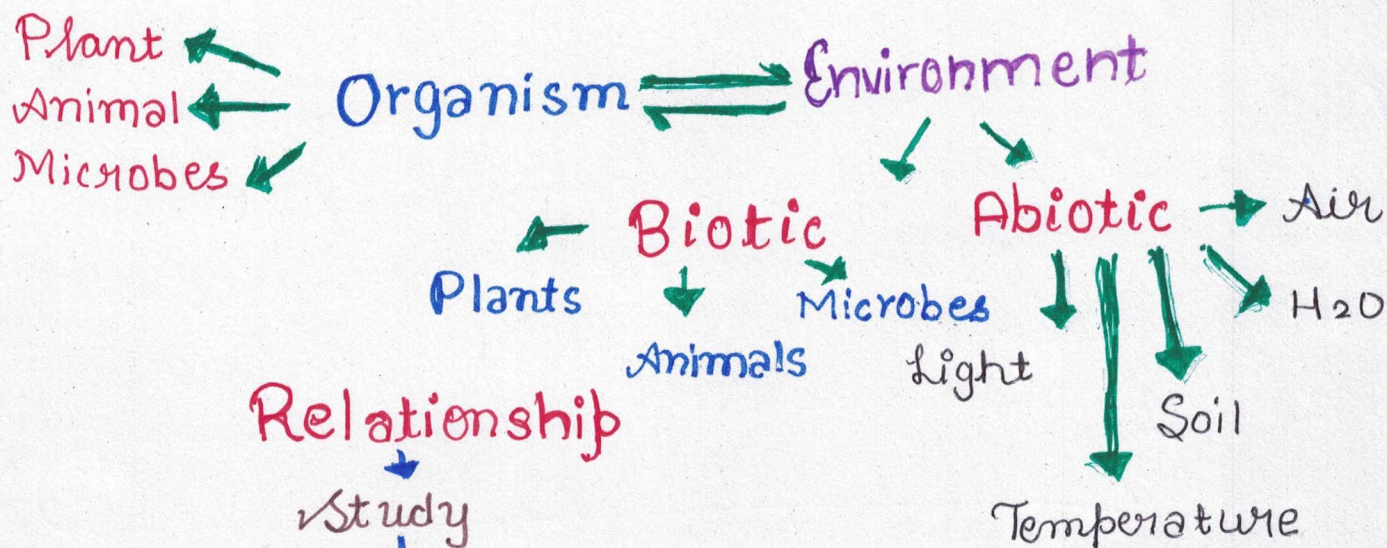
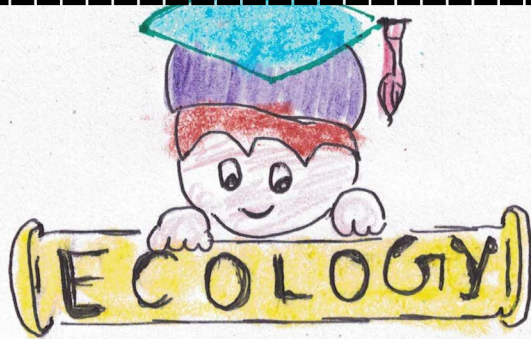




Organisms and Their Environment





Relationship

Study

Ecology

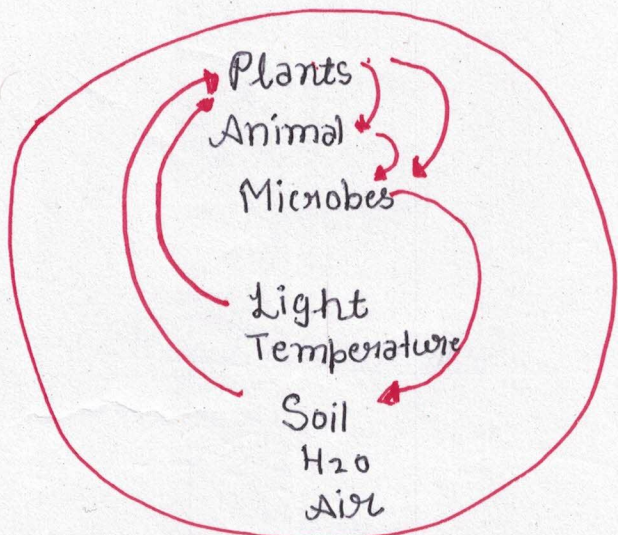
Oikos

Logos

Habitat

Logos study

Example :- forest, Grassland, Dessert, pond, lake etc



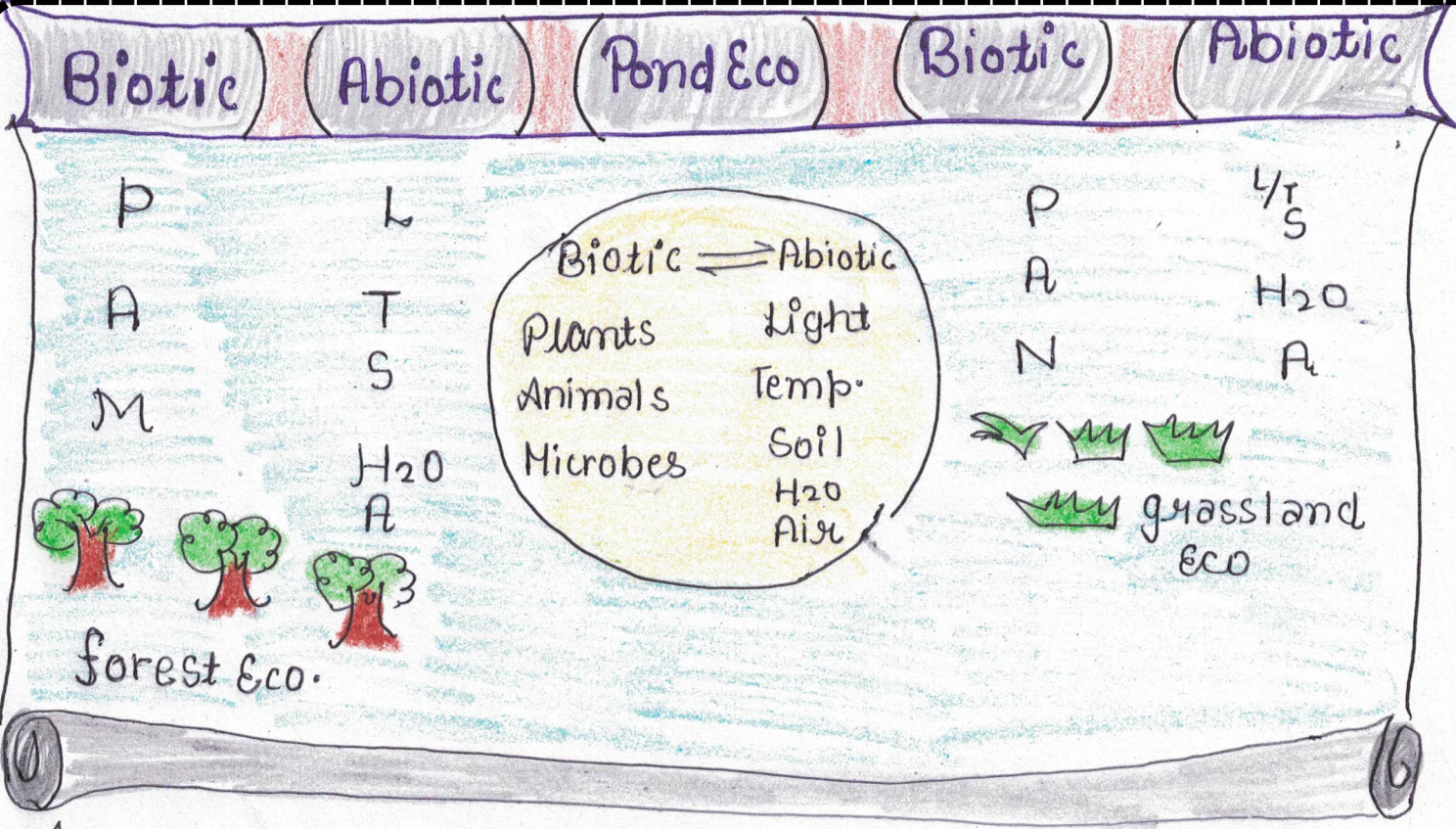
140

Term ecology was given by Haeckel.
father of Ecology - Reiter.

Indian father of Ecology Prof R.D. Mishra

Ecological Order

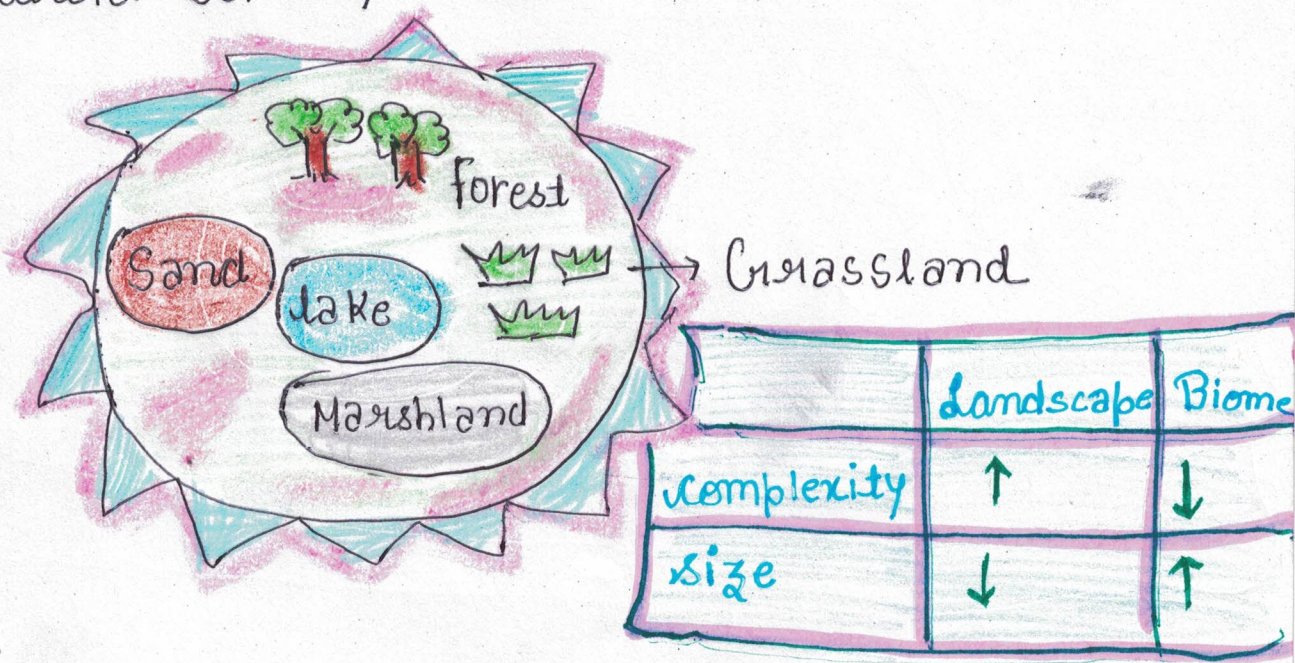




The first interaction of an organism to its environment is at physiological level.

