

EVS

- Env Protection Act :-1986
- Env: sum total of water, air and land and inter relationship among them and living and non living beings.
- Segments: Atmosphere, Hydrosphere, Lithosphere(Solid part of the Earth crust), Biosphere.
- Ecology: Ernst Haeckel 1869, deals with the study of interaction of org in their natural space with their surroundings
- Ecology—>Study of ecosystems
- Ecosystem: Tansley, 1935: self regulating group of biotic community of species interacting with each other and with their non living env.
- Ecosystem —
 - Abiotic comps: solar, inorganic, organic
 - Biotic: Autotrophs, heterotrophs

Structure(Trophic levels): Decomposer—>Detritivores—>Carnivores—>Herbivores—>Producers.'

- Mutualism: Coral and algae, honeyguides bird and humans
- Commensalism(one benefit, other neutral) : Orchids in tree, E coli in human
- Antagonism: Mosquitoes and man
- Three pathways for plant degradation: Decomposition, Vert Herbivores, Wild Fires
- Types of food chains: Grazing(start with plant), Detritus(Starts with dead organic matter):Leaf litter—>worms—>birds
- Functions of ecosystem: Energy flow(1% of total solar energy is used by green plants—>10%law) and nutrient cycling.
- Biomagnification: Biomagnification is the accumulation of a chemical by an organism from water and food exposure that results in a concentration that is greater than would have resulted from water exposure only and thus greater than expected from equilibrium.

- Biochemical cycles: The cyclic movements of elements of biosphere b/w organisms and env.
- Mineralization: The return of chemical elements from living organisms to abiotic component
- 4 Biochem cycles: Hydro cycle, Carbon cycle, Nitrogen cycle, Phosphorous cycle
- Nitrogen fixation: Symbiotic Rhizobium with roots of legumes. Non symb bact: Cyanobacteria.
- Lightning storms convert atmospheric N into nitrates and reaches the soil through rain water. They can also be converted to ammonia by denitrifying bacteria.
- Phosp cycle: Only cycle with no gas state:
 - $\text{PO}_4(\text{inorg}) \rightarrow \text{nucleic acids, phospholipids, ATP (by plants)} \rightarrow \text{Animals obtain P by water or by eating other org.} \rightarrow \text{PO}_4(3)- \text{ released by decomposers.} \rightarrow \text{Converted back to PO}_4.$
- Two ecosystems:
 - Terrestrial: Grassland, Forest, Dessert
 - Major terr eco is called BIOME
 - Forest: 40% of total land on earth, 21% in India.
 - Canopy-sub canopy-middle flora zone-ground flora zone-litter zone-rhyzosphere zone with sun light penetration.
 - Types of forest: Deciduous, temperate coniferous, temperate deciduous.
 - Grassland: 19% of earth surface
 - Dessert: 17%
 - Aquatic:
 - Freshwater
 - Lentic: Stagnant water(Hyacinth, Hydrilla)
 - Lotic: Flowing water
 - Marine: 70% of earth

- Microalgae, diatoms, diatoms, microalgae.
 - Estuary: Here river meets sea
 - Change in salinity.
 - Sea weeds, azolla, sea grass, algae, mangroves, small fish, zooplanktons, crustaceans.
 - Photosynthesis:
 - Light dependent in chloroplast—>O₂ evolution
 - Light ind: in stroma —>CO₂ fixed as glucose
 - Rubisco: Earth's most abundant enzyme.
 - Photorespiration: Chlorophyll b absorbs light and passes to chlorophyll a where light is converted to chemical energy.
-

Biodiversity

- Variety among all groups of living organisms and ecosystem complexes in which they occur.
- Convention of Bio Div in Rio de Janeiro(1992) defined Biodiversity.
- Species diversity: Shannon-Wiener index and Simpson index
 - The Shannon-Weiner Species Diversity Index is calculated by taking the number of each species, the proportion each species is of the total number of individuals, and sums the proportion times the natural log of the proportion for each species. $(N/T * \log N/T)$
 - Simpson's Diversity Index is used to calculate a measure of diversity, taking into account the number of something as well as its abundance.
- Causes of Bio div loss:
 -

Climate change- Temperature, Storms, Earth Quakes etc.

Pollution.

Destruction of habitats.

Invasive alien species.

Overexploitation of the natural environment.

Hunting

Habitat Fragmentation

Collection for Zoo and Research

Control of Pests and Predators

Genetic Mutations

Co-extinction – When related or dependent species vanishes.

- Consumptive use value: Directly used products like food, fuel, fibre, meds
 - Penicillin from Penicillium, Tetracycline from bacteria, Quinine from bark of Cinchona tree, Digitalin(Heart ailment) from foxglove, Vinblastine and vincristine(anti-cancer) from Periwinkle
- Productive use value: Commercially usable values: lumber or wild gene resources
- Social value
- Ethical Value
- Option Value: New cures might be there somewhere in the ecosystems.
- Ecosystem service value: prevention of soil erosion, maintenance of soil. nutrient cycling, rains, reducing global warming.
- Biome