

# Ecosystem

→ An ecological  
community  
+

→ various  
abiotic factors

# What is an ecosystem

Biotic  
part of an  
ecosystem  
(= Community)



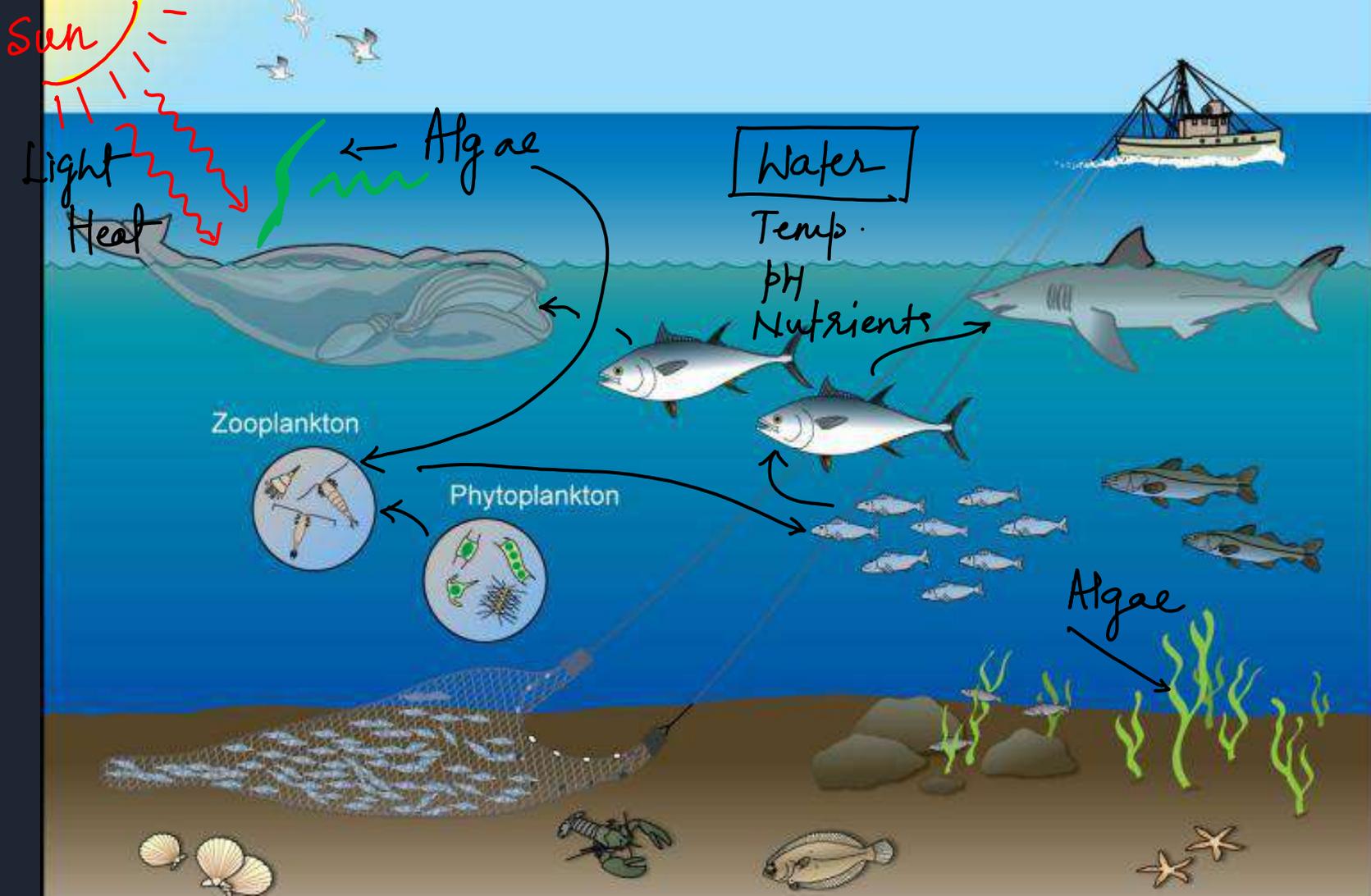
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An ecosystem is a naturally occurring  
assemblage of organisms, including  
plants, animals, and other living  
organisms, living together with their  
environment.