Landscape

- Ecosystem is the unit of landscape.
- Group of different ecosystem surrounded by Natural bandary is Landscape.



Branches

Autecology

Synecology

Single Individual | Single Species $\Rightarrow$ Env.

Group of Diff. Species $\Rightarrow$ Env.

Also called

- species ecology
- Population Ecology
- Ecology of Individual

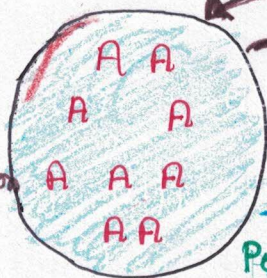
Also called

community Ecology.



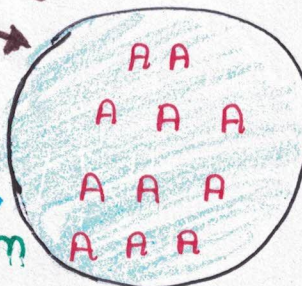
Meta population

long time
↓
local population

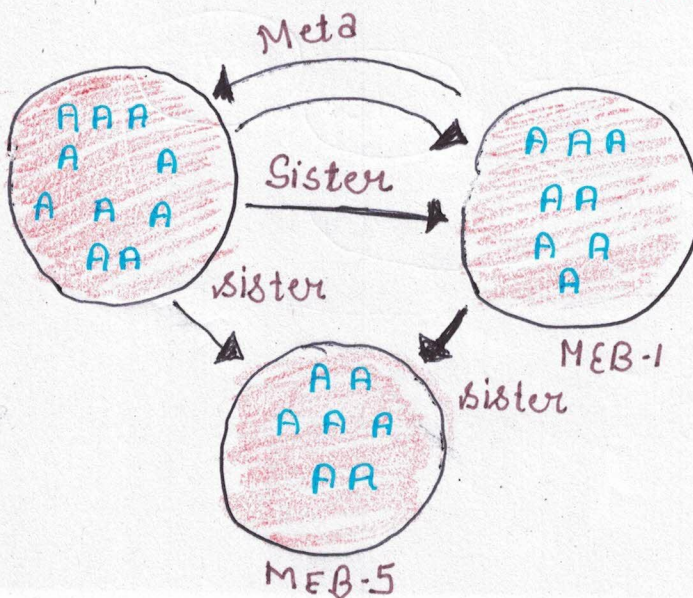


Area 1
Kota
climate 1

Sister
Population



Area 2
Delhi
climate 2

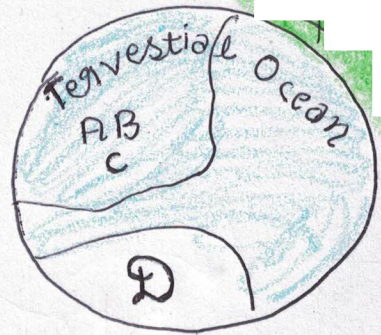


All meta population
are sister population
but all sister population
are not Meta population

Endemic Species

- Found in a particular area
- Number ↓
- Characters of Extinction ↑
- formation - due to continental separation

Eg: → Kangaroo → Australia
 Kiwi → New Zealand
 Meta Sequoia → China Valley



Key- Stone Species

(Main Role)

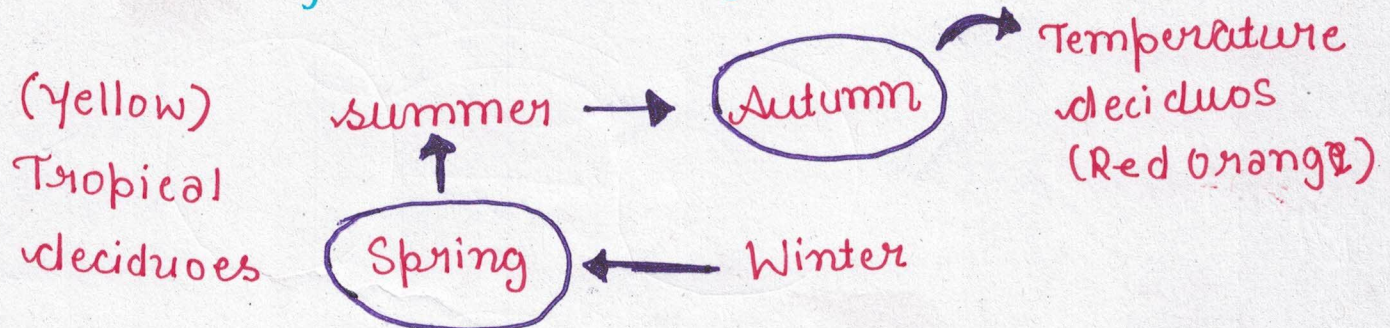
- Number ↓ (Ecosystem)
- Biomass ↓ = weight of living → **Variable**
 fresh weight
 Dry weight
 (fresh weight of H₂O)
 ↓
 constant
 ↓
 More accurate fall
- Influence ↑ - Maintain **Structure**
Balance

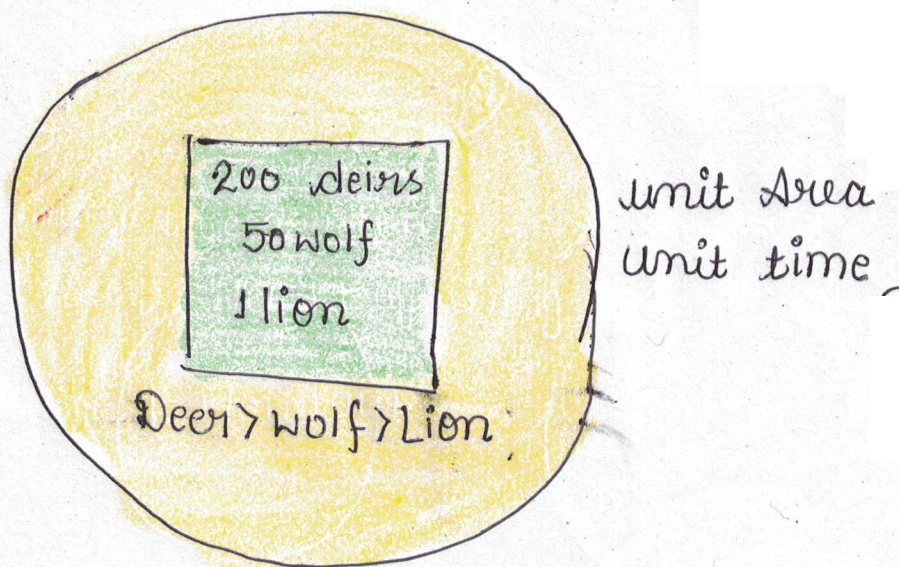
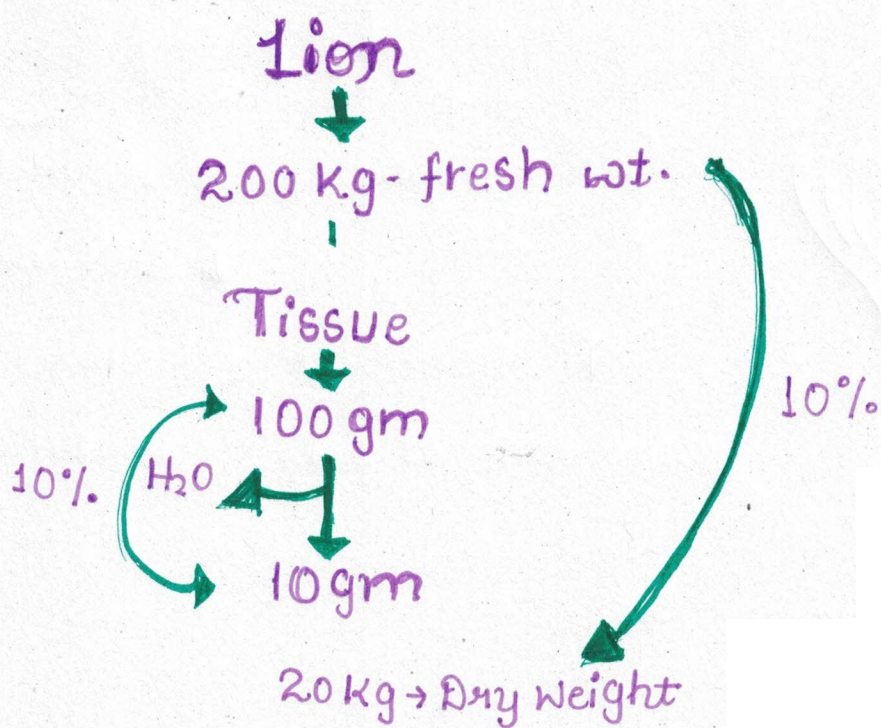
Example:

