



# Jammu & Kashmir

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1. > Dachigam National Park
2. > Hemis National Park
3. > ~~Kishtwar~~ Kishtwar National Park
4. > City Forest (Salim Ali) National Park

1. > Dachigam National Park! -

- Dachigam stands "ten villages"
- 1981 - declared as national park.
- Total Area of the park is about  $141 \text{ km}^2$
- Park is famous for its unique and **diverse** **wildlife** and **birds species**.



• Park ~~is famous~~ contains - last viable 'Hangul' population in the world (Relates to the Red deer of Europe)

• Rich wildlife includes Leopard, common palm civet, Jackal, Red fox, musk deer, Black bear, brown bear, yellow-throated marten and himalayan weasel.



Hangul

(कश्मीरी stag)

(Red deer of Europe)

2. Hemis national park: -

• Park - among the largest contiguous protected region, second to Nanda devi biosphere reserve.

• Total area of the Park is about 4,400 km<sup>2</sup>



Established as a national Park  
in the year 1987.

- Park is protected home to the endangered mammals like Leopards, Asiatic lilbex, tibetan wolf, the eurasian brown bear and the red fox.

✓ The confluence of Indus and Zaskar rivers acts as the