(Abiotic) (3)

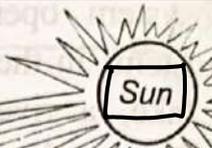
- Abiotic factors
- (1) Light
  - (2) Temperature
  - (3) Air
  - (4) Water
- etc.

(1)



# Pond Ecosystem

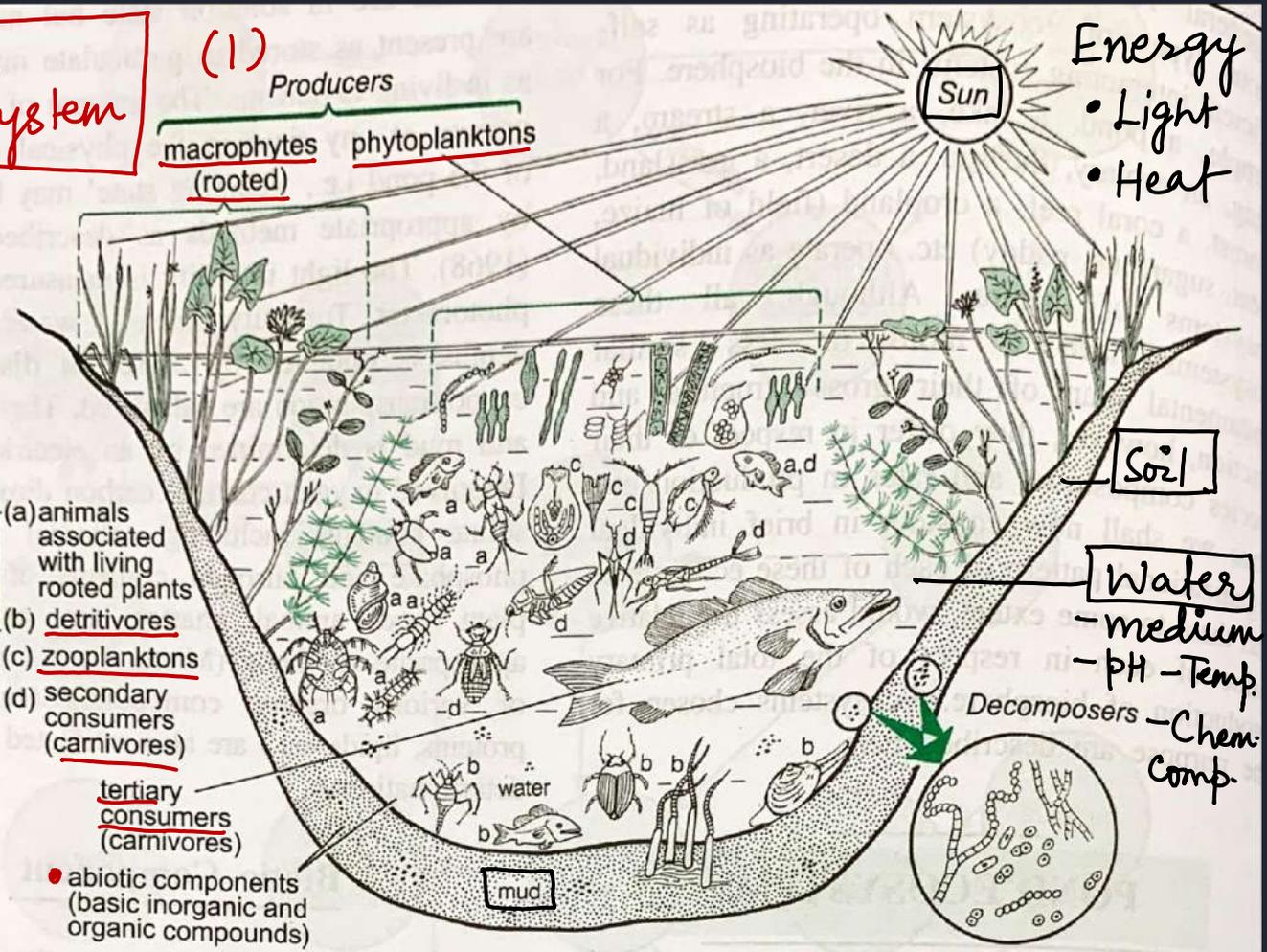
(1)  
Producers  
macrophytes (rooted)  
phytoplanktons