(i) Tropical deciduous → summer

→ Max plant leaves

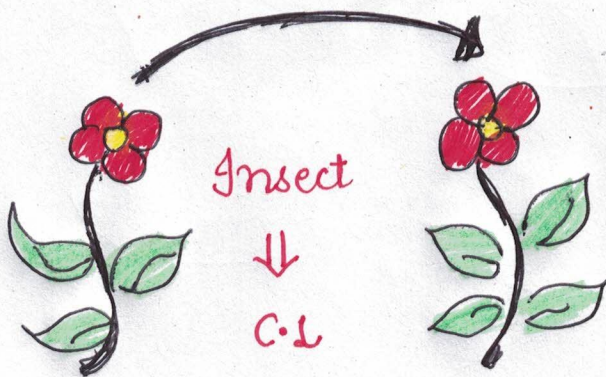
Grown fruits → down → fig tree (Anjeer)





- Ex: 2. lion in forest
3. Kangaroo rat in forest

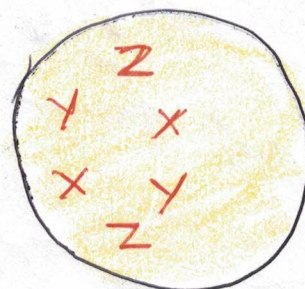
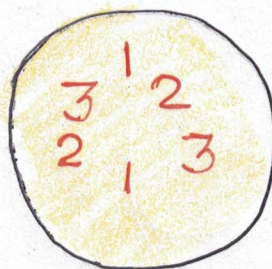
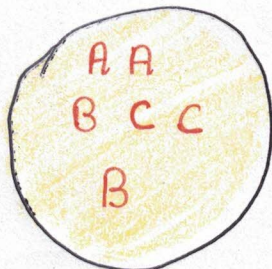
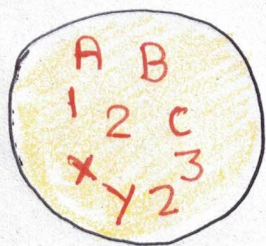
3. Pollinator Insect:-



3. Producers → Herbivores → Carnivores
(C.L.)

☞ All symbiotic Associations are critical link but all critical links are not Symbiotic.

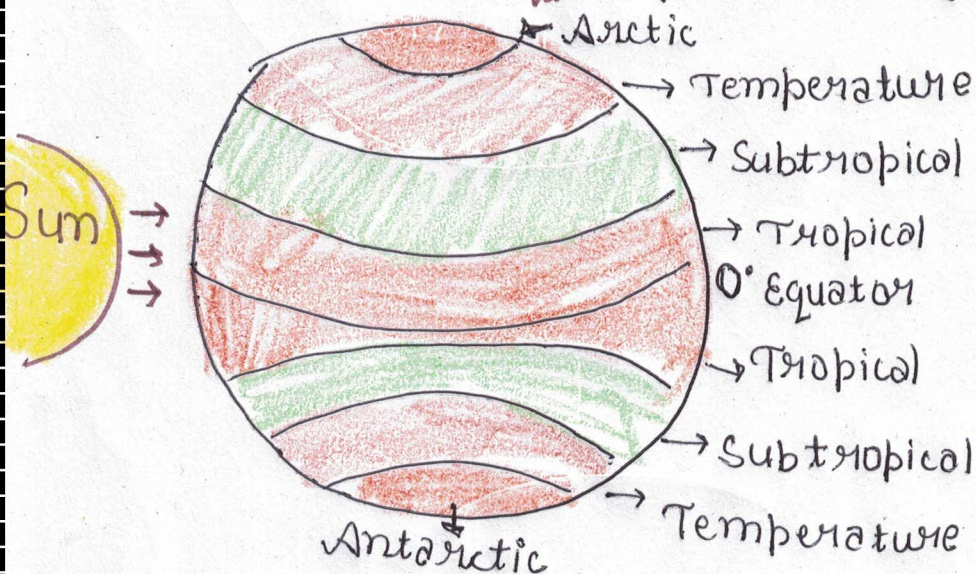
COMMUNITY



Biotic community = Plant community + Animal community + Microbial community

Characters (Structural)

(i) Species Diversity :- factors (i) type of Area



Latitude → Distance from Equator ↑ Temp ↓ Diversity ↓

Altitude → Height above Sea level ↑ temp ↓ Diversity ↓

(ii) Climate :-

Temperature : Most Important factor

Diversity and distribution of plant species
जैसा plant होगा वैसा animal अपने आप आ जायेगा।

Rainfall (water): 2nd most Important factor

Light : Photosynthesis

(iii) Type of Soil

soil Related factor:- Edaphic factor

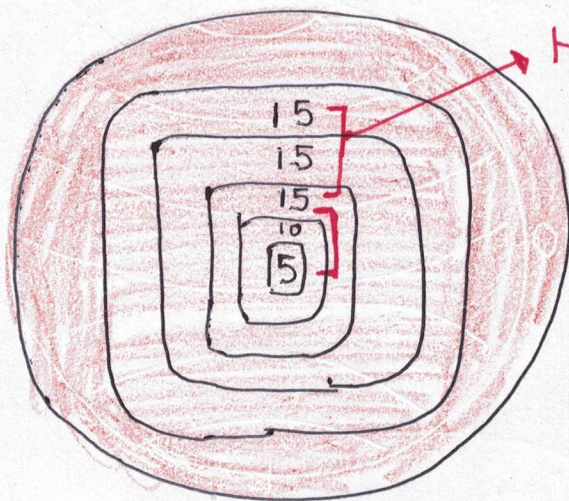
Particle Size

water holding
capillary

Aeration
(O₂ Movement)

(iv) Size of Area

↑ Diversity (But upto a limit)



Here, Species are repeating after certain area so, we can say diversity depends on Area but upto a limit.

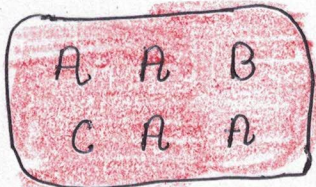
Quadrature Method



Question

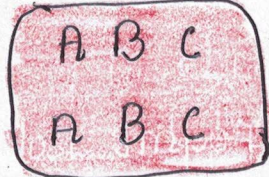
A, B, C = Bird species
x = Mammal
1 = Insect

147



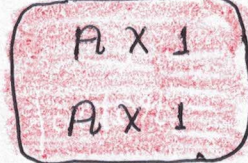
Area-1

- 3 species
- Related



Area-2

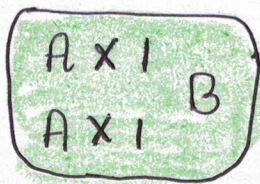
- 3 species
- Related



Area-3

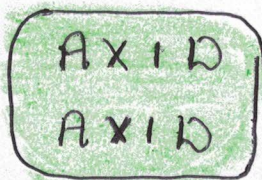
- 3 species
- Unrelated

If no. of species are equal then priority is given to unrelated.



Area-4

- 4 species
- Unrelated



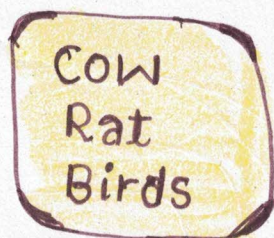
Area-5

- 4 species

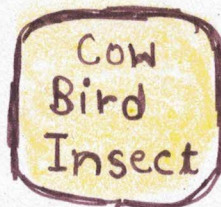
Area 5 is more diverse than Area 4.

Area 4 is more diverse than Area 3

Question



Area 1

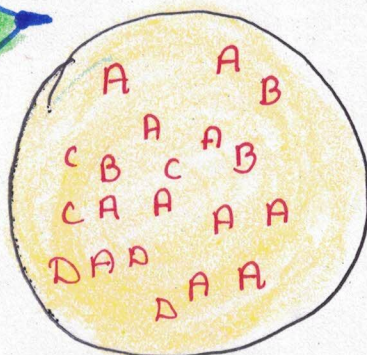


Area-2

More diverse

Special Diversity = $\frac{\text{No. of Species}}{\text{Species Richness}}$ = $\frac{\text{Even/Equal distribution}}{\text{Equitability}}$ + $\frac{\text{Taxonomical Un Related.}}{\text{Un Related.}}$

DOMINANCE



A → community.
(As no. of Species A is more)

Example



Pinus community = Himalayas



Prosopis community = Aravali Hills



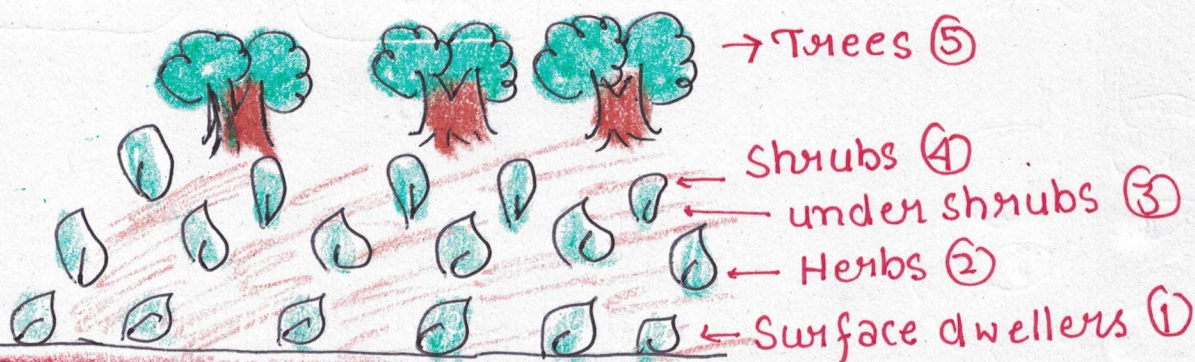
Mangroove Community = Sunderbans (West Bengal)

TREE TO TREE COMPARISON = NUMBER

TREE TO GRASS COMPARISON = BIOMASS

3. Stratification

(i) forest stratification → Basis = light.



