



What Is Ecology?

- ❏ Ecology is the scientific study of *interaction among organisms and their environment*— both living (biotic) and non-living (abiotic) components.

Mr Vinoth



HISTORICAL VIEW

Ernst Haeckel (1866) coined the term ecology (Greek oikos = house; logos = study).

Ecology: The Study

A scientific discipline focused on understanding the complex interactions between living organisms and their surroundings.

A frog lives in a pond

It eats insects .

It needs water, sunlight, and air .

It is also food for snakes .

So, ecology studies this whole *“who lives where, who eats what, and how they all depend on each other.”*

ECOLOGY & ENVIRONMENT



Environment: The Context

The sum of all external conditions (living and non-living) that influence an organism or a community.

A fish in a pond .

Its environment = water (non-living) + plants, insects, other fish (living) + sunlight, air, temperature (non-living).

So, the environment is just everything around the fish that affects its life.



Broad Classification of Environment

Two major components:

Biotic (Living) Components

Abiotic (Non-living) Components



Abiotic Components

These are non-living *physical and chemical* elements of the environment.

Sunlight (gives light and heat)

Water (rain, river, sea)

Air (oxygen we breathe)

Soil (where plants grow)



Abiotic Factors

Atmosphere

Gaseous layer around the Earth, supplies oxygen, CO₂, nitrogen, and regulates temperature

Example: Air, wind currents

Hydrosphere

All water bodies — supports aquatic life and regulates climate

Example: Oceans, rivers, groundwater

Lithosphere

The Earth's crust and upper mantle — provides minerals, nutrients, and land for life

Example: Rocks, soil, mountains



Abiotic Factors

Climate

Long-term patterns of temperature, humidity, and precipitation

Example: Tropical, arid, polar zones

Solar Radiation

Energy from the Sun — drives photosynthesis and climate

Example: Daylight, UV radiation

Chemical Factors

Inorganic & organic chemicals that influence ecosystems

Example: pH of soil/water, nutrient levels, salinity



Biotic Components (Living)

These are all living organisms that directly or indirectly interact with *each other and with abiotic factors*.



Ecosystem Harmony

Three Main Groups of Biotic Components

Biotic components can be categorised into three main groups based on their role in energy flow within an ecosystem:



Producers (Autotrophs)



Consumers (Heterotrophs)



Decomposers & Detritivores





Producers (Autotrophs)

Manufacture their own food using solar energy or chemical energy.

- Basis of all food chains.
- Examples: Green plants, algae, phytoplankton, chemosynthetic bacteria.

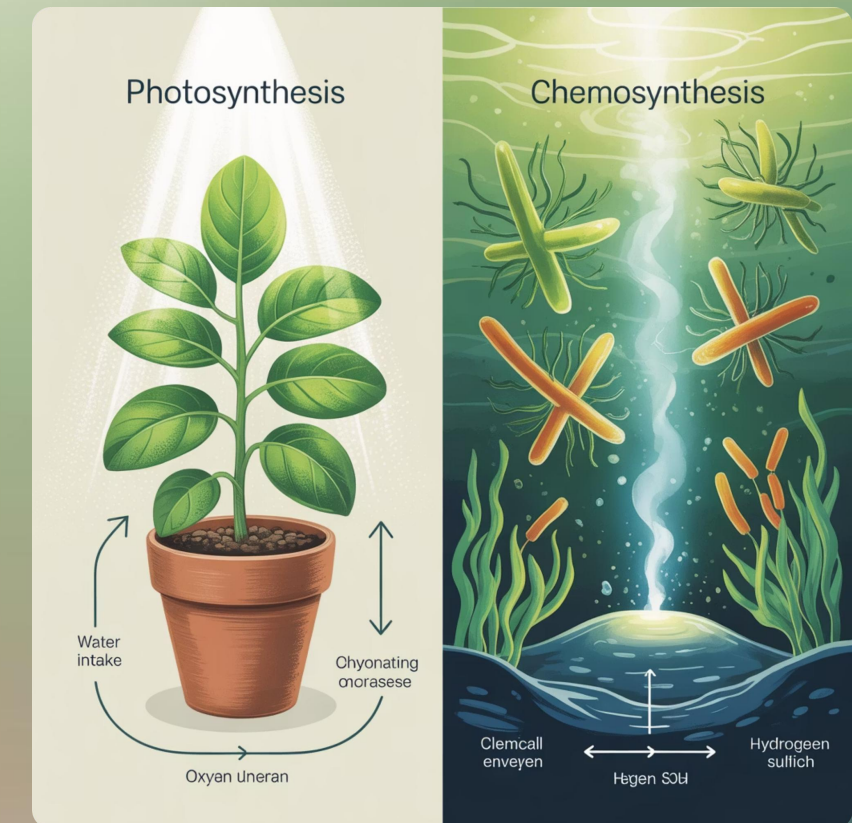
Using Solar Energy (Photosynthesis)

