

ORGANISM AND POPULATION

Ecology is the branch of biology concerned with the study of inter-relationship between living organisms and their environment.

The term ecology was coined by Ernst Haeckel in 1889.



Organisms and Populations

INTRODUCTION TO ECOLOGY

- ✓ Ecology is the study of **organisms**, **populations**, and **communities** as they relate to one another and interact in the ecosystems they comprise.
- ✓ In ecology, **ecosystems** are **composed of organisms, the communities** they comprise, and the **non-living aspects of their environment**.



INTRODUCTION TO ECOLOGY

- ✓ **Ecology:** Study of the interactions of organisms with each other and with the physical environment
- ✓ **Population:** All the members of the same species that inhabit a particular area
- ✓ **Community:** All the populations found in a particular area



ECOLOGICAL TERMS

- ✓ **Ecosystem:** A community and its physical environment, including both nonliving (abiotic) and living (biotic) components
- ✓ **Biosphere:** All of the ecosystems on Earth, including their biotic communities



ECOLOGY SUBDIVISION



AUTECOLOGY

Study of individual plant or the population of individual plant species in relation to environment.



SYNECOLOGY

Study of plant communities and their relationship with environment.



✿ Ecological Levels Of Organisation ✿

Hierarchy in the levels of organisation connected with ecological grouping of organisms is called ecological hierarchy or ecological levels of organisation.

INDIVIDUAL

Basic unit of ecological hierarchy as it continuously exchanges materials and information with its environment. It is distinct living entity which carries out all life processes in its body, separate from those in other individuals. New individuals develop from preexisting ones.



POPULATION

Group of similar individuals in a particular geographical area or space.



BIOTIC COMMUNITY

Assemblage of populations of different species of plants, animals, bacteria and fungi which live in a particular area and interact with one another through competition, predation, mutualism, etc.





ECOSYSTEM

Segment of nature consisting of a biological community and its physical environment, both interacting and exchanging materials as well as energy, e.g., pond ecosystem.




BIOME

A large regional unit delimited by a specific climatic zone, having a partialiar major vegetation zone and its associated fauna, e.g., tundra, desert, temperate deciduous forest, tropical rainforest.

