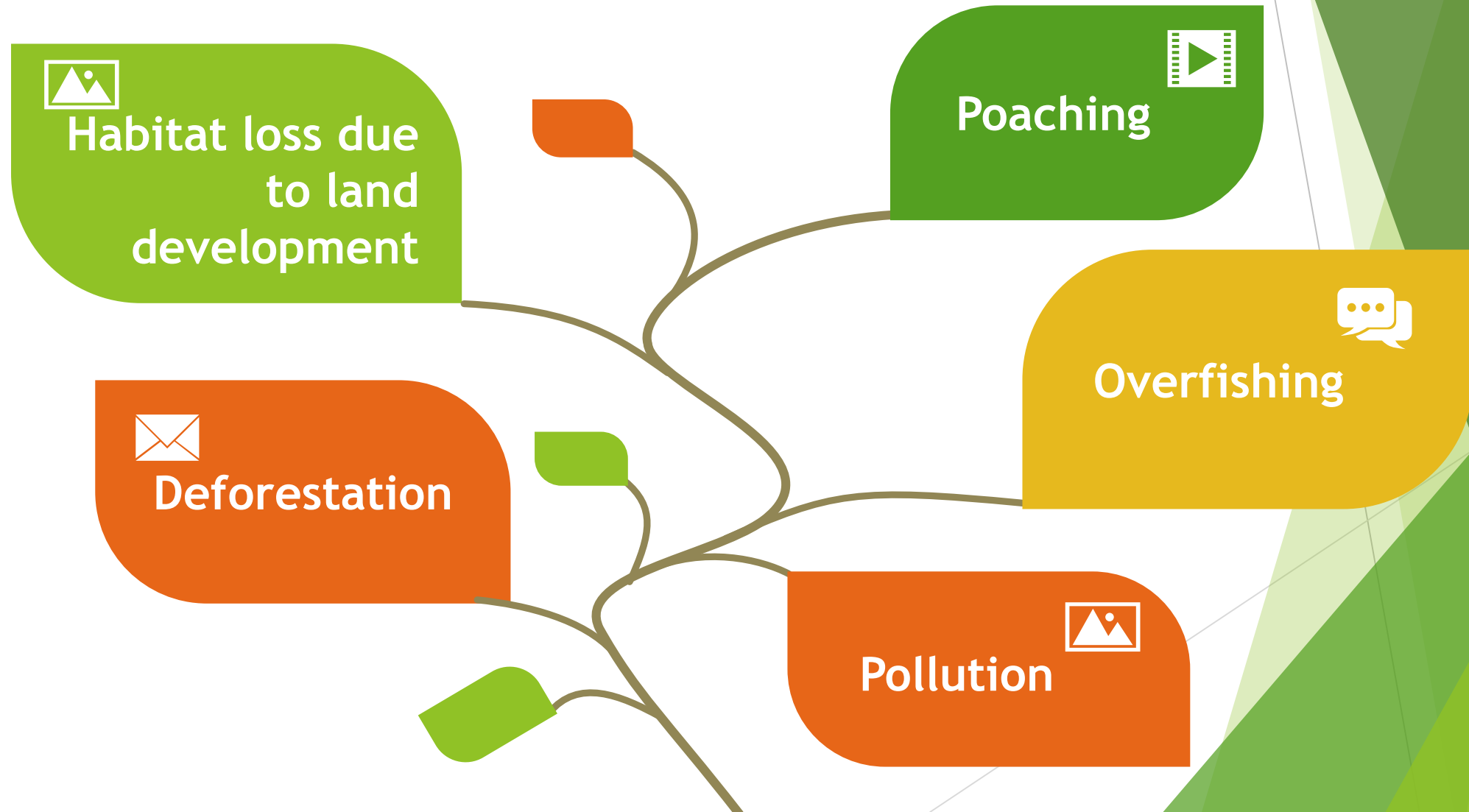
Sustainable Fisheries



Leaves enough fish in the sea to breed and maintain future stocks and ensures the environment they live in is kept healthy



Biodiversity Threats in Malaysia



Conservation of Diversity in Malaysia.

Ecosystem management through conservation and preservation



Nature reserves



National Parks



Planned land



Legal protection of endangered species



The slide features a central green circle with the text "NEXT LECTURE 2.5 POPULATION ECOLOGY" in bold black font. The circle is surrounded by several stylized white flowers with yellow and blue accents. The background is white with green geometric shapes on the right side.

**NEXT
LECTURE
2.5 POPULATION
ECOLOGY**