ECOSYSTEM

EDI:1E0mm 15 the **ftmaipnal unit of nature where living organisms interact among** themselves and also with the surroundings physical environment.

Ecosystem- Structureand Functions The biotic and abicitic factors *of* ecosystern **work in integrated** manner for **flow** of energy within the components of ecosystem. Interaction of biotic and ablotic components re51.11t5 **in** a physical 5tructure that is characteristic **for** each type **of ecosystem. The** vertical distribution of different species occupying different levels is called stratification.

Productivity- Primary' production i5 **defined a5 the amount of Oiorna55 pr organic matter produced per unit** area prim a time period by plants during photosynthesis. The *rate* of biomass **production is** called productivity. It can be divided into gross primary productivity (Gl:T] and **net primary productivity {PIPP}. GFP** of an ecosystem is the rate of production of **organic** matter during photosynthesis and **NPP is the remaining biomass after respiration (R).**

GPP—R = NPR

NPP k5 the available biomass for consumption to heterotrophs.. Secondary productivity is defined 35 the rate of formation of **new** organic matter **by consumers_**

- **Decomposition- Breakdown of ournplex organic matter into inorganic substances like carbon** clioKide, carter and nutrients is called decomposition. Decomposition involves following **steps- fragmentation, leaching, catabolism, humification and mineralization. The** detritivores break down detritus into smaller particles called fragmentation. hum ification leads to **accumulation** of **dark coloured amorphous substance called** humus.
- **Energy Flow-All living organisms are dependent for their fixid on producers, directly or** indirectly. There is a 'unidirectional flow of energy from the sun to producers **.and** then to **consumers_ Photosynthetically artNe radiation (PAR) is responsible for synthesis of food by** plants. The process of eating and being eaten Is called food chain in which energy flow **from producers to consumers_ In Grazing loodl chain (GFC)-**

Grass (ncducor) **Goat** (erkrary Consumer} (iSecondrg Coragner}

The detritus food chain begins {DFC) begins with dead organic matter, it is made up of decomposers which are heterotrophic organisms {fungi and bacteria). Natural interconnection of food chain forms the food web.

Based on sou rce of food organism occupies a sp•iific place in food chain that is known as trophit

Each tropic lever has a certain mass of living material at particular time called as Standing trop It is measured as mass of living organism or number **in unit** area.

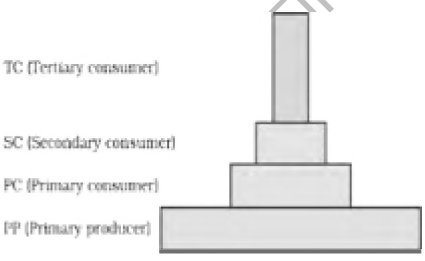
The nurnber of trophic levels in the grazing food chain is limited **as the transfer of energy follows 10** percent law that is only **10** percent of the energy is transferred to each trophic level from the lower

trophic level_ In GFC, following trophic levels are possible- pfoducer, 1 berbiyore, primary carnivore, seconder e carnivore.

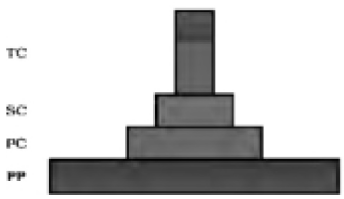
Ecological Pyramids

Ecological pvrarnidi ls the graphical representation of an ecological parameter lrhumber, biomass, energy) sequence wise in various trophic levels of a food chain with producers at the base and herbivores in the middle and carnivores at the top tiers. It can be upright, inverted, or spindle shaped.

a) Pyramids of number- Employs the number of individuals per unit area at various trophic levels with producer at base and various consumers at sticcessNety higher levels_ It is generally uprkshlt.



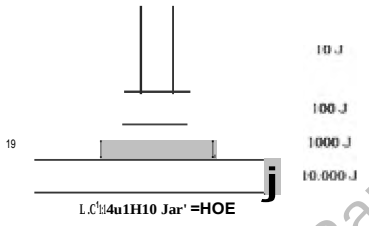
b) Pyramids of biomass- represent the biomass in various trophic levels. A pyramid of mass is upright except In atitiatic food chain involving short lhothd plankton.



