

The Blueprint of Nature

Ecosystem Structure and Function

A visual guide to the physical architecture and biological engines of our world.



The Physical Environment (Abiotic)

-  • Water
-  • Soil
-  • Air
-  • Temperature
-  • Day-length
-  • Solar Input



The Living Organisms (Biotic)

-  • Producers (Plants/Algae)
-  • Consumers (Animals)
-  • Decomposers (Microbes/Fungi)

An ecosystem is a functional unit of nature where these biotic and abiotic components interact, resulting in a physical structure characteristic of each specific environment.

Ecological Dashboard

Defining the Roster: Species Composition

The identification and enumeration of plant and animal species within an ecosystem.



To understand a localized environment—whether a small pond or a vast forest—ecologists must first catalog the exact identities and populations of the organisms that inhabit it.



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$$E=mc^2$$



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Key Highlights

- » Free Study Material, Videos & Infographics
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- » Get Clear Explanations, Not Just Marks
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Spatial Architecture: Vertical Stratification

Stratification is the vertical distribution of different species occupying different levels within an ecosystem.

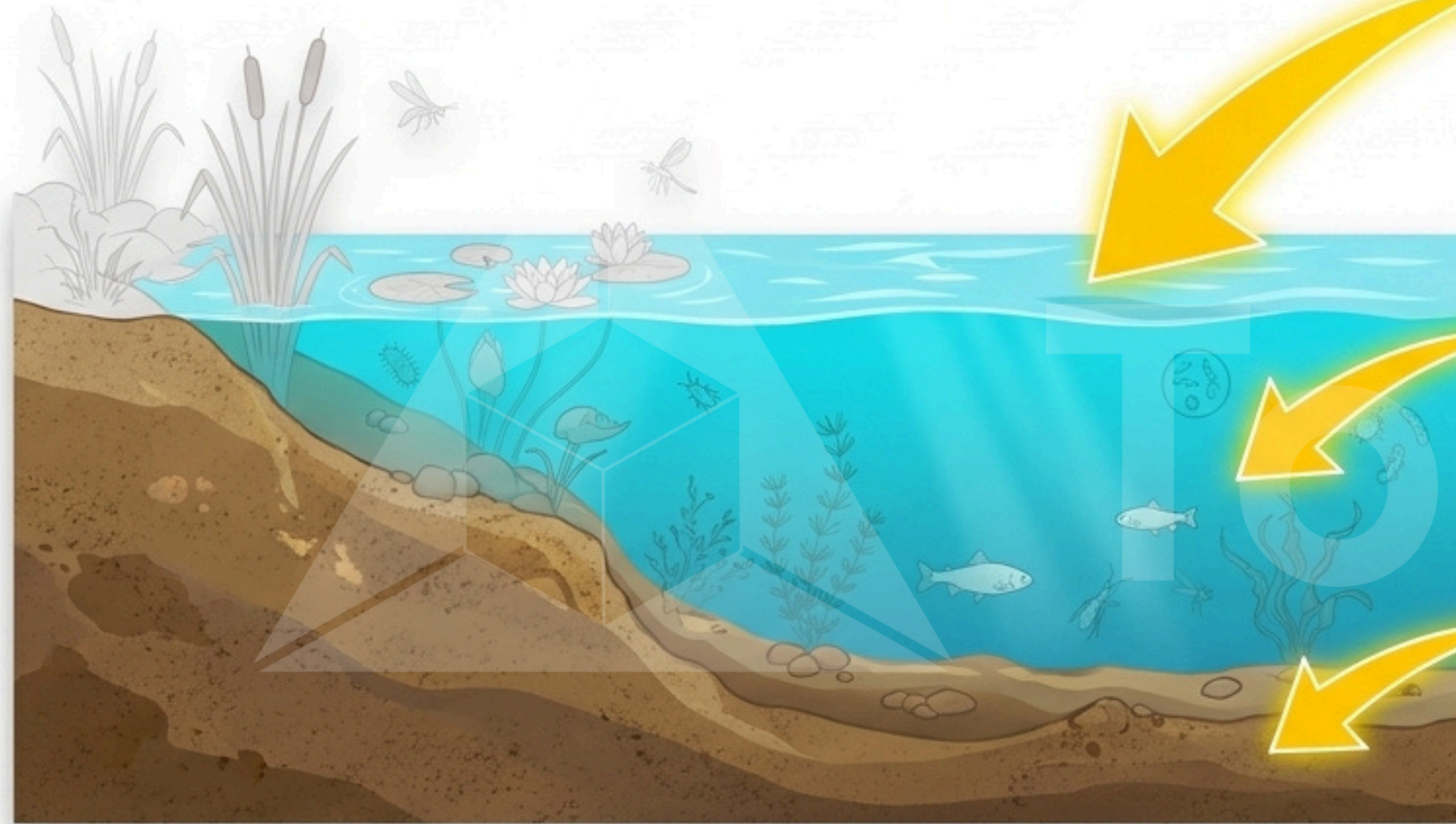
Trees – Occupy the top vertical strata or uppermost layer.

