IAS BABA

# PRELIMS PINNACLE – 2023

## YOUR ROADMAP TO SUCCESS IN PRELIMS 2023

## ENVIRONMENT

## HANDOUTS

**TOPICS:**

Ecology,
Ecosystems & its types,
Ecotones,
Ecosystem dynamics –Food Chain & Food web,
Flow of energy,
Tropic Levels,

Notes

## Contents



## KEY DEFINITIONS

| | |
|---|---|
| **Ecology** | A branch of biology that studies the interactions among organisms and their biophysical environment. |
| **Ecosystem** | A community or organisms together with the environment in which they live. |
| **Ecotone** | Is a zone of junction between two or more diverse ecosystems. Eg. marshlands (between dry and wet ecosystems), mangrove forests (between terrestrial and marine ecosystems). |
| **Ecocline** | A gradation from one ecosystem to another when there is no sharp boundary between the two. |
| **Ecotype** | A plant or animal species that occupy a particular habitat which is adapted to local environmental conditions. Eg. common grasses such as Agrostis tenuis |
| **Ecological Niche** | Is the unique functional role or place of a species in an ecosystem.<br><br>No two species can have same ecological niche within a habitat. |
| **Ecotopes** | The smallest ecologically-distinct landscape features in a landscape mapping and classification system.<br><br>They represent relatively homogeneous, spatially-explicit landscape functional units. |
| **Ecophene** | Population which is characterised by the same genotype but different phenotype (individual's observable traits, such as height, eye color, blood type) in a particular habitat. |
| **Ecozones** | It delineates large areas of the Earth's surface within which organisms have been evolving in relative isolation over long periods of time, separated from one another by geographic features, such as oceans, broad deserts, or high mountain ranges, that constitute barriers to |

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| | migration |
| **Habitat** | It is the type of natural environment in which a particular species of organism lives. |
| **Biotope** | It is an area of uniform environmental conditions providing a living place for a specific assemblage of plants and animals. |
| **Home range** | The area in which an animal lives and moves on a periodic basis. It is related to the concept of an animal's territory which is the area that is actively defended. |
| **Biocoenosis** | It is an association of different organisms forming a closely integrated community Biotic community is also called as Biocoenosis, all interacting organisms living together in a habitat. |

## SPECIES/BIOTIC INTERACTIONS

| Type of Interaction | Sign | Effects | Examples |
|---|---|---|---|
| **Mutualism** | +/+ | Both species benefit from interaction | Pollinator and Plants, Plants and mycorrhizal fungi, clown fish and anemone |
| **Commensalism** | +/0 | one species benefit, one unaffected | Sucker fish on shark, Beetles on cow dung |
| **Amensalism** | -/0 | one species is harmed, the other is unaffected | Large tree shades a small plant, retarding growth of small plant. |
| **Parasitism** | +/- | one species benefit, one is disadvantaged | Ticks on dog |
| **Competition** | -/- | each species affected negatively | Lions and Tiger. |
| **Predation** | +/- | one species benefit, one is disadvantaged | Lion and Zebra |
| **Neutralism** | 0/0 | no net benefit or harm to either species | Sparrow and Humans. |

## ECOSYSTEM

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| **Ecosystem**<br><br>A structural and functional unit of biosphere consisting of community of living beings and the physical environment, both interacting and exchanging materials between them. | **Components** | **Abiotic (Non-Living Things)** | Energy, Rainfall, Temperature, Atmosphere, Substratum, Latitude and altitude and Materials. |
| | | **Biotic (Living Things)** | Primary producers (Autotrophs), Consumers (Heterotrophs), Saprotrophs (decomposers). |
| | **Classification** | **Terrestrial** | Forests, Grasslands, Deserts. |
| | | **Aquatic** | Fresh water, Coastal, Marine water. |

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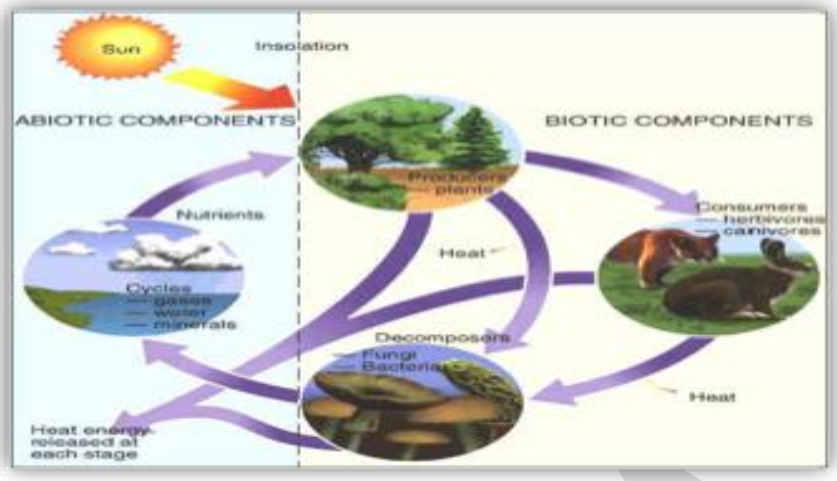