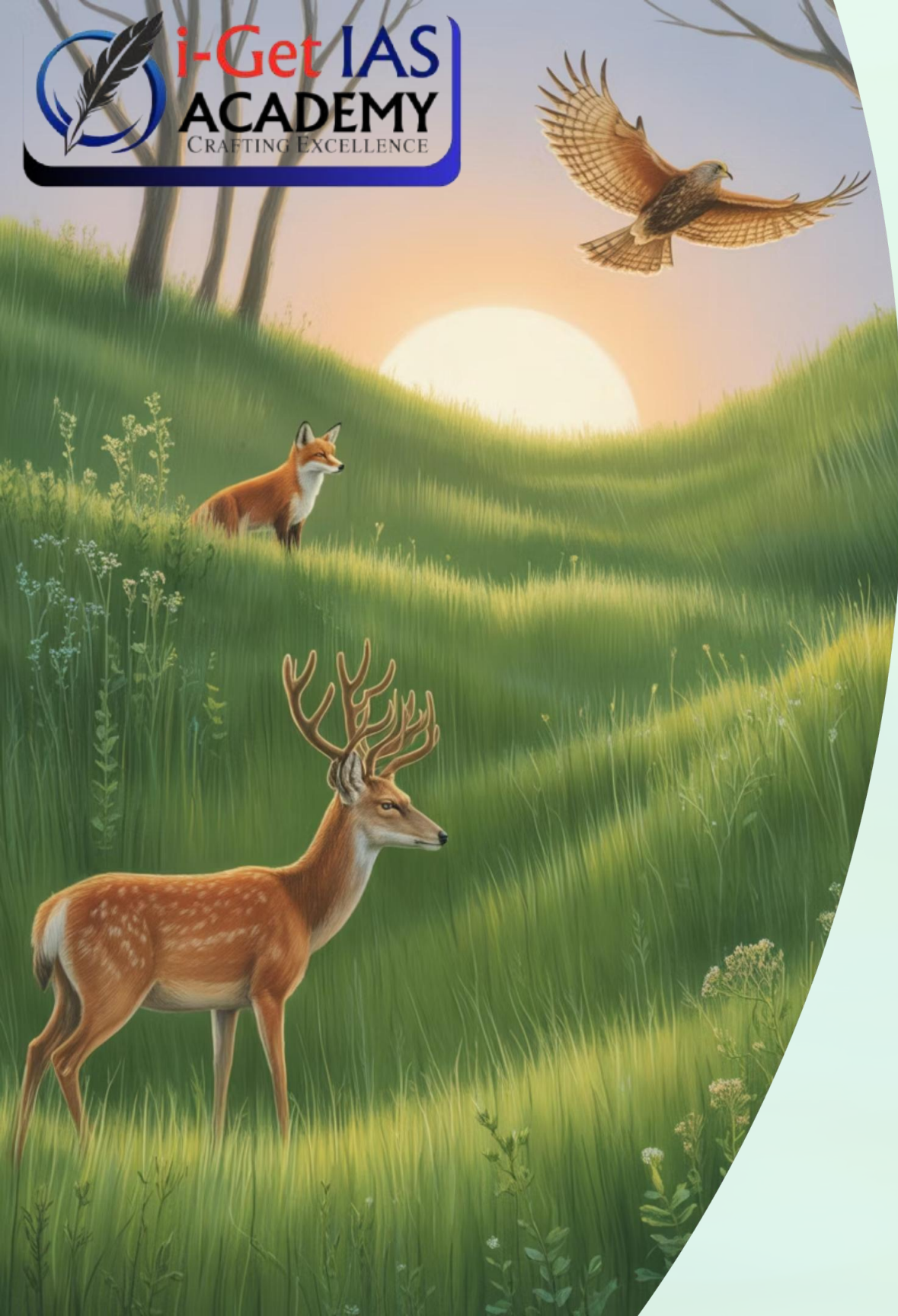
- Green plants make their own food from sunlight, water, and carbon dioxide.**

Using Chemical Energy (Chemosynthesis)

- Bacteria near deep-sea vents use chemicals like hydrogen sulfide from hot water to make their food (no sunlight there).**

- Plants = solar chefs
- Deep-sea bacteria = chemical chefs





Consumers (Heterotrophs)

Depend on other organisms for food.