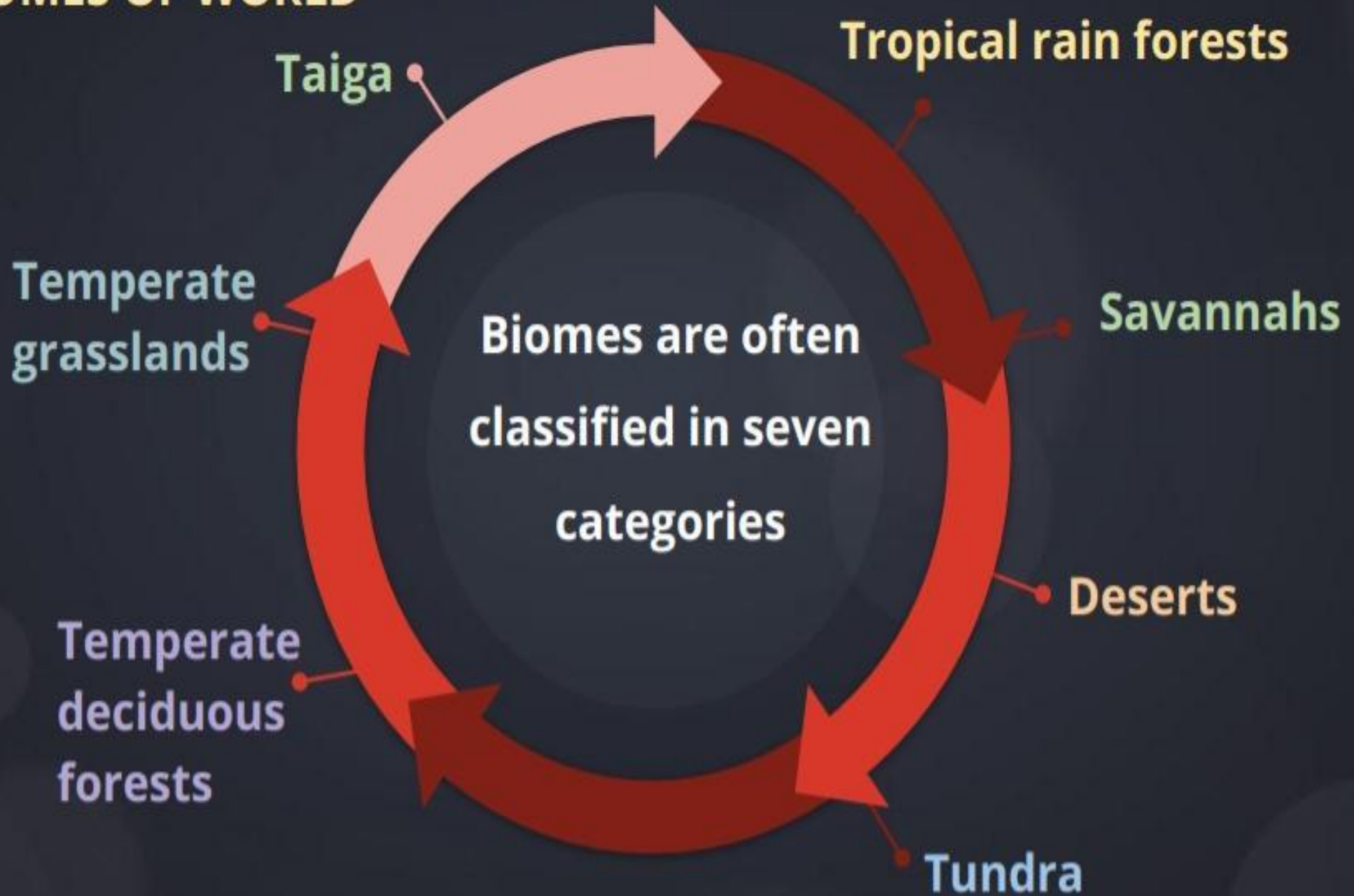


BIOSPHERE

Biologically inhabited part of earth along with its physical environment consisting of lower atmosphere, land and water bodies.



MAJOR BIOMES OF WORLD



IMPORTANT TERMS

ENVIRONMENT

- It is the sum total of all biotic and abiotic factors, substances and conditions that surround and potentially influence organisms without becoming their constituent part. Various components of environment are interlinked as well as interdependent.

WEATHER

- The short-term properties of the atmosphere such as heat, cold, cloud, rain, wind, etc., at a given place and time is called weather. It varies from place to place at the same time and also at the same place at different times.

HABITAT

- Habitat refers to a specific place where a species normally lives.
- It is delimited by a combination of factors such as pond, desert, river, valley, saline soil, etc., where a community resides.
- For examples the habitat of the malarial parasite, *Plasmodium vivax* is the red blood corpuscles of human for a part of its life cycle and stomach of the female *Anopheles* mosquito for the other part of its life cycle.
- More than one animal or plant species may live in the same habitat.

