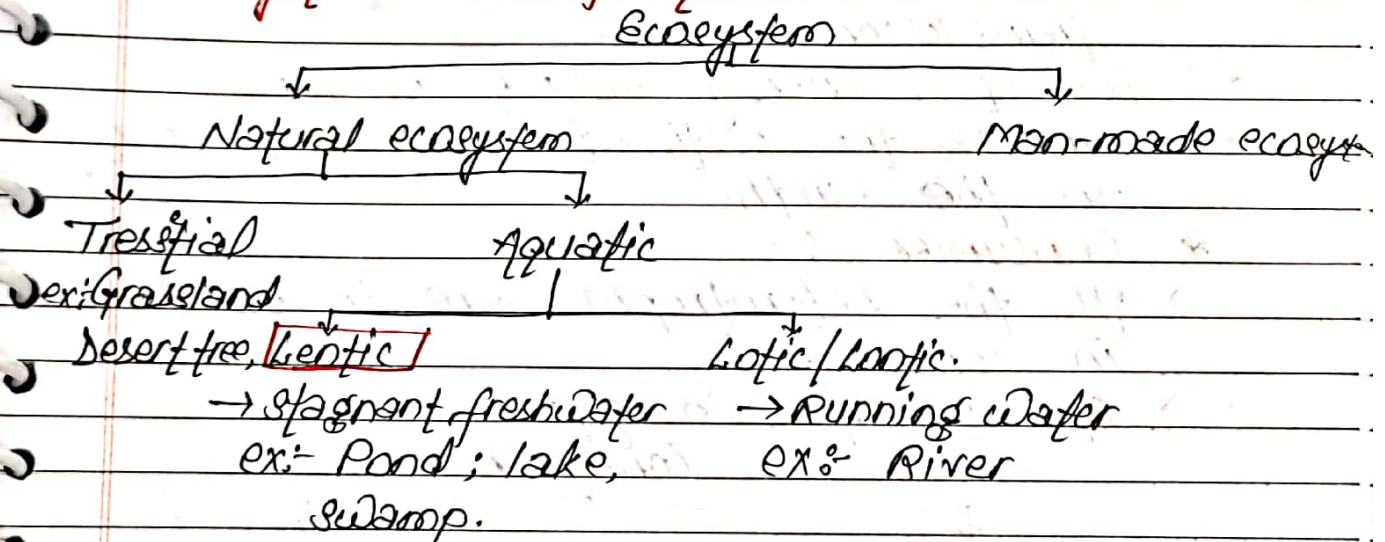


Ecosystem

Ecosystem

- All biotic and abiotic components in a particular area and time is called ecosystem.
- It is the smallest structural and functional unit of environment.
 - Term ecosystem was given by A.G. Tansley.
 - Father of ecosystem is E.P. Odum.
 - * Ecosystem classification.



- Carl Mobius given the term Biocenosis. Biocenosis is similar term for ecosystem.

* Stratification :-

Vertical distribution of different species occupying different levels is called stratification.

- At top trees are present ; 2nd top is shrubs ; 3rd is herbs and at ground or bottom level grass present in this stratification.

* Biotic component

- including plant, animals and microbes are biotic component.
- It also include producer & consumer.

* Producer

- All photosynthetic autotrophs are included in producers.
- It is also called converter or transducer.
- for it ; energy source is sun.
- Sun is the ultimate source of energy on the earth.

* Consumer :-

- All the heterotrophs are included in consumer.
- It is of two type.

Consumer

Macro consumer

Micro-consumer

ex:- It is also called decomposer or saprotrophs.
ex:- Bacteria
fungi

1° Macro consumer

2° Macro consumer

3° Macro consumer

or 2° producer

or Primary

ex:- Herbivores

carnivores.

Goat

Cat

Tiger

Cow

Dog

Lion

Rabbit, etc

Fox

Hawk

Snake

* Productivity :-

- The amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis.
 - It is expressed in term of Weight (g m^{-2}) or energy (kcal m^{-2}).
 - Productivity is of two types.
 - (i) Primary Productivity (ii) Secondary productivity.
 - The amount of biomass or organic matter produced per unit area in a unit time, primarily.
 - Rate of formation of new organic matter by consumers.
 - It has two types of calculations.
 - (i) GPP (ii) NPP
 - Total biomass produced by plant during photosynthesis. (GPP)
 - Amount of biomass stored in plant after respiratory loss & it is available form of biomass for consumer.
- $$NPP = GPP - R$$

* Decomposition :-

- Earthworms are called friend of farmers.
- It is the process in which it breaks down complex organic matter into inorganic substances like CO_2 , water and nutrients. and this process is called decomposition.

- It is highly energy requiring process.
- Dead plant remaining such as leaves, bark, flowers, and dead remainings of animals including fecal matter, other excretory is called detritus.
- Detritus is the raw materials form of decomposition.
- It is completed in 5 steps.