4-5 strata

Maximum Stratification

Maximum diversity

Tropical Rain forest

Multistoried forest

clear Stratification.

Question

Why stratification occur in forest?

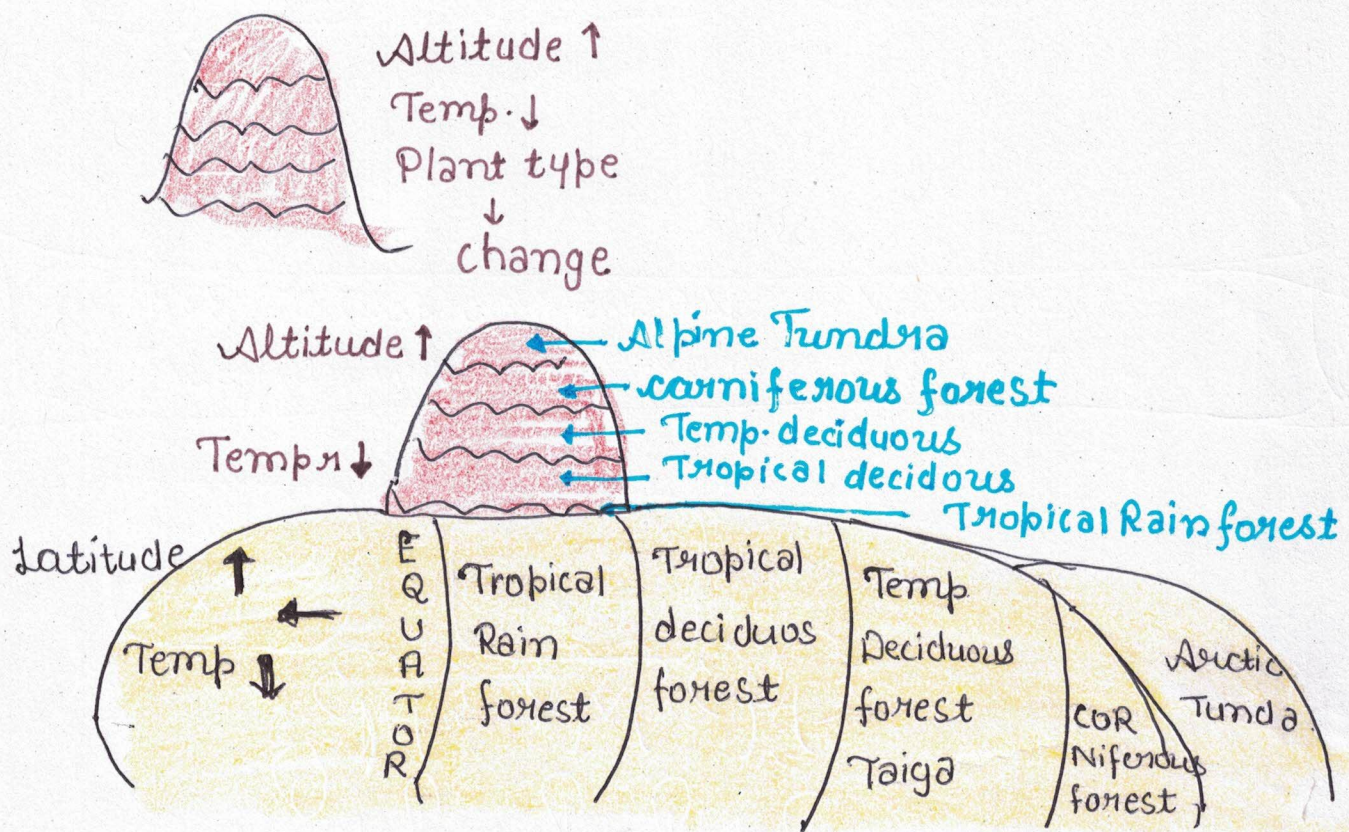
Answer

According to need of light
OR

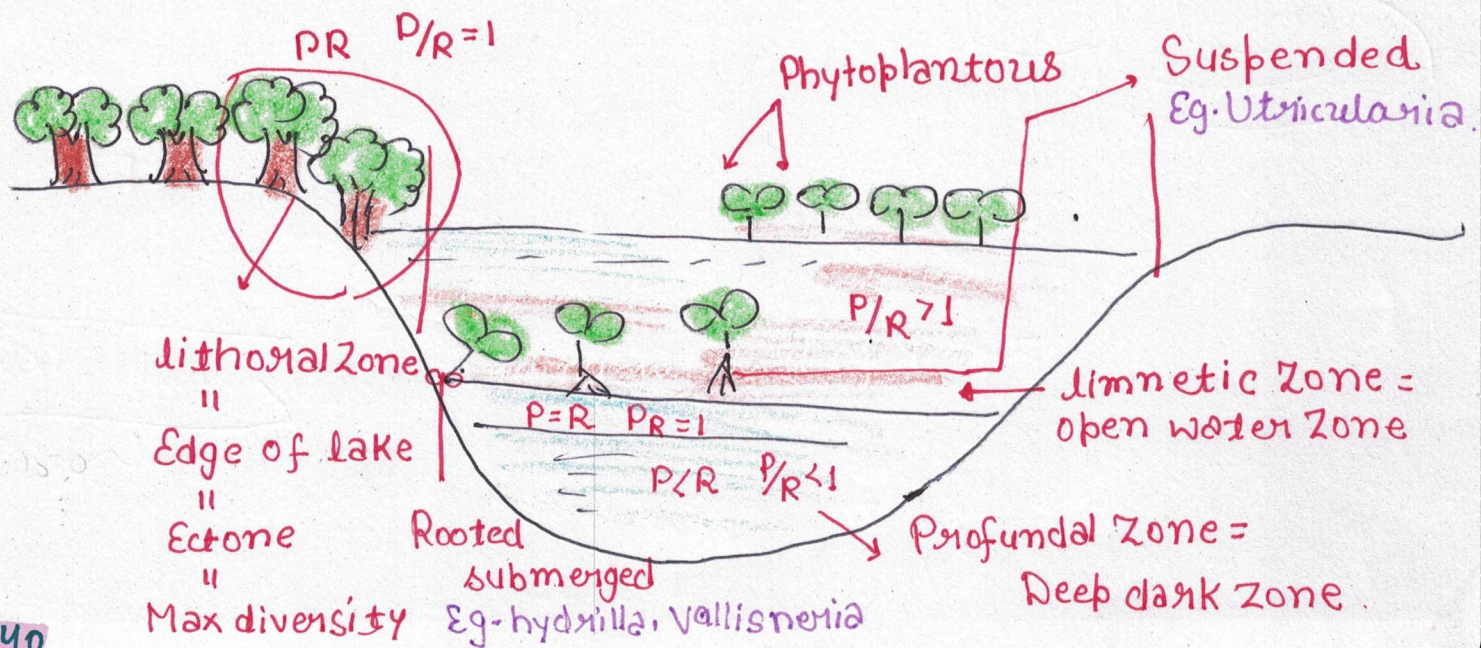
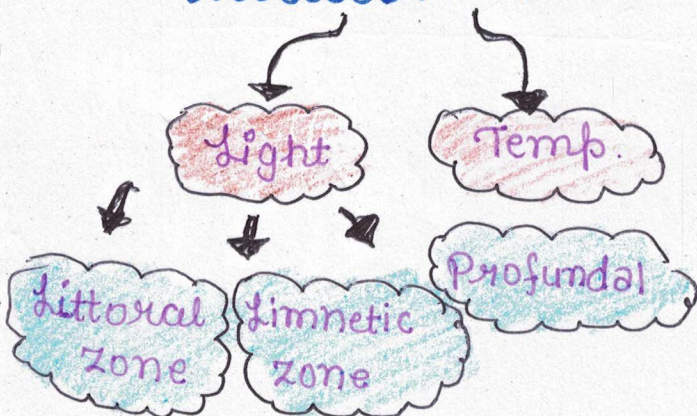
for Efficient use of Resources (light)