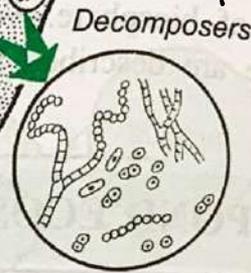
Energy  
 • Light  
 • Heat

**Consumers**  
 primary consumers (herbivores)  
 benthos  
 (a) animals associated with living rooted plants  
 (b) detritivores  
 (c) zooplanktons  
 (d) secondary consumers (carnivores)  
 tertiary consumers (carnivores)

• abiotic components (basic inorganic and organic compounds)



**Water**  
 - medium  
 - pH - Temp.  
 - Chem. Comp.



mud

Soil

# Definition

According to E.P. Odum, it includes all organisms in a given area interacting with the physical environment.

1. Biotic diversity.
2. A clearly defined trophic structure.
3. Materials flows & cycles, including the exchange of materials between biotic and abiotic components within the system and with the external environment.

→ food chain  
& food web

# Types

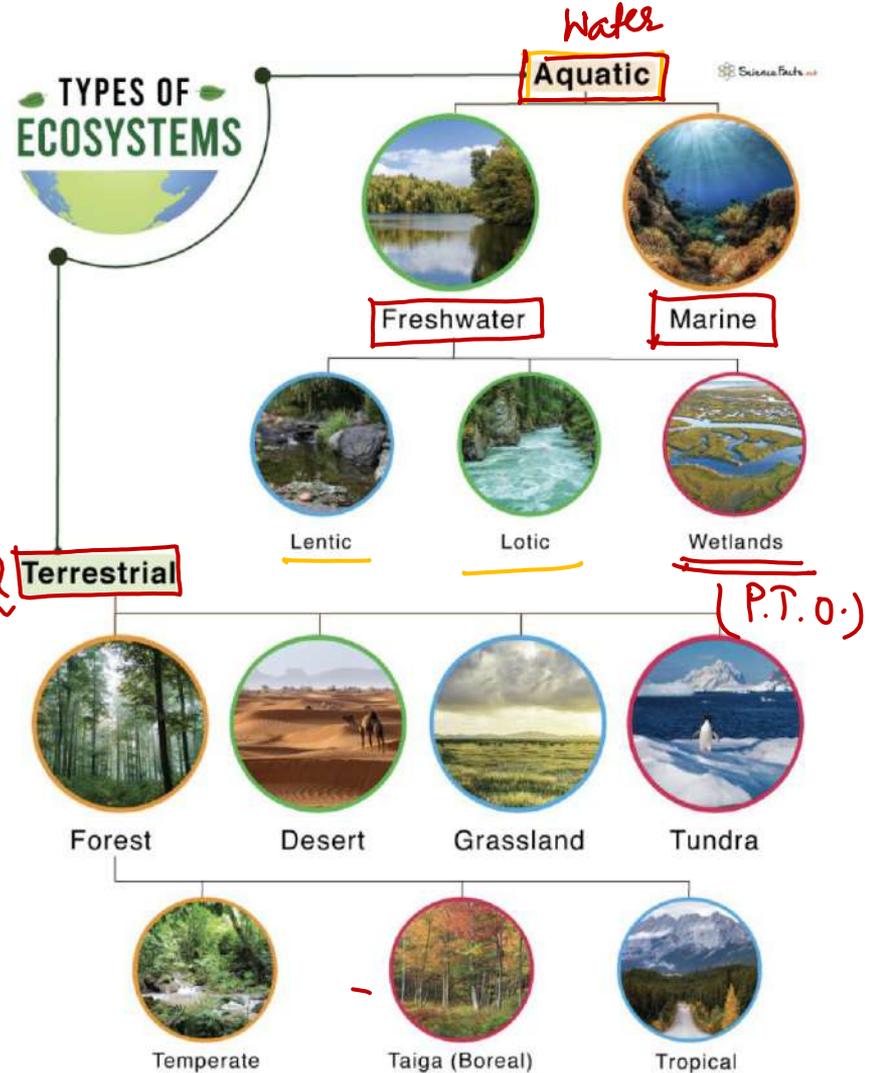
- Marine — Oceans & Seas (Saltwater)