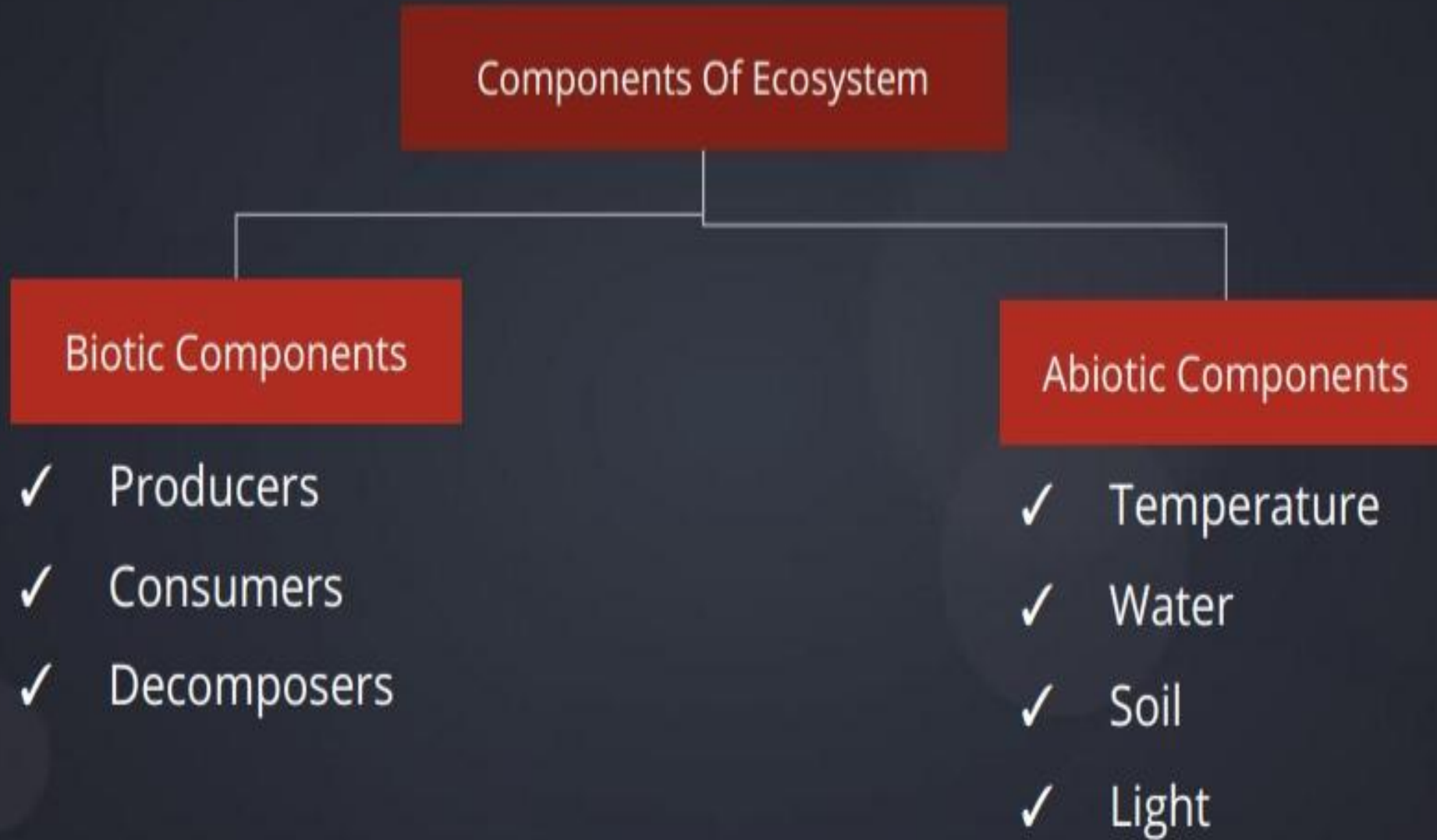
NICHE

- Refers to specific part of habitat occupied by individuals of a species which is restricted by its range of tolerance, range of movement, microclimate, type of food and its availability, shelter, type of predator.
- Tadpole and adult frog occupy different ecological niches as the former is herbivorous aquatic while the latter is carnivorous amphibian.
- An ecological niche supports a single species. Each species occupies a distinct niche and no two species occupy the same niche.