- **Primary consumers**
Herbivores (deer, grasshoppers, zooplankton)
- **Secondary consumers**
Carnivores that eat herbivores (frogs, small fish)
- **Tertiary consumers**
Carnivores that eat other carnivores (eagles, sharks)
- **Omnivores**
Eat both plants and animals (humans, bears)



Decomposers & Detritivores

Break down dead organisms and waste into nutrients that return to the soil and water

Detritivores: Earthworms, some insects, crabs.

Decomposers: Fungi, bacteria.

Detritivores = Eaters of waste bits

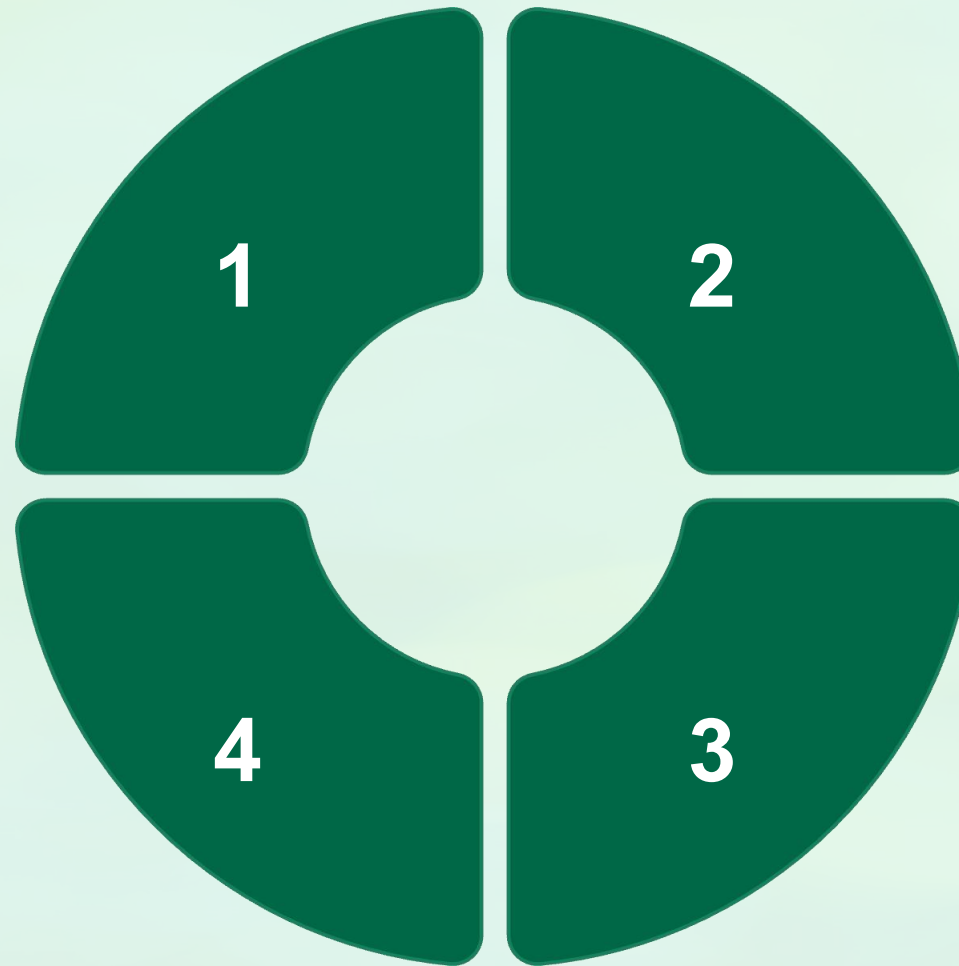
They eat dead plants and animals (detritus) directly — not like bacteria that break it down chemically.

- 1 — Earthworms eat dead leaves and soil.
- 2 — Lice eat rotting wood.
- 3 — Crabs eat dead animals and plants in water.

Decomposers : Cleaners of nature

A fallen leaf lies on the ground.

Then plants use those nutrients again.



Fungi (like mushrooms and bacteria attack it.

Slowly the leaf rots and becomes nutrients in the soil.

So:

Decomposers (fungi, bacteria) = break waste down *chemically*

Detritivores (worms, crabs, etc.) = *chew and eat* dead stuff directly



Interaction Between Components - Ecology



Abiotic - Biotic Interaction

Sunlight (abiotic) allows plants (biotic) to photosynthesize; plants provide food for herbivores; herbivores are prey for carnivores.