1. Fragmentation
2. Leaching
3. Catabolism
4. Humification
5. Mineralisation.

[1] Fragmentation :-

Detritus animal breaks the detritus into smaller fragments is called fragmentation.

[2] Leaching

Water soluble minerals move down along with water & precipitate as unavailable form of salts and water is called leaching.

[3] Catabolism

Bacteria and fungus use their own enzyme to degrade the detritus into simpler inorganic substances this process is called catabolism.

[4] Humification

It is the process in which detritus converted into dark-colour amorphous material. called humus.

→ Humus is highly resistant from microbial

→ Their degradation occurs at extremely slow rate.

[5] Mineralisation.

Further degradation of humus leads to formation of minerals and process is called mineralisation.

* Food chain :-

→ In ecosystem, every organism depend on any other organism for their food.

→ All organisms are arranged in series in which flow of energy occurs by eating and being eaten.

→ In food chain, flow of energy occur in the form of food.

→ Maximum profit level in a food chain will be 4 because flow of energy decrease at each trophic level.

→ Food chain in flow of energy is unidirectional.

→ Shorter food chain will provide greater energy.

→ Decomposers are not included in food chain

→ It is of 3 types.

(1) Predatory food chain

[a] Grassland

T_1 = Producer

(Tree)

T_2 = 1st consumer
(Rabbit)

(2) Parasitic food chain

T_1 = Tree

T_2 = Birds

T_3 = Parasite

(3) Detritus food chain

Dead organic matter
↓ converted into

decomposition

T_3 = 2^o consumer
(fox)

T_4 = 3^o consumer
(Lion)

1b) Aquatic

T_1 = Phytoplankton

T_2 = Zooplankton

T_3 = Small fish

T_4 = Large fish

* food web :-

- Natural interconnection of food chain are form food web.
- If food web is complex in ecosystem then it is stable and complex.
- Flow of energy is unidirectional i.e. one trophic to another trophic.
- Each trophic level is maintained by its previous and next trophic level.

* standing crop :-

Total amount of organic matter or biomass in a particular area.

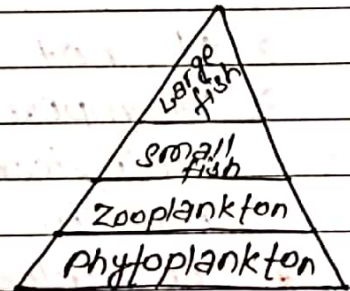
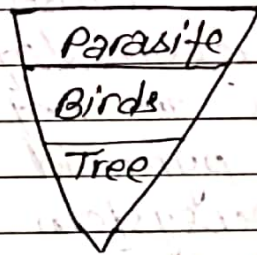
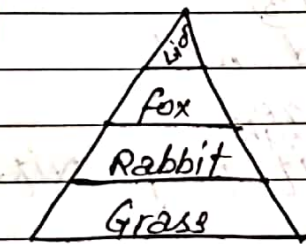
* standing state

Total amount of inorganic matter like sulphur, phosphorus, nitrogen & H_2 in a particular area & time in an ecosystem.

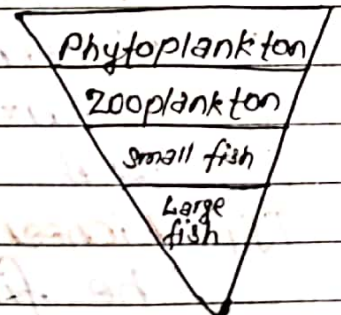
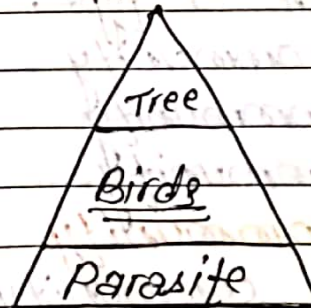
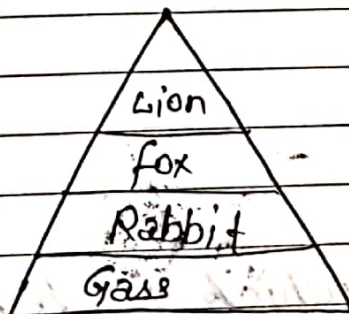
* Ecological pyramid.

- It is discovered by Charles Elton
- It is also called Eltonian pyramid.
- Graphical representation of ecological pyramid at different trophic level in an ecosystem is called ecological pyramid.
- The base of pyramid represents the producer while apex represent the top consumer.
- It is formed for [1] number
 - [2] Biomass
 - [3] Energy.

[1] Pyramids of Number :-



[2] Pyramids of Biomass



* Climax

The last and most stable community during succession called climax community.

* Seral

Community between pioneer and climax is called seral community.

* Sere :-

Communities that successively change in a given area.