Habitat Vs Niche

Habitat	Niche
It refers to a specific physical area where a species lives	It refers to the role a species plays in its habitat
More than one species can live in the same habitat	Only one species can live in one ecological niche
Habitat of a species does not change	A species may change its niche with age or season

COMPONENTS OF ECOSYSTEM



COMPONENTS OF ECOSYSTEM: BIOTIC FACTORS

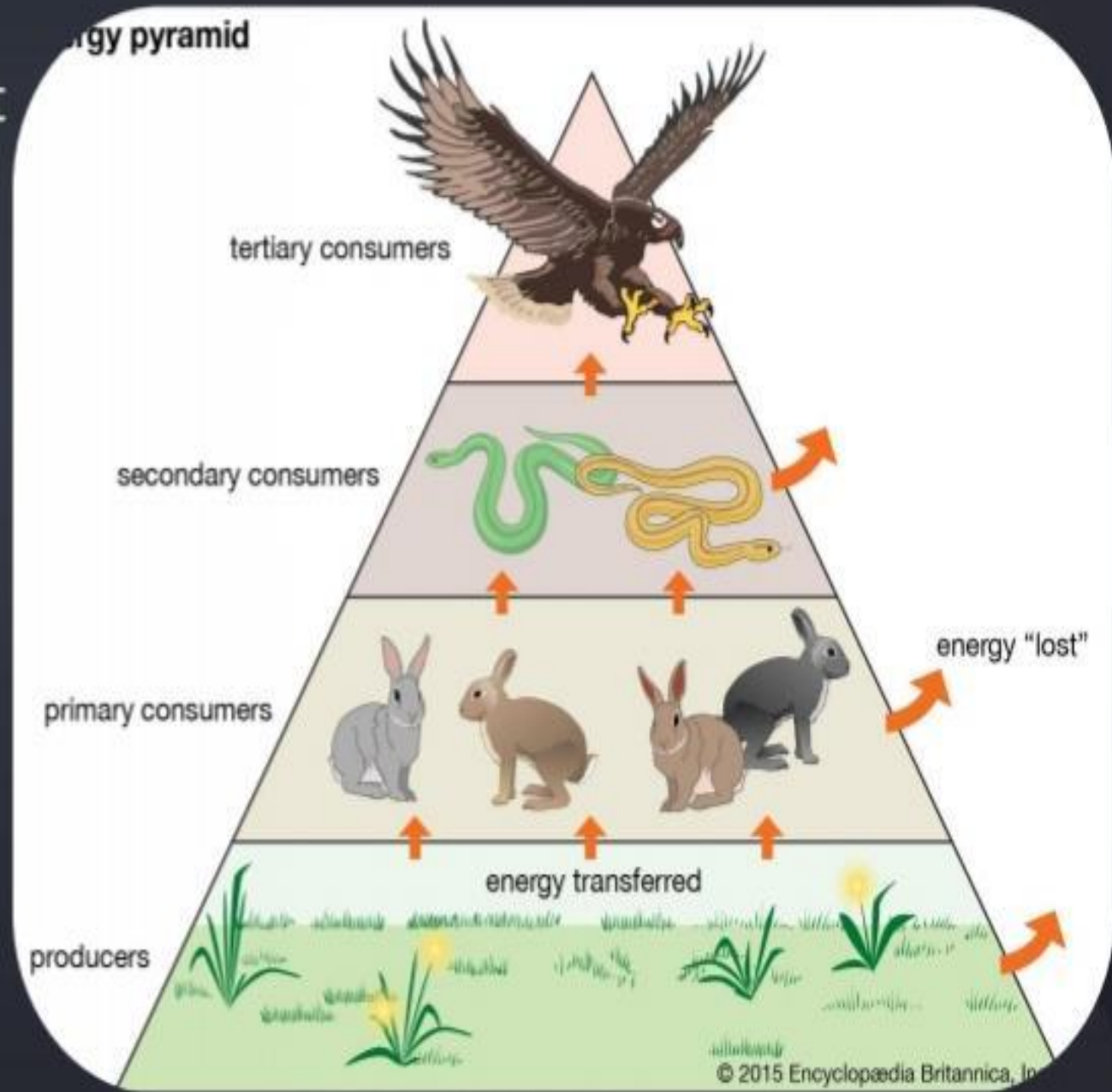
Producers:

- ✓ These include all the **autotrophs**.
- ✓ They use **light energy** and **synthesize food on their own**,
- ✓ Algae and other **hydrophytes of a pond, grasses of the field, trees of the forests** are examples of producers.