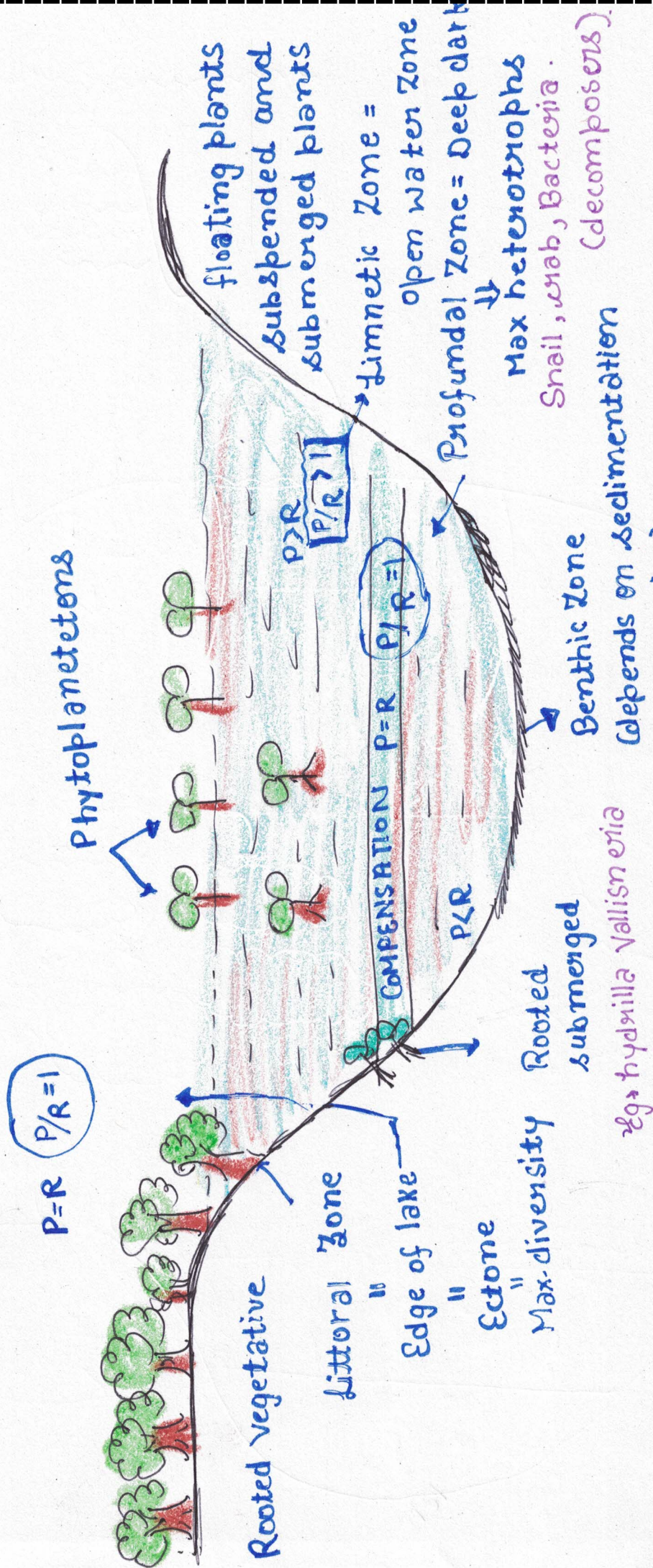


(ii) Mountain stratification :- Basis = Tempⁿ



(iii) Lake stratification :-

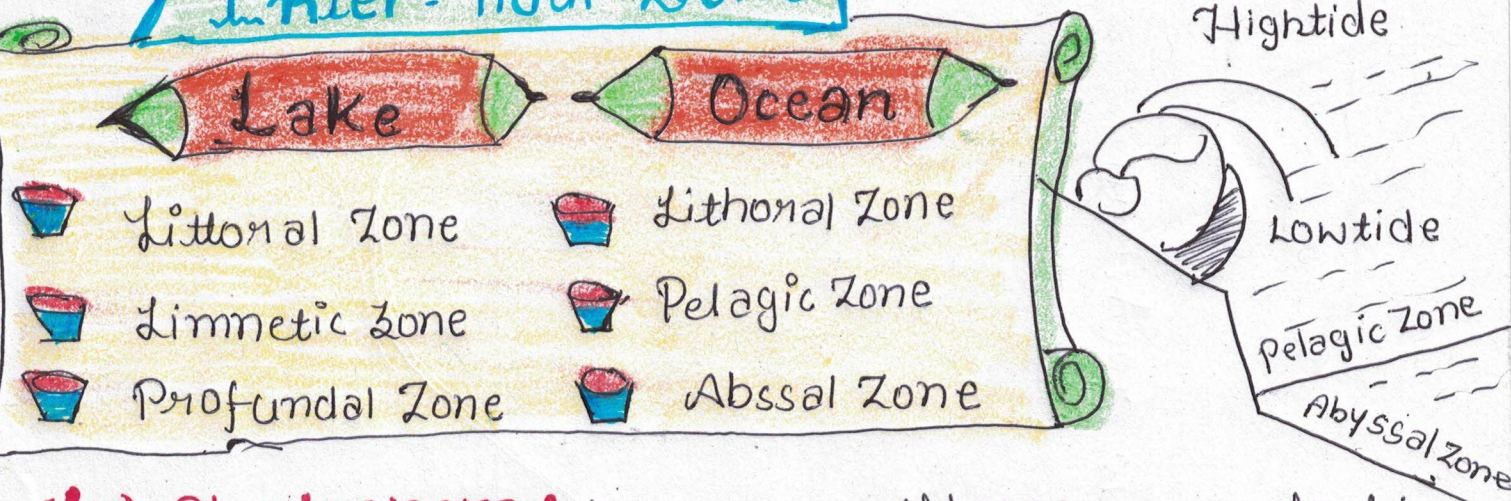




Ecotone:- Transition or overlapping zone in between two Ecosystem

Nekton:- free-swimming animals of a sea or lake.

Inter-Tidal Zone



(iv) Physiognomy → External Appearance or looking of plant community called as physiognomy.

It is determined by dominant plant species.

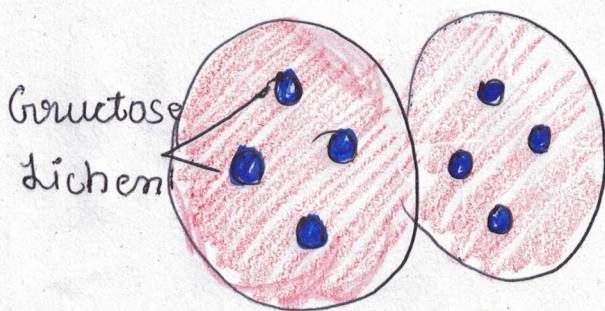
Example coniferous forest, tropical rain forest, Evergreen forest (Red-orange), (green).



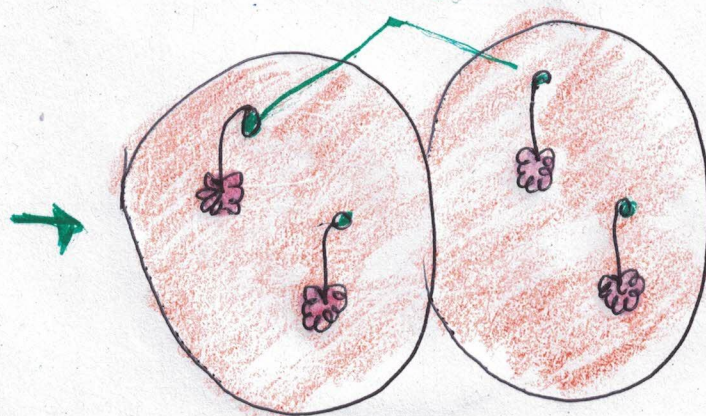
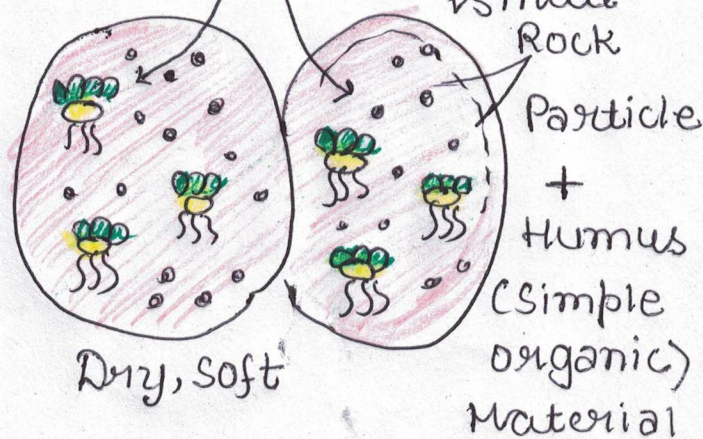
Succession



Foliose Lichen



ORGANIC ACID



Soil ↑
Moist ↑



Herbs → Shrubs



Trees

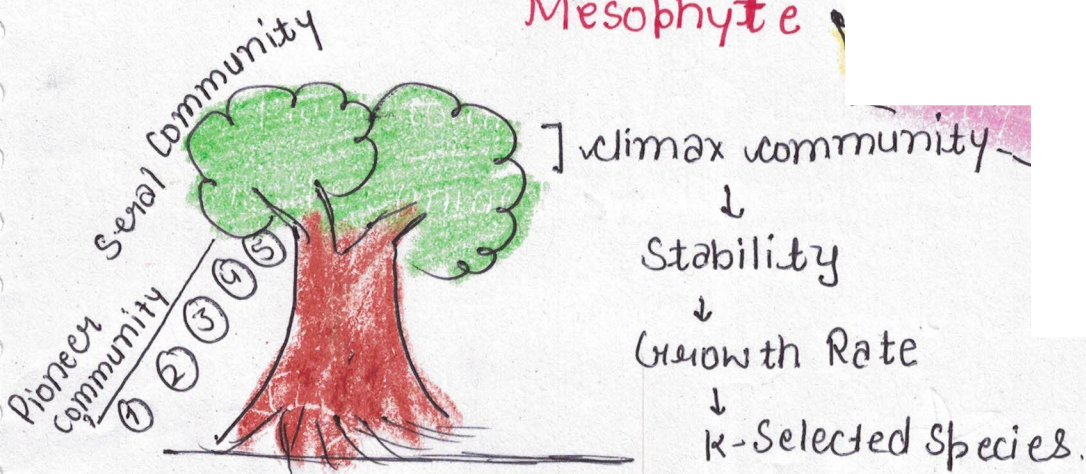
||

Mesic condition

||

Mesophyte

(Medium water)
Condition



Stability ↓

Growth Rate (Reproduction) ↓

r-Selected Species (Intrinsic rate of Increase)

Succession →



less stable to more stable



Short lived to long lived.



Diversity Increase



Biomass Increase.



Humus Increase



Niche Specialisation Increase.