- Fresh water (Not salt water)

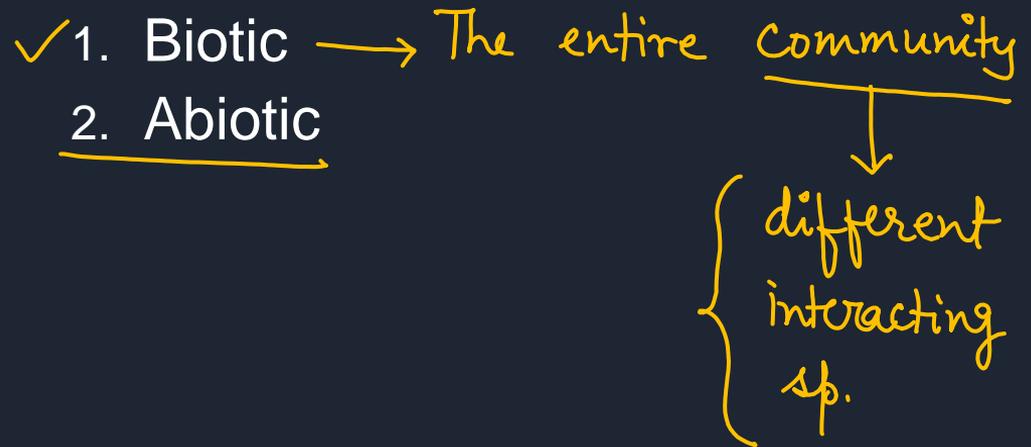
Lentic  
Stagnant  
water — Pond, Lake  
etc.

Lotic — Running  
(Flowing  
water)

- Rivers  
- Streams



# Parts



# Biotic Components

- All the species in an ecosystem
- Include all plants, animals and microbes
- 3 groups
  - ✓ ○ Autotrophs
  - ✓ ○ Heterotrophs
  - ✓ ○ Decomposers

# Abiotic Components – *Already Covered*

- ✓ 1. Light
- ✓ 2. Temperature
- ✓ 3. Water
- ✓ 4. Atmospheric gases
- ✓ 5. Wind
- ✓ 6. Soil (edaphic)
- ✓ 7. Physiographic (nature of land surface) factors.

# Biotic Factors: Autotroph

- An autotroph is an organism that produces organic compounds from carbon dioxide as a carbon source.
- They use either light or reactions of inorganic chemical compounds as a source of energy.
- Examples include plants, algae, cyanobacteria, and some eubacteria.

# Biotic Factors: Autotroph

- Autotrophs using photosynthesis are photolithoautotrophs.
- Bacteria that utilize the oxidation of inorganic compounds such as hydrogen sulfide or ferrous iron as an energy source are chemolithoautotrophs.
- Autotrophs serve as food for other organisms (heterotrophs).

# Heterotroph

- A heterotroph is an organism that requires organic substrates for growth and development.
- For an organism to be classified as a heterotroph, it must obtain its carbon from organic compounds.
- All animals, fungi, and many bacteria are heterotrophic.

# Heterotroph

- Types:
  - Herbivore
  - Carnivore
  - Omnivore
  - Parasite
    - ✓• Obligate
    - ✓• Facultative

# Omnivores

- Omnivores are organisms that consume both plant matter and animal tissue as part of their diet.
- They have a flexible feeding behaviour that allows them to exploit a wide range of food sources.
- Omnivores have adaptations in their teeth and digestive systems to process both plant and animal matter efficiently.
- Examples of omnivores include humans, bears, pigs, rats, crows, and cockroaches.