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| **Ecosystem services** | **Provisioning services** | Eg. Food, water, fuel, wood, biochemicals and genetic resources |
| | **Supporting services** | Eg. Nutrient cycling, Biomass Production, soil formation, primary production. |
| | **Regulating services** | Eg. Climate, flood, disease and water regulation, water purification, pollination |
| | **Cultural services** | Eg. Spiritual, religious recreation, ecotourism, cultural heritage |

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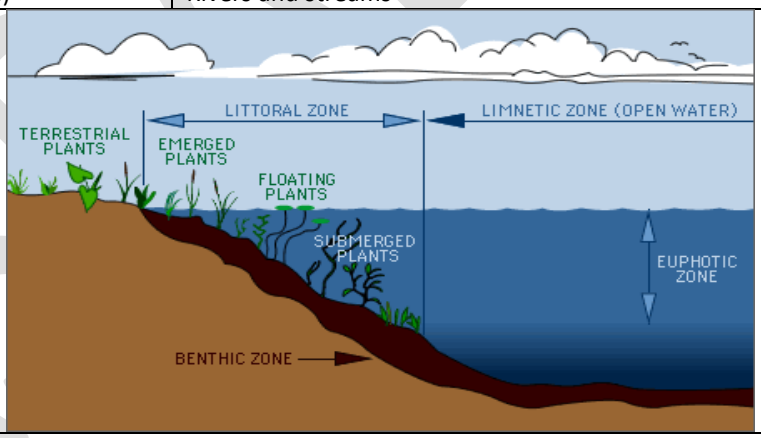
| **Fresh water Ecosystem** | **Lentic** (standing bodies) | Lakes, Ponds, Inland wetlands |
| | **Lotic** (flowing bodies) | Rivers and streams |
| **Fresh water life zones**<br><br>Defined by their depth and distance from shore | **Littoral Zone**<br>**Limnetic Zone**<br>**Benthic Zone** |  |
| **Lakes** | **Oligotrophic Lake** | Newly formed, poorly nourished lake. |
| | **Eutrophic Lake** | Lake with large or excessive supply of nutrients. |
| | **Mesotrophic Lake** | Fall somewhere between Oligo and Eutrophic lake. |
| **Factors Limiting the Productivity of Aquatic Habitats** | • Sunlight – photic and aphotic zones<br>• Dissolved Oxygen<br>• Temperature<br>• Winterkill (An ice layer on the top of a water body can effectively cut off light, Photosynthesis stops but respiration continues in such water body. If the water body is shallow, the oxygen gets depleted, and the fish die) | |
| **Biological Zones of Marine Ecosystem** | **Littoral Zone (close to shore)** | |

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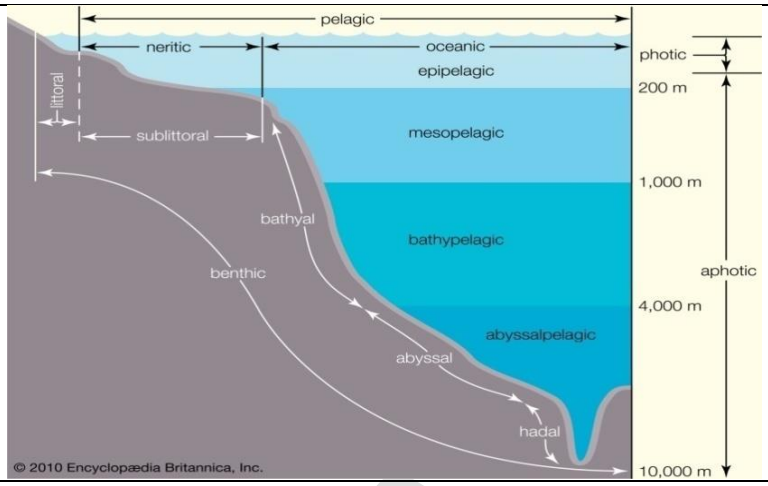
| | **Bathyal Zone** |  |
| | **Abyssal Zone** | |



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| **Aquatic life forms** | **Neuston** | These are unattached organisms which live at the air-water interface such as floating plants, etc. E.g., beetles and back-swimmers. |
| | **Periphyton** | Organisms which remain attached to stems and leaves of rooted plants or substances emerging above the bottom mud such as sessile algae and their associated group of animals. |
| | **Plankton** | • "Plankton" term is used for all the organisms found in marine as well as freshwater, which are non-motile and cannot swim against the water current (drifted by water currents)<br>• This group includes both microscopic plants like algae (phytoplankton) and animals like crustaceans and protozoans (zooplankton)<br>• Vary widely in size, from 0.2 $\mu$m to more than 20 cm. From microscopic bacteria to large organisms such as jellyfish<br>• Account for 50% of total oxygen produced by photosynthesis<br>• Large aquatic organisms are dependent on planktons and feed on them |
| | **Nekton** | Contains animals which are swimmers. |
| | **Benthos** | Organisms found living in the bottom of the water mass. |