Niche

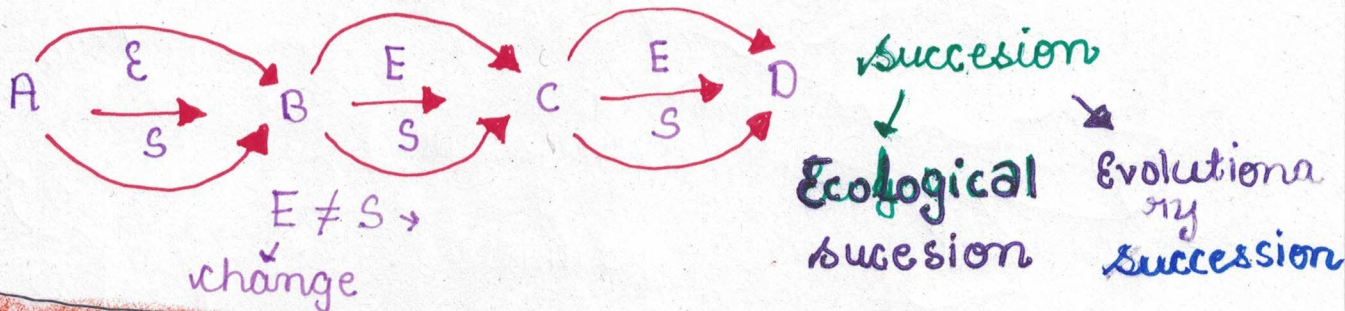
Habitat
(work)

functional Role
(work place)

SSS



Succession or Evolution parallel process रहे हैं, आज नहीं हैं।



Causes of Succession

(i) Biotic/Living/Autogenic:

Self community → Mistake
communities खुद का ही destruction कर दे।

(ii) External/Allogenic/Physiographic:

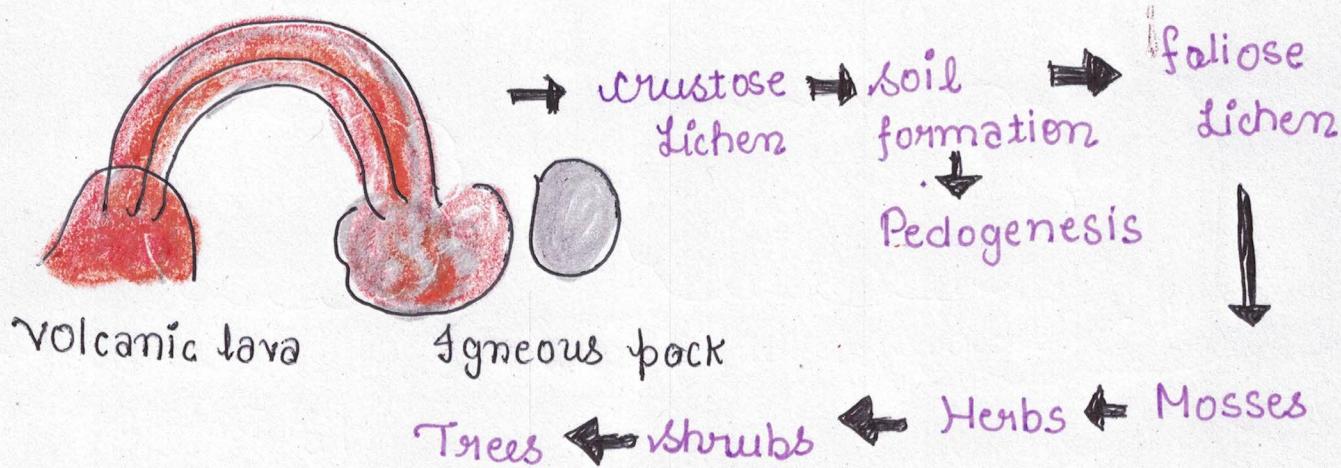
Eg: → Landslide, Volcanic lava, flood etc.

Types of Succession

(i) Primary Succession :-

☕ Slow process

☕ 100 of years.



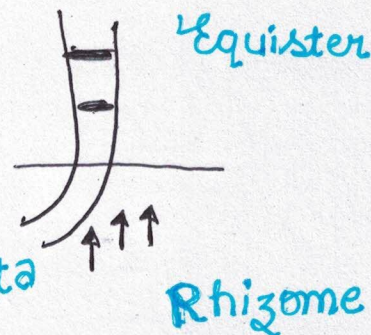
Example :- volcanic lava, newly formed pond, bare rock, sand dunes

(ii) Secondary Succession:-

- fast process
- 100 - 200 of years

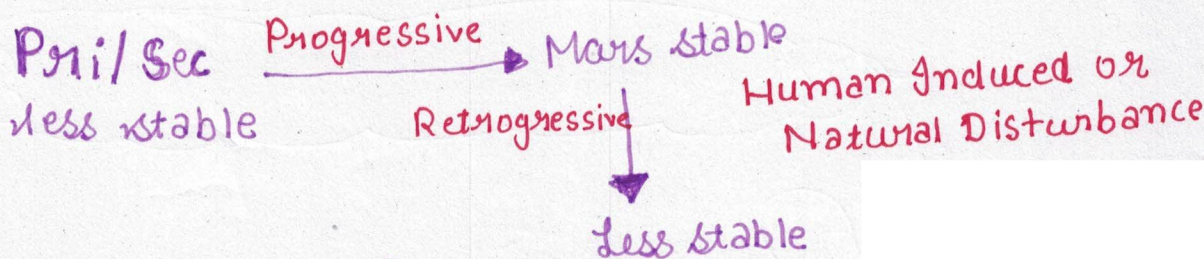
forest → forest fire → Destroy

Pteridophyta



Trees ← Shrubs

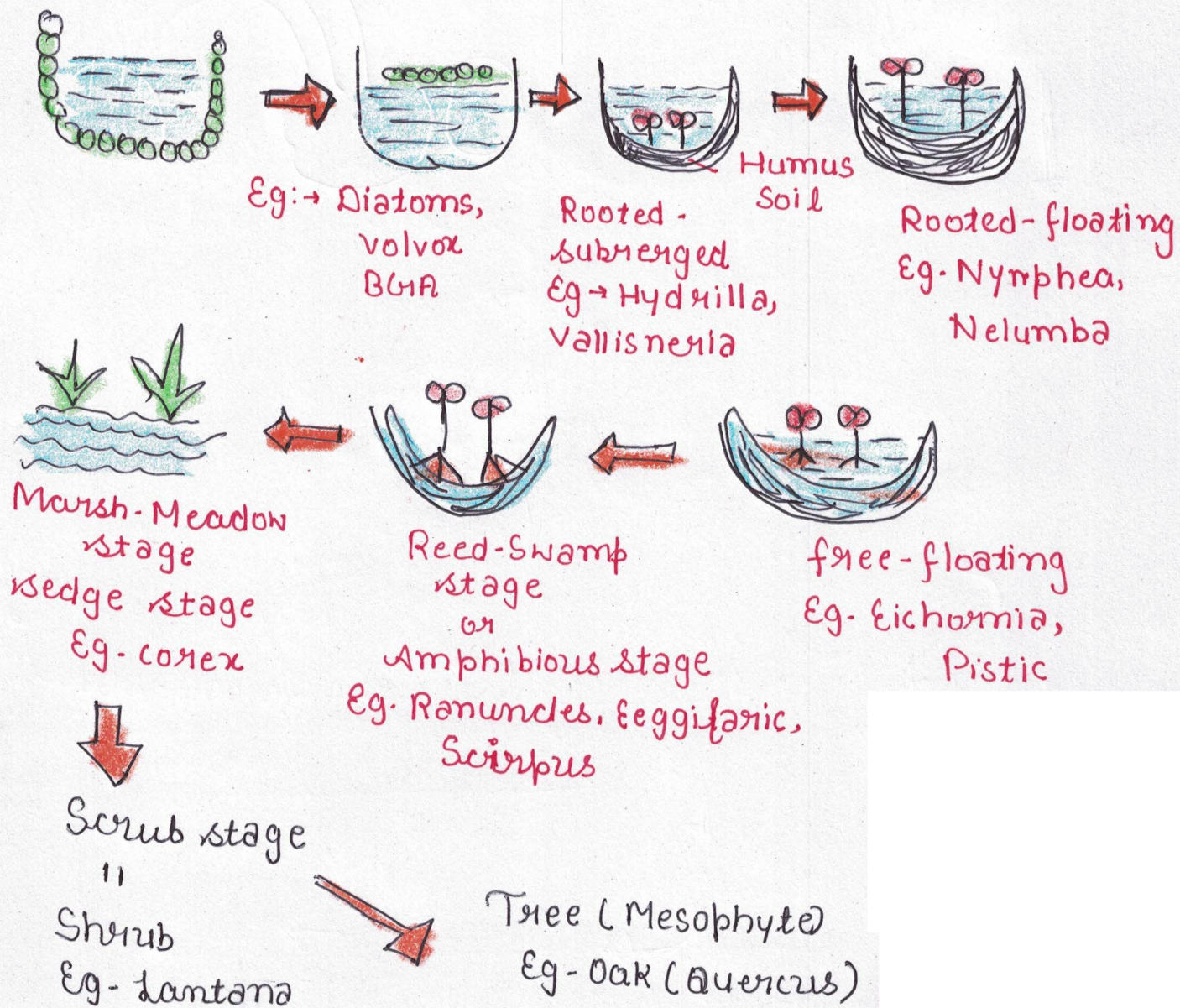
Example:- forest fire, abundance farm lands, flooded area.