A pyramid of biomass in sea is generally invert because biomass of fishes generally exceeds phytoplankton.

PP

[cli **Pyramids of energy- It gives graphic representation of amount of energy trapped by** rk.rent trophic levels per unit area. It Is always upright because during transfer of energy' **from one trophic levels to next lot of wastage occurs in feed ing, digesticin, assimilation and** respi ration.



Ecological Successlork

The gradual and fairly predictable change in species COrnriOSitiOn of a given area is called ecological succession_ During **5UCCe55iDn some Species** colonise an area and their population becomes more numerous whereas population of other spat ies decline and **eVendisappear.**

- **Orderly and sequential change that leads to a community that is near equilibrium is pilled cli max** community_
- The entire sequence of communities that successively changes Ina given area Is called sort **and individual transitional communities are termed seral stage or seral communities_**
- **Primary succession starts where no organism are there. For example bare rocks, cooled** volcano etc.
- Secondary succession occurs in the area where the living organisms have lost due to certain **regions like forest fire, Earthquake etc.**

Successional Plants

On the basis of nature of habitat, succession of plants can be grouped as-

- Hydrach succession takes place **in** wetter area and the successional series progress from hydric to the rnesic conditions.
- Xerarch succession takes **place** irk chi areas and series progress from xeric ba mesicconditions..
- **The species that invade a bare area are called pioneer species. In primary succession on rocks** lichens are pioneer species that secrete acids to dissolve the **roc** for 'weathering to form soil,
- In pilmary succession in water, the pioneer species are the small phytoplanktons that are **replaced by free floating angiosperms.**

Nut**rient Cycling**

The movement of nutrients elements through the **various components of an ecosystem is called** nutrient cycling, rt Is also called as biogeo•chernical cycle_ There are two types of nutrientcycles-

- Gaseous — exist in atmosph ere.
- Sedimentary- exists in earth crust_

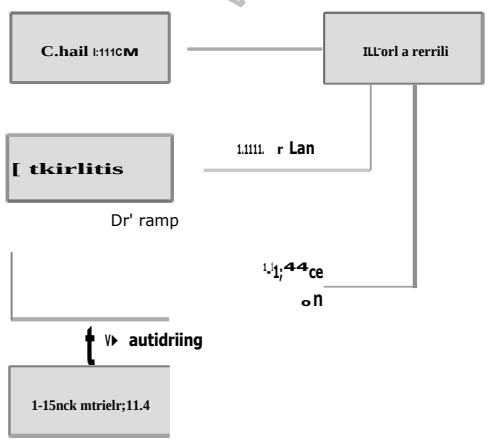
Environmennl factors like soil, moisture, pH, temperature regulate the rate of release of nutrients Into the atmosphere.

Carbon Cycl e

Carbon cycling occurs through atmosphere, ocean and through living and dead organisms.. Most of carbon is **fixed by plants -during the prdren of** photbs˙ynthe5it **and returns. to** atmosphere in **kirrn** of CO_2 during respiration. burning of wood, forest fire and combustion of organic matter, fossil fuel, and volcanic activity are other sources of releasing CO_2 In the atmosphere.

Phosphorus cycle

The natural reservoir of phosphorus **is rock** which contains phosphorus in the **form** of phosphates- On weathering, minute amount of phosphates dissolve in toil solution and absorbed **by the roots of** the plants_ The waste products of dead organism's are decomposed by bacteria to release **phosplibrus. Gaseous exchange between organism and environment is negligible** at compared lb carbon,



EeosysternSeivices

The products of ecosystem processes are called ecosystem services. it incl udes-

- The healthy forest ecosystem purify air and water
- Mitigates floods and droughts
- *Cycle* nutrients

- Generate fertile soil
- Provide wild life ha bltat
- Maintain bilaclive r5ity etc.

Thiele. furelarniental ecosyste.rn services. are taken granted !mouse they are *tree* although its value is twice the total global gross national product !GNP). Soil formation accounts for about 50% of total ecosystem. services.