Shrubs – Occupy the second layer.

Herbs & Grasses – Occupy the bottom layers.



Case Study: The Pond Ecosystem (Physical Infrastructure)



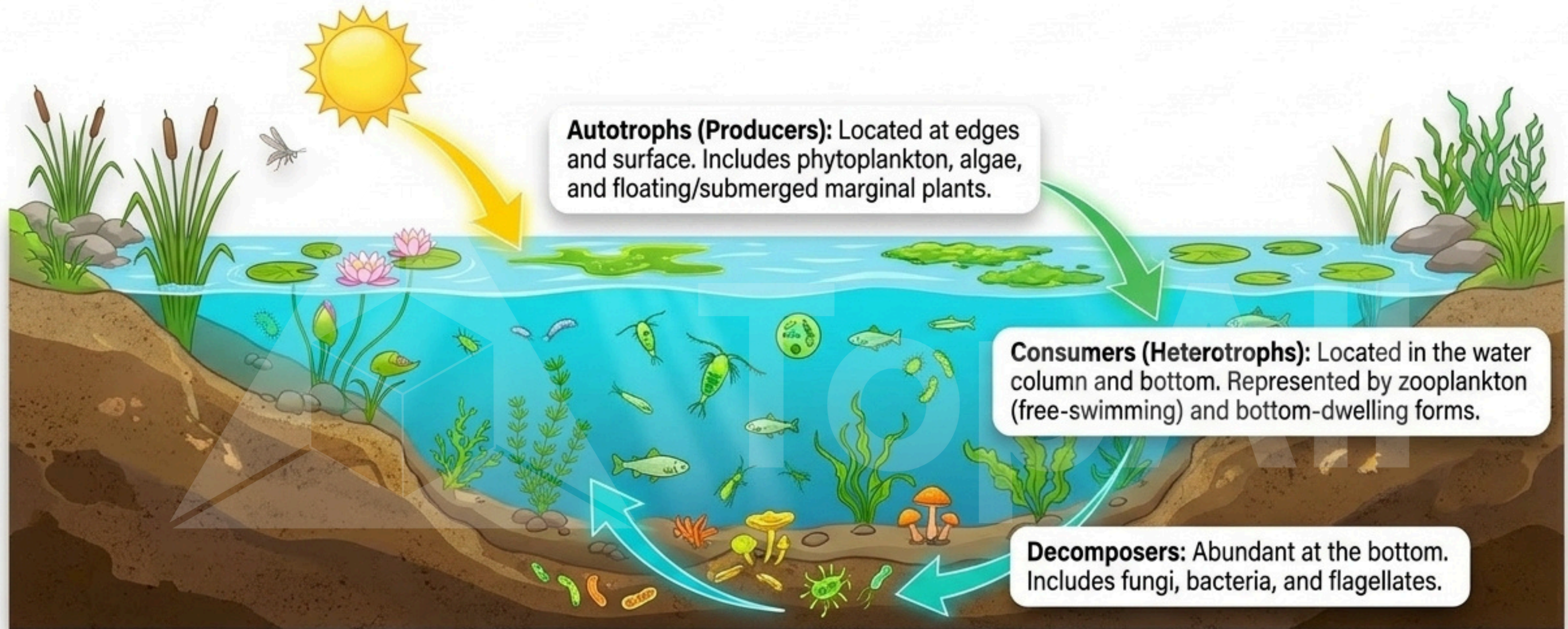
Solar Input & Climate – Cycles of temperature, day-length, and radiant energy regulate the rate of function.

Dissolved Substances – Water containing dissolved inorganic and organic materials.

Rich Soil Deposit – The nutrient-dense foundation at the bottom of the shallow water body.

A pond is a self-sustainable unit that perfectly exhibits all basic ecosystem components in a simple, observable space.

Case Study: The Pond Ecosystem (Biological Network)



Key Takeaway: Radiant energy is converted to organic material by autotrophs, consumed by heterotrophs, and mineralized by decomposers for reuse.

The Engine of the Biosphere: Four Core Functions



Productivity

The Input.

Conversion of inorganic matter into organic material using radiant solar energy (Primary production by autotrophs).

Energy Flow

The Transfer.



Unidirectional movement of energy towards higher trophic levels, with inevitable dissipation and loss as heat.



Nutrient Cycling

The Reuse.

The continuous circulation of vital minerals and nutrients back and forth between the physical environment and living organisms.

Decomposition

The Breakdown.



Degradation and mineralisation of dead matter by decomposers, releasing nutrients back into the system.



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