P = Photosynthesis
(vii) P/B Ratio
B = Biomass

High | Low

Hydrosere



Ecological Succession, Evolution of Ecosystem

Difference

Lithosere

- Pioneer → crustose lichen
- Dry - Mesic
- slow-process
- Uniform

Hydrosere

- Pioneer → phytoplankton
- Water - Mesic
- fast
- Marginal to centre

⑥ Species Interaction/ Population Interaction ⑥

Intraspecific Interaction $A \leftrightarrow B$
 $B \leftrightarrow B$

$A \leftrightarrow B$ Interspecific Interaction

Cooperative (Positive)

Competitive (Negative)

Positive
 $A \quad B$

Negative
 $A \quad B$

Aggregation

Mating Behaviour

Communication

Altruism

Eg. Leming, Honey bee, Termites

→ food

→ Shelter

→ space

→ light etc

(i) Mutualism

$\oplus \oplus$

(ii) Commensalism

$\oplus, \ominus$

(iii) Proto-co-operation

$\oplus, \oplus$

Parasitism Predator
 (i) Exploitation

$\oplus \ominus$

(ii) Ammensalism

$\ominus, \ominus$

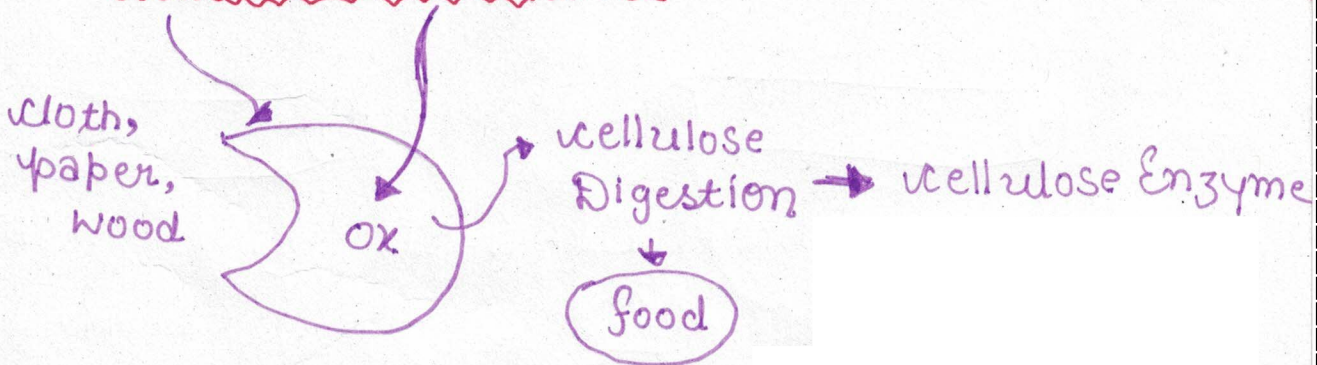
(iii) competition

$\ominus, \ominus$

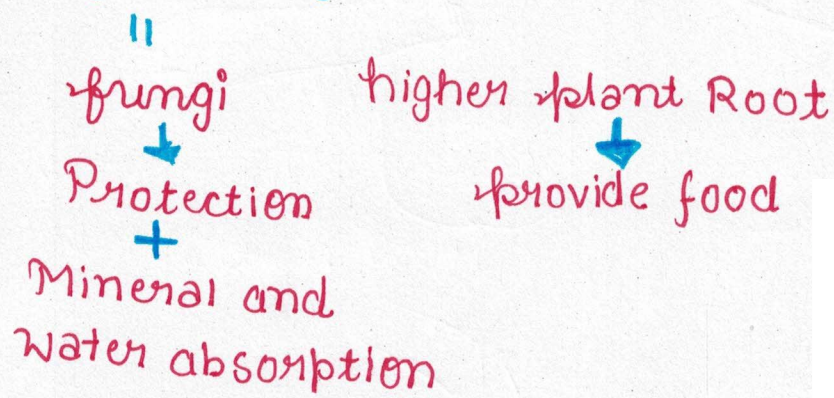
InterSpecific Interaction : Positive

(i) Mutualism/ symbiosis/ obligatory Mutualism:-

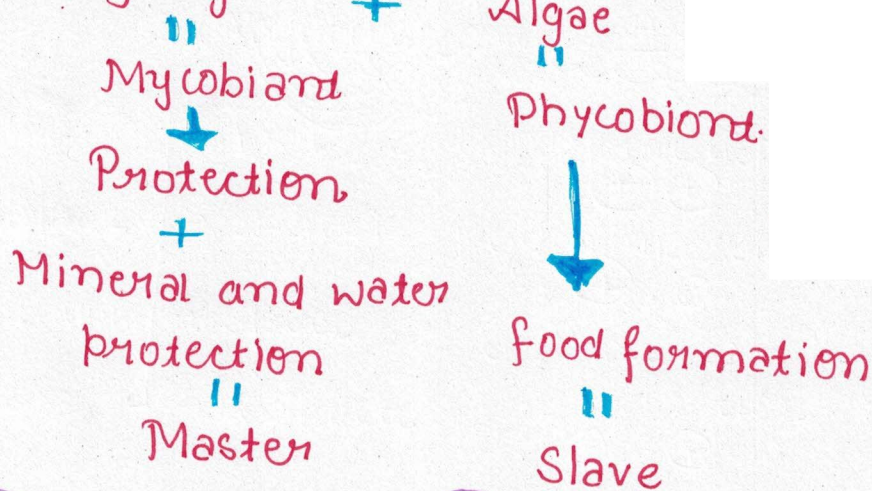
Ex: (i) Termite & Trichonympha:-



(ii) Mycorrhiza:-

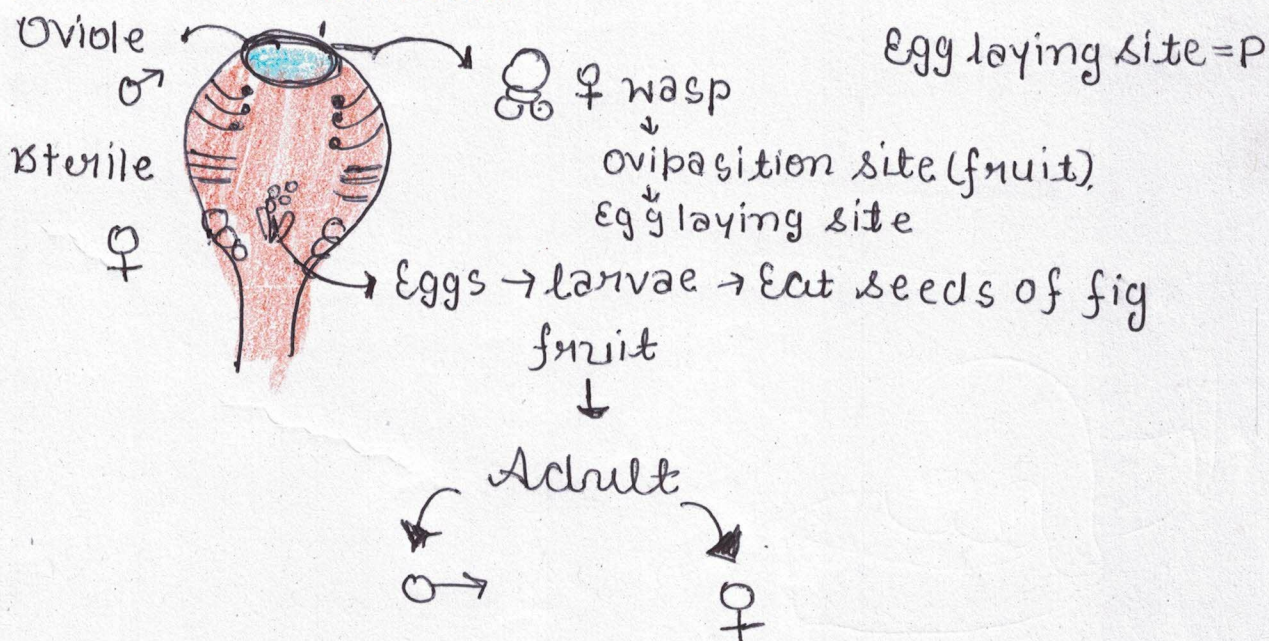


(iii) Lichen = fungi + Algae



Helotism = Master + Slave

(iv). fig. Thee and Wasp:-



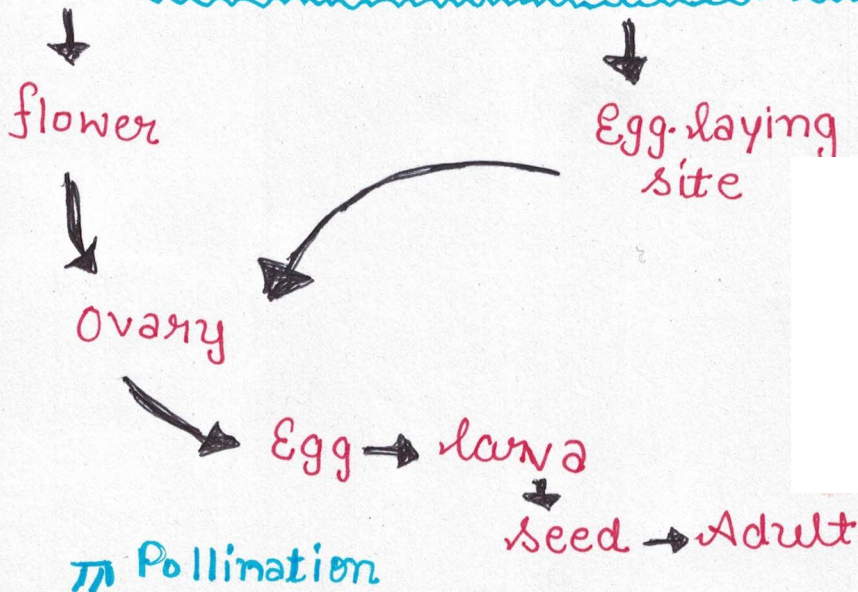
CHARACTERISTIC

☕ Co-Evolution:- एक दूसरे के साथ बदलना

☕ Co-Existence:- साथ-साथ जीना

☕ Co-Extinction: साथ-साथ मरना

(v) Yucca plant and Pronuba Moth:-



(vi) Orchid And Bee / Bumble Bee:-

ophrys



♂ Bee

☕ Pseudo copulation

☕ Sexual Deceit

☕ Co-Evolution

☕ Mimicry → Mimic = Petal
Model = ♀ Bee

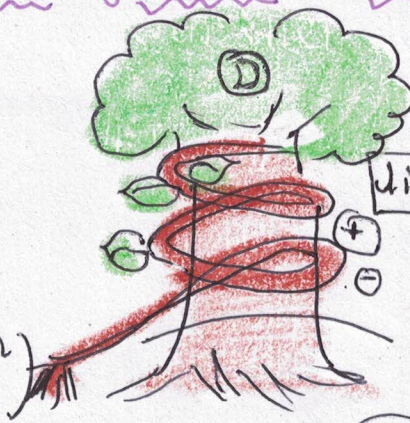
2. Commensalism

Example (i) Lianas / Woody climbers / woody vines :-

Tropical Rain forest

Dense forest

(Root System developed)