Biotic - Biotic Interaction

Predation, competition, mutualism, etc.



Abiotic - Abiotic Interaction

Climate affects soil moisture; ocean currents affect temperature distribution.

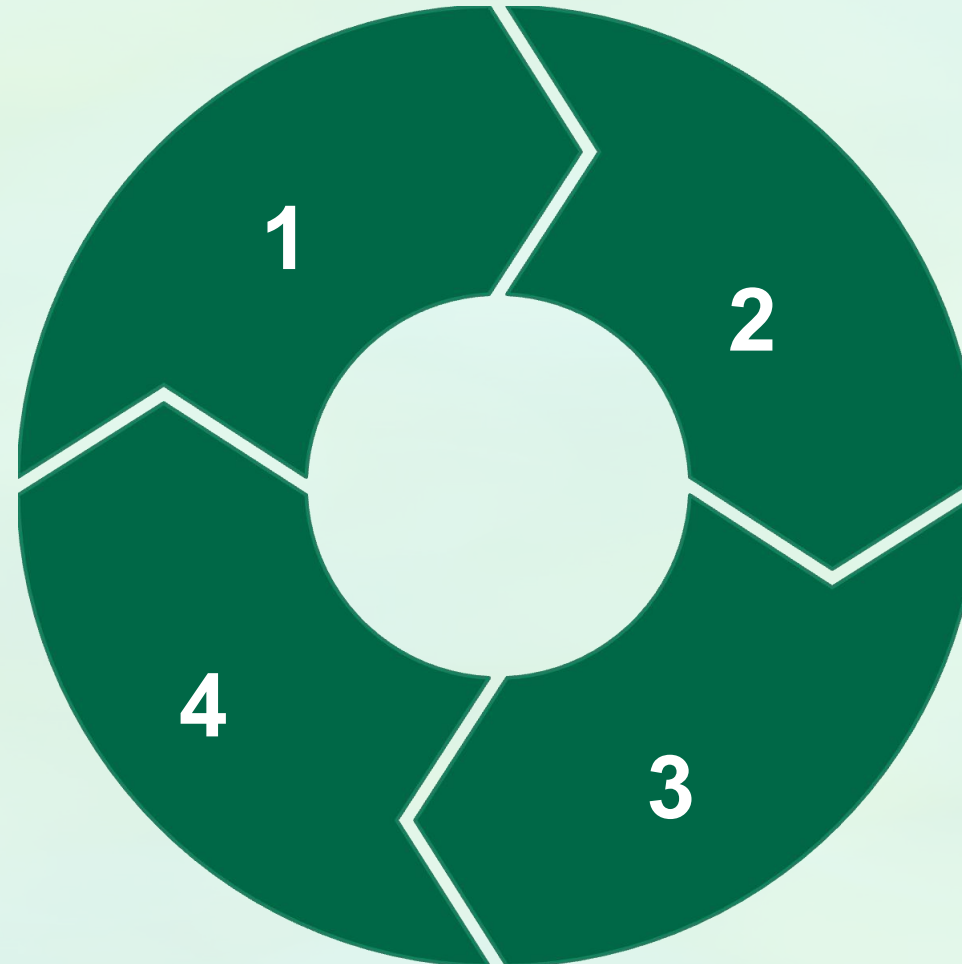




Ecological Succession

**The process of change in species structure
of an ecological community over time.**

**Bare rock → first
lichens & moss grow.**



Then grasses appear.