# Decomposers

- Decomposers are organisms that break down dead organic matter into simpler substances and return nutrients to the environment.
- They play a vital role in recycling nutrients and breaking down organic material into forms that can be reused by other organisms.
- Decomposers include bacteria, fungi, protozoans, and certain invertebrates such as earthworms and millipedes.



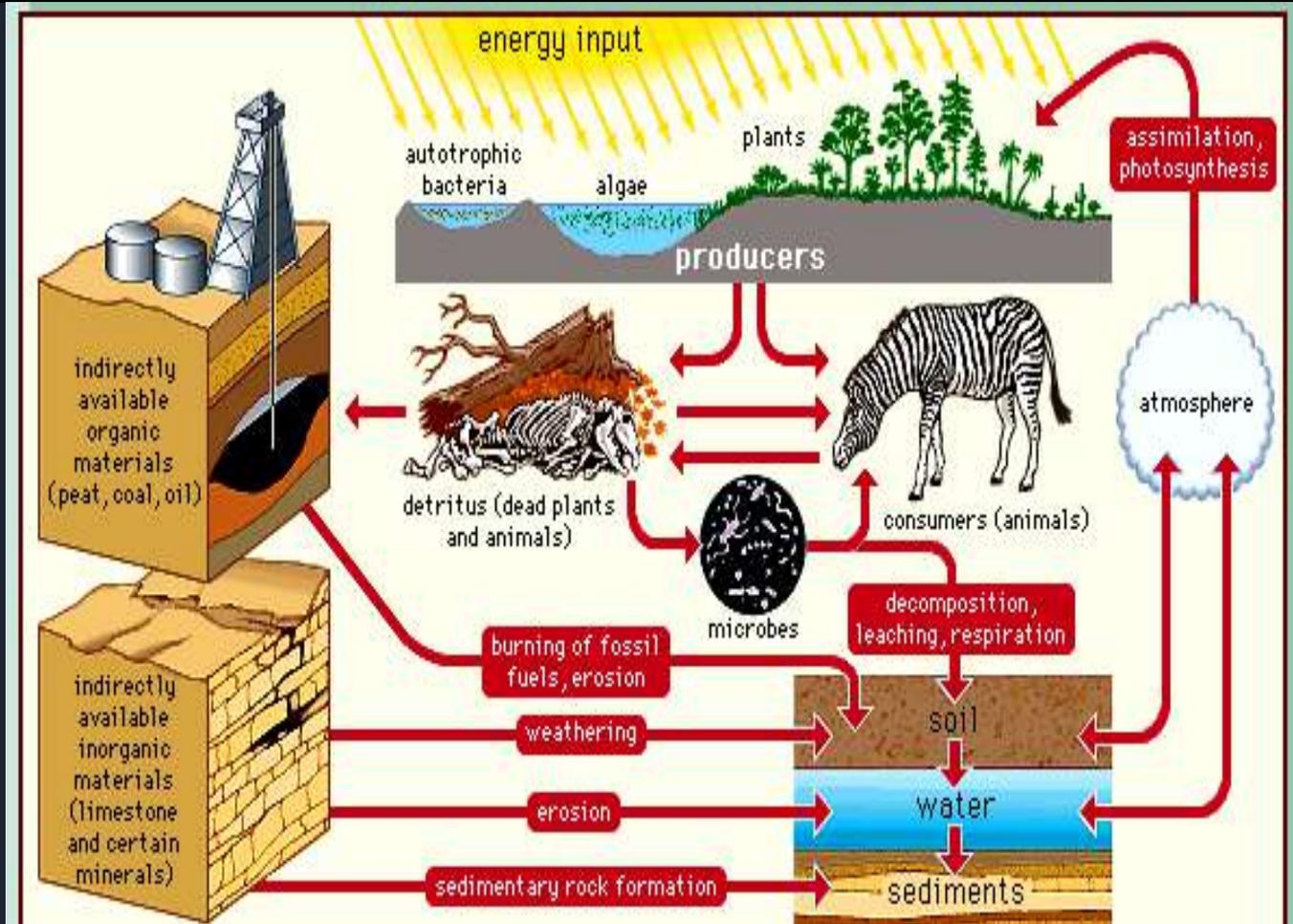
# Detritivores vs. Decomposers

- **Detritivores** physically consume partially decomposed organic matter, while **decomposers** break down dead organic matter through chemical processes.
- Detritivores are larger, mobile organisms like earthworms, while decomposers are microscopic and immobile.