Leaves and chlorophyll developed

Eg: - Bauhinia Tinuspora

(ii) Epiphytes:-

Tropical Rain forest

Dense forest

Eg: - Orchid (Hanging Masses)

Mango



Leaves chlorophyll developed

Hanging Root

light
Moisture

velamen



Environmental Moisture Absorption

(iii) Epizones / Epizotic :-

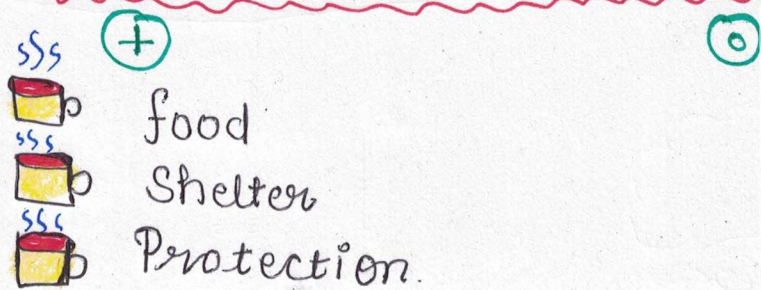
(a) Shucker fish and Shark
(Echeneis) ⊕ ⊙

Transportation food protection

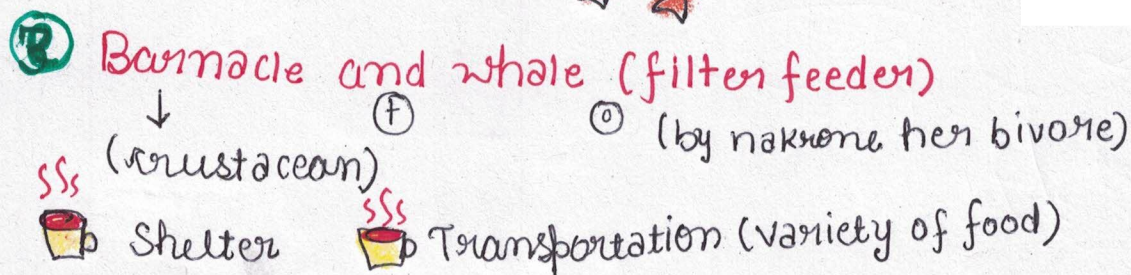
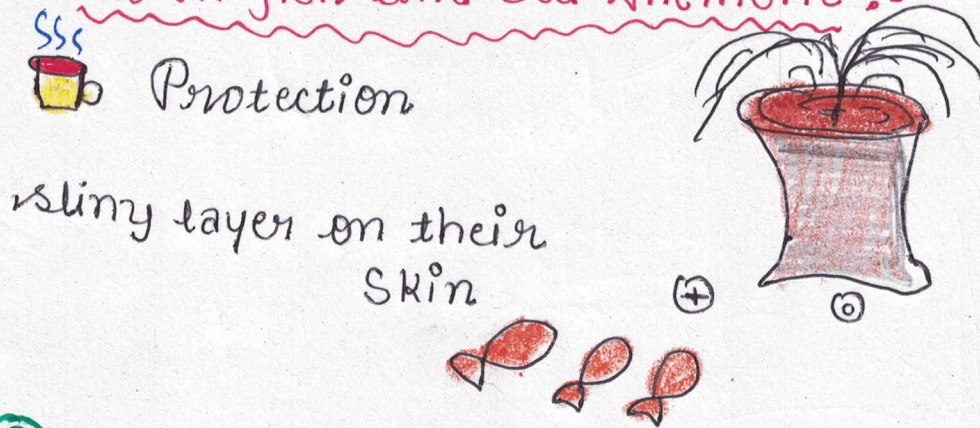
(b) Pilot fish and Shark
⊕ ⊙

Protection food

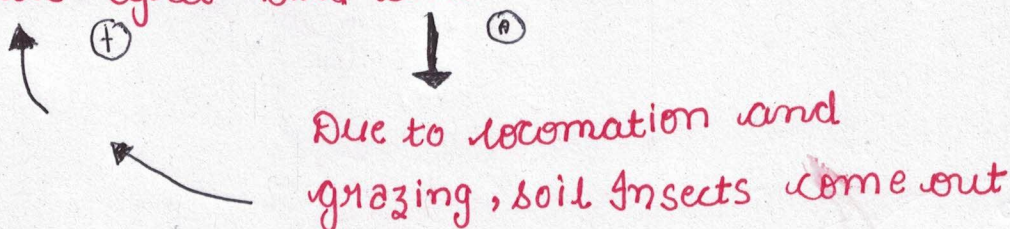
(c) E. coli and human Intestine:-



(d) clown fish and Sea Anemone :-

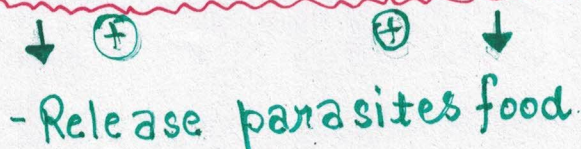


(f) Cattle Egret Bird and cattle :-

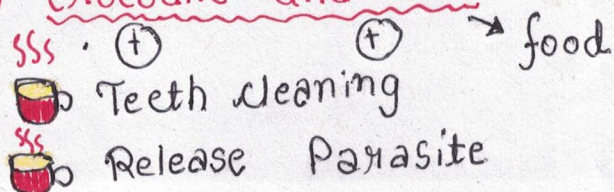


(3) Proto-cooperation / facultative / Non-obligatory Mutualism

(i) Rhinoceros and Tick Bird :-



(ii) Crocodile and Bird :-



(iii) Hermit crab and Sea Anemone :-

Protection



Variety of food

 Successful parasite

 true parasite

Parasites are indirectly helpful to Predators (but considerably)

Note

According to some old Scientists variety of food is not a countable benefit for sea anemone so, the relation is also considered as commensalism. If proto co-operation is not given in option then ans. will be commensalism. If both given then proto co-operation

Interspecific Interaction: Negative / Antagonism / Detrimental

(i). Exploitation :- (+), (-)

parasitism

(+), (-)

Predation

(+), (-)



+, -

(P)⁺

Small

→



 Growth

 Survival

large  Reproduction

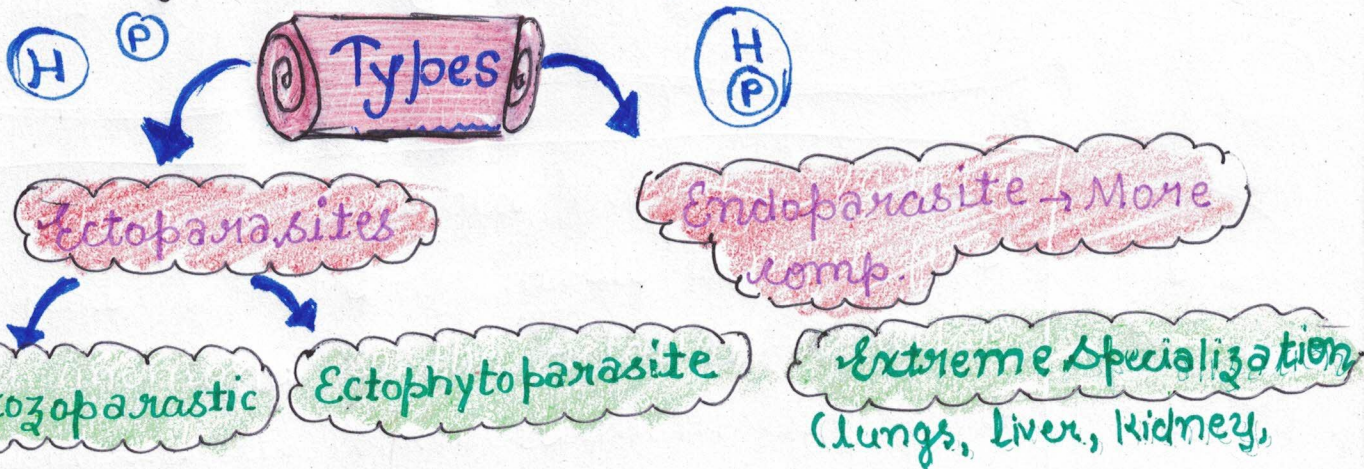
 Survival

 Parasites do not directly kill their host

 True parasite → complete use of host → **food**.
→ **Shelter**.

 Successful parasite → complete user of host →
But Minimum loss.

 Parasites are indirectly helpful to predators by making their host physically weak.



 Example:-

 Ticks on dog

Human lice

copepods on marine

 fishes.

 copepods on marine fishes.

 Leech on cattles

Amphids (Plant lice)



lac Insect



Red cotton bug

RBC

Example



Taenia



Ascaris



Entamoeba



Plasmodium.

Other Types

(i) Hyperparasite

eg:- organism

Bacteria
(Parasite)

Bacteriophage
(Hyperparasite)

(ii) Holg parasite :-

(a) Total stem parasite

Eg:- *Cuscuta* (Amarbel)



Leaves & chlorophyll degenerate

Houstonial Roots

Root System less developed

↓
Sucking Roots

↙
Food

↓
Mineral

↘
Water