Consumers:

- ✓ These include all the **heterotrophs** that **directly or indirectly depend on producers** for their food.
- ✓ Consumers are further categorized as **herbivores, carnivores, omnivores and parasites.**



COMPONENTS OF ECOSYSTEM: BIOTIC FACTORS

Decomposers:

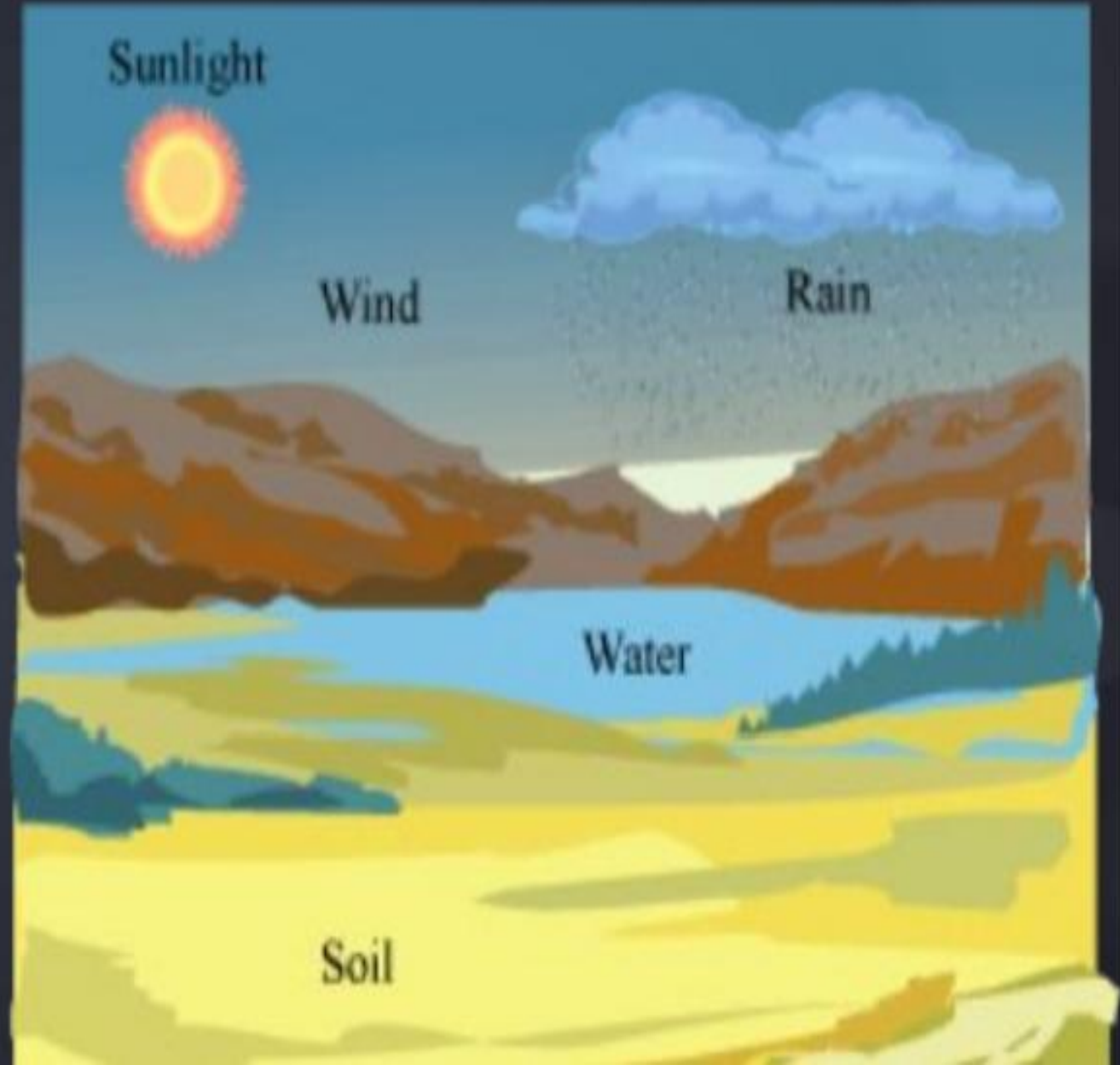
- ✓ These include **saprophytes** which act on **dead matter and decay** them for their nutrition.