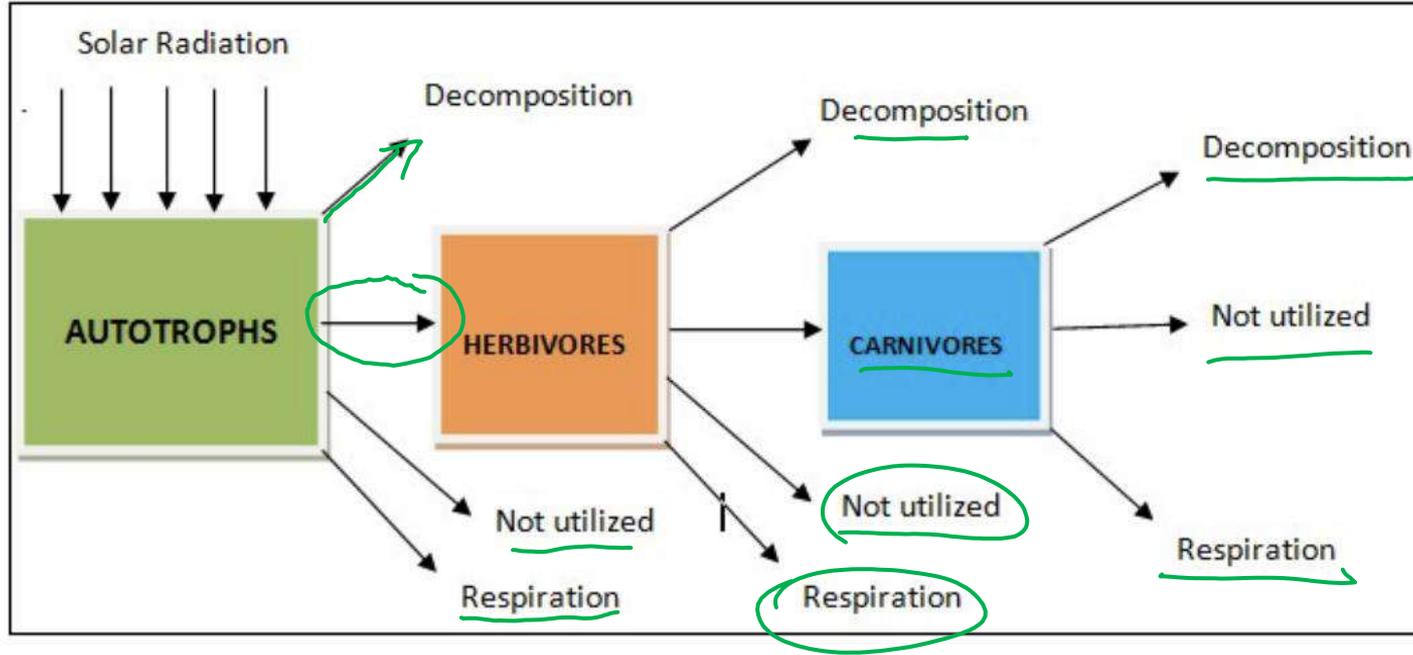
# Detritivores vs. Decomposers

- Detritivores contribute to fragmentation and aeration of organic matter, while decomposers are responsible for initial breakdown and microbial decomposition.
- Detritivores transfer energy to higher trophic levels, while decomposers primarily recycle nutrients for plant use.