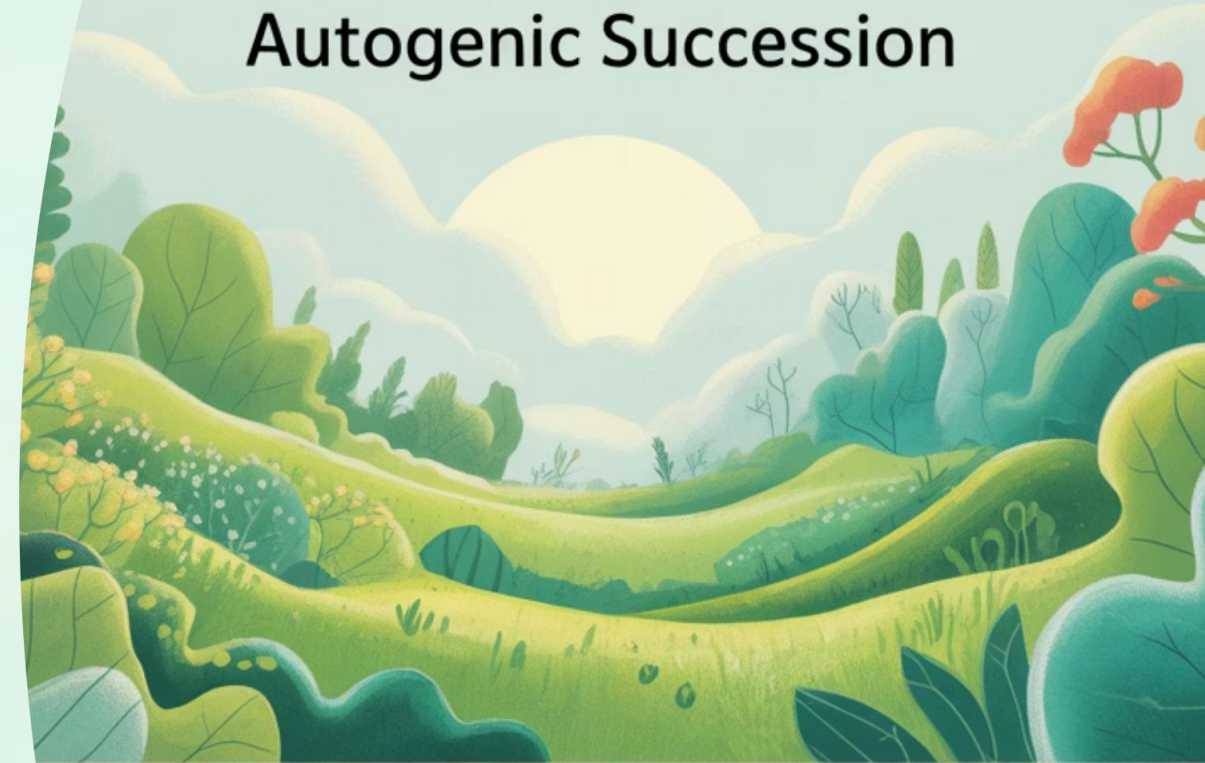
Finally, a forest forms.

**Later shrubs and trees
grow.**

Types of Ecological Succession

- Autogenic Succession
- Allogenic Succession

Autogenic Succession



Allogenic Succession



Autogenic Succession

Driven by the biotic (living) components of the ecosystem

Especially the organisms of the community itself

- ① Lichens secrete acids that break down rocks
→ soil formation → mosses & grasses invade



The existing species modify the environment

Soil, microclimate, nutrients, shade, humidity

Making it favourable for new species to replace them.

- ☐ **Large trees creating shade → shade-tolerant species replace sun-loving species.**



Allogenic Succession

Succession driven by external (abiotic) environmental factors rather than the community itself.

-  Flooding converts a forest into a wetland.**



Changes in soil, climate, water availability, or natural disasters alter the habitat and initiate succession

- ① Volcanic eruption covering a forest with lava → primary succession begins.**



Driving Force	Caused by living organisms of the community	Caused by external abiotic factors
Example	Lichens forming soil, tree shading	Flood, fire, volcanic eruption
Speed	<i>Usually gradual</i>	<i>Can be sudden or rapid</i>
Control	Internal (community-driven)	External (environment-driven)

PYQ - Environment & Ecology



In the grasslands, trees do not replace the grasses as a part of an ecological succession because of (2013)

A) insects and fungi

B) limited sunlight and paucity of nutrients

C) water limits and fire

D) None of the above

2. Lichens, which are capable of initiating ecological succession even on a bare rock, are actually a symbiotic association of (2014)

A) algae and bacteria

B) algae and fungi

C) bacteria, and fungi

D) fungi and mosses

3. Which one of the following is the best description of the term 'ecosystem'? (2015)

A) A community of' organisms interacting with one another

B) That part of the Earth which is inhabited by living organisms

C) A community of organisms together with the environment in which they live

D) The flora and fauna of a geographical area

4. Consider the following kinds of organisms:

- 1. Copepods**
- 2. Cyanobacteria**
- 3. Diatoms**
- 4. Foraminifera**

Which of the above are primary producers in the food chains of oceans?(2021)

A) 1 and 2 only

B) 2 and 3 only

C) 3 and 4 only

D) 1 and 4 only

5. Which of the following are detritivores? (2021)

1. Earthworms
2. Jellyfish
3. Millipedes
4. Seahorses
5. Woodlice

Select the correct answer using the code given below.

A) 1, 2 and 4 only

B) 2, 3, 4 and 5 only

C) 1, 3 and 5 only

D) 1, 2, 3, 4 and 5

Thank
you

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