COMPONENTS OF ECOSYSTEM: ABIOTIC FACTORS

Temperature:

- ✓ The physiological functions and geographical distribution of organisms is governed by temperature.
- ✓ Temperature affects the kinetics of enzymes, BMR (Basal Metabolic Rate) and other physiological actions in organisms.



COMPONENTS OF ECOSYSTEM: ABIOTIC FACTORS

Temperature:

- ✓ **Eurythermal:** A few organisms which can tolerate wide range of temperatures
- ✓ **Stenothermal:** Many organisms which can tolerate narrow range of temperatures



Eurythermal



Stenothermal

COMPONENTS OF ECOSYSTEM: ABIOTIC FACTORS

Water:

- ✓ Important factor influence the life of organisms.
- ✓ The **productivity and distribution** depends on water.
- ✓ For **aquatic organisms, chemical composition , pH, salinity and temperature of water are important.**



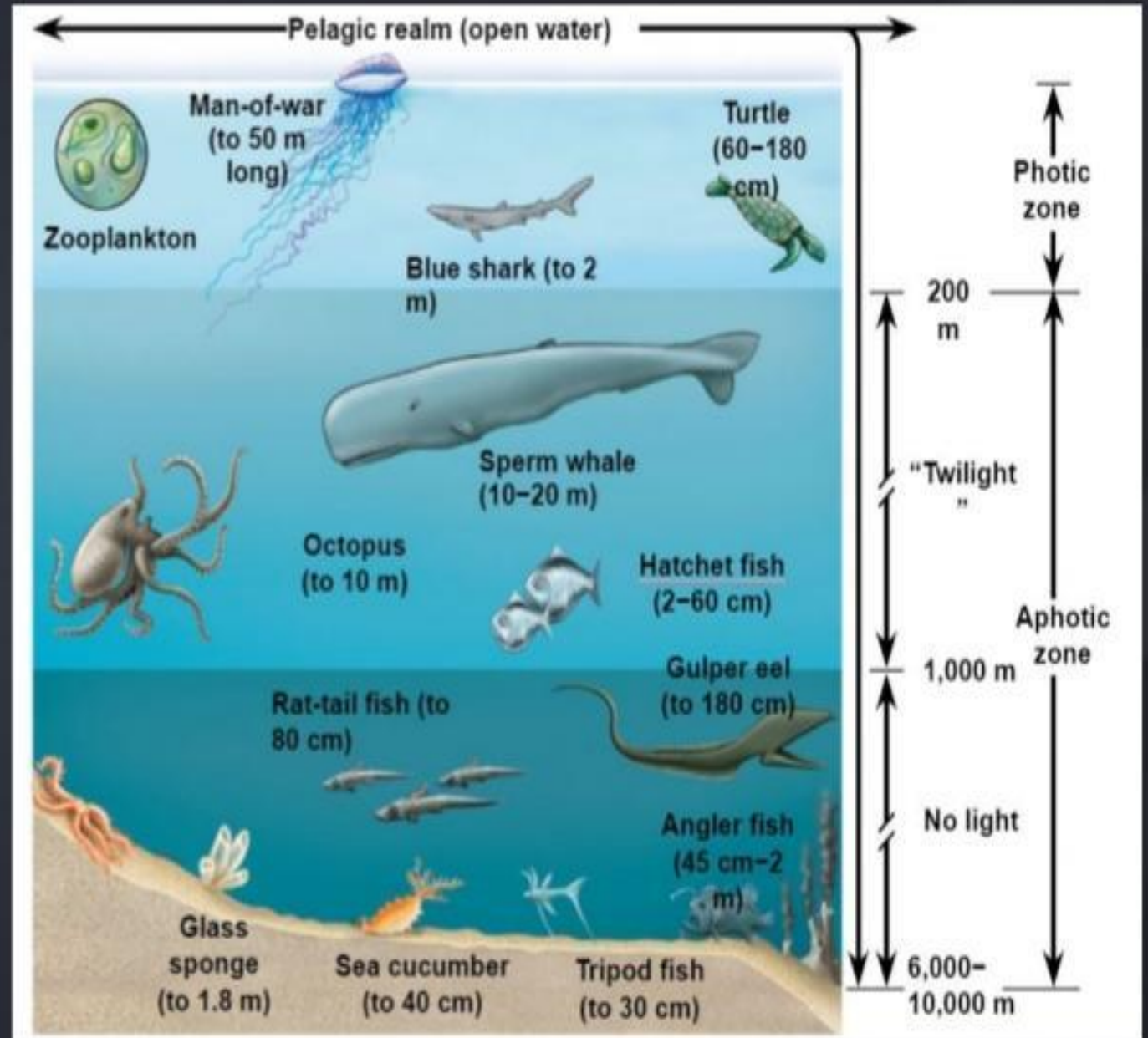
ABIOTIC FACTORS: LIGHT

- ✓ Light is important abiotic factor bcoz the autotrophs prepares its food by photosynthesis.
- ✓ **Sciophytes** : Small herbaceous plants and some shrubs live under the canopy forest trees are adapted to photosynthesis under very low light intensities.