* Type of Succession :-

[1] Primary Succession

- Succession of plant community on the area where is no any other previous record of vegetation.
- It is very slow process and took 1000 years.

[2] Secondary succession

- Succession on those area where previous record of vegetation occur but destroyed due to natural or man-made cause like fire, flood, landslide, sedimentations and sudden climate change.
- It is fast process and took approximate 100 years.

* Hydrosere :-

Succession in fresh water

Phytoplanktons (Pioneer community)



Rooted submerged plant

27/09/22

* Nutrient cycle :-

- It is also called biogeochemical cycle.
- The movement of nutrient elements through the various components of an ecosystem is called nutrient cycle.

→ It is of two type

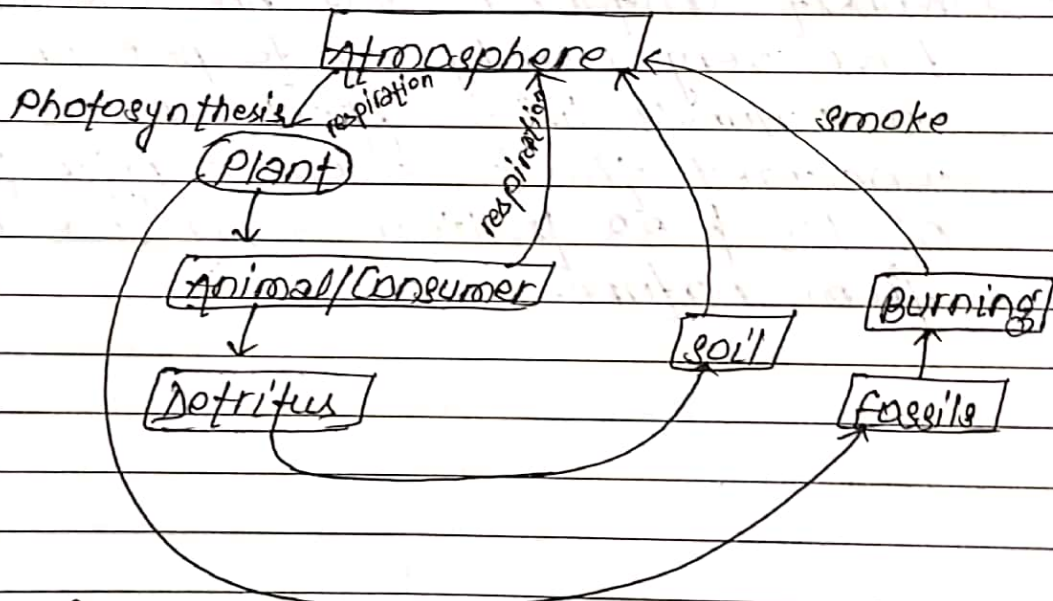
[a] Gaseous

In it, C, H, O, N these gases are involved in nutrient.

[b] Sedimentary

S, P, Ca. These elements are come out through sedimentation nutrient cycle.

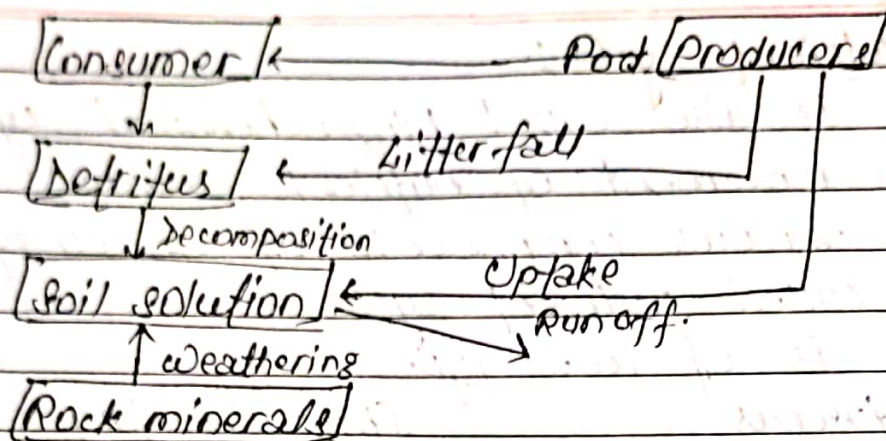
[1] Carbon cycle :-



- 4×10^{13} kg of carbon is fixed in biosphere or atmosphere through photosynthesis annually or yearly.

[1] Phosphorus cycle.

- Exchange of phosphorus between organism and environment are negligible.



→ Atmospheric input of phosphorus through rainfall are much smaller than carbon input.

* Ecosystem services

→ The product of ecosystem process as named as ecosystem services.

→ Robert Constanza and his colleagues have very recently try to put price tags on nature's life-support services and concluded that average price tag of US \$ 33 trillion a per^{year} we consume from nature.