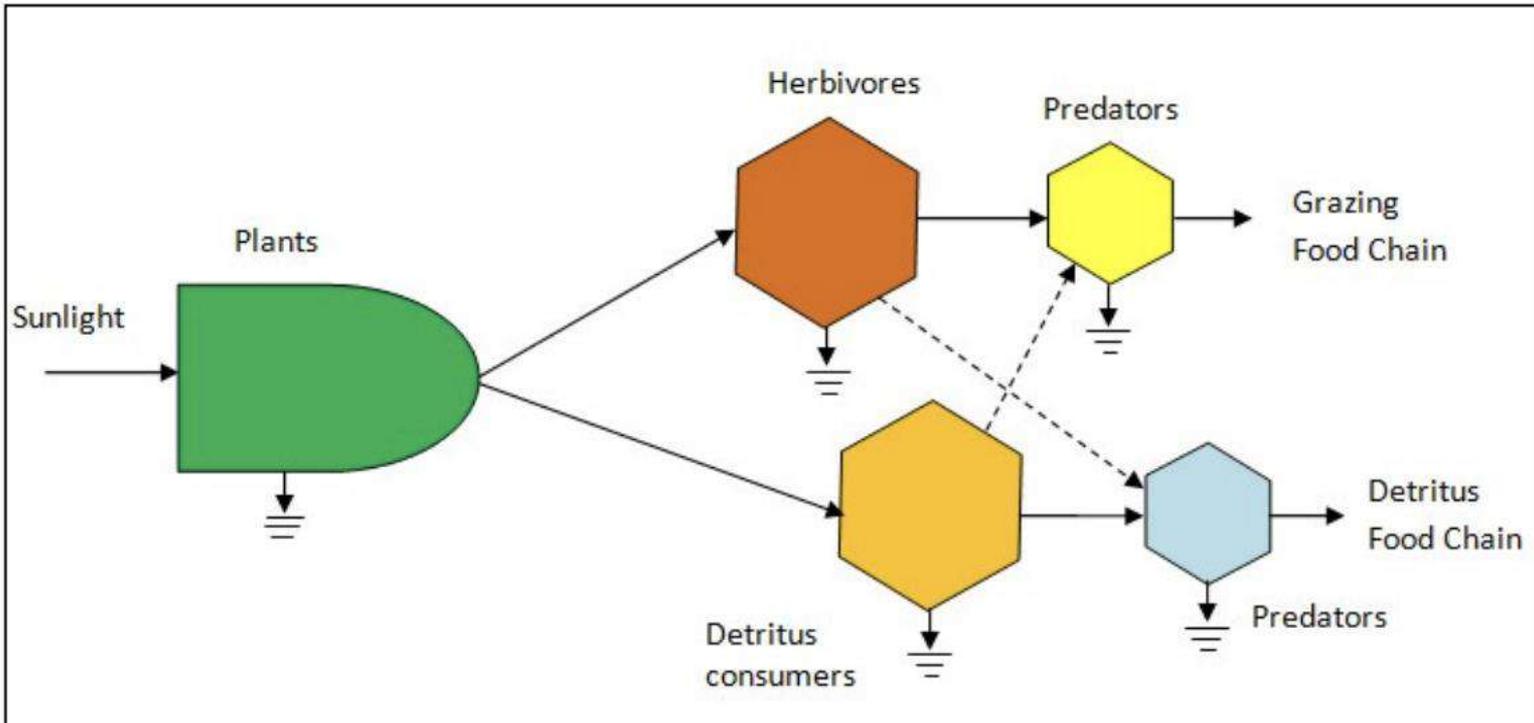
# Flow of energy



# Flow of energy



# Flow of energy



## The law of 10%

At every level of trophic  
transfer the available energy  
at the next level is just about  
10% of the energy available  
at the previous trophic level

**Tertiary Consumers**

**Predators**



**Kilocalories available in the bodies of tertiary consumers**  
**6 Kilocalories per square meter per year**

**Secondary Consumers**

**Predators**



**Kilocalories available in the bodies of secondary consumers**  
**60 Kilocalories per square meter per year**

**Primary Consumers**

**Herbivores**



**Kilocalories available in the bodies of Primary Consumers**  
**600 Kilocalories per square meter per year**

**Primary producers: Plants: deciduous trees, shrubs, grasses**

**6000 Kilocalories per square meter per year**

## The law of 10%: Reason

3 Factors

1. Efficiency of consumption •
2. Efficiency of assimilation •
3. Efficiency of production •

thank  
you