- ✓ These are called **sciophytes**



ABIOTIC FACTORS: SOIL

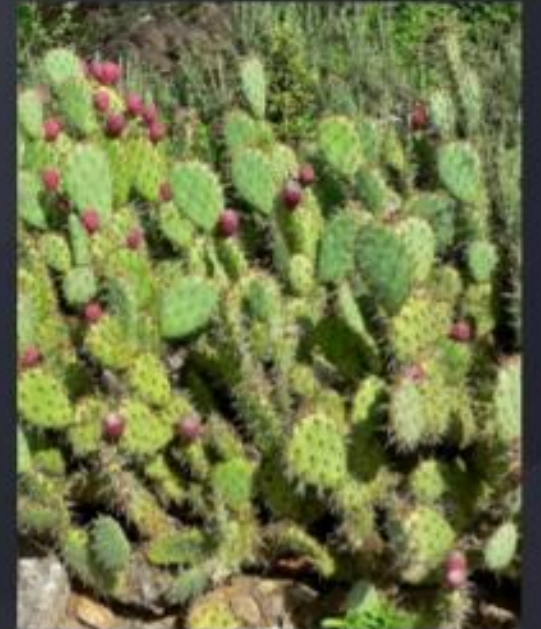
- ✓ Nature and properties of **soil depends on climate, weathering process.**
- ✓ The **physical and chemical** properties of soil determine the type of plants that can grow in a particular habitat.
- ✓ The characteristics of the bottom **sediments of aquatic environment determine type of benthic animals that can live there.**



ORGANISMS AND POPULATIONS

Adaptations

- ✓ Adaptation is the **morphological, physiological & behavioural** attribute that enables an organism to survive and reproduce in its habitat.
- ✓ Many adaptations have evolved **over a long evolutionary time and are genetically fixed.**



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Adaptations

- ✓ Presence of **thick cuticle on leaf surfaces**.
- ✓ **Sunken stomata** help to minimise water loss through transpiration.
- ✓ **CAM photosynthetic** pathway enables their stomata to remain closed during day time.
- ✓ Desert plants like **Opuntia** have no leaves (they are reduced to spines).
- ✓ Photosynthesis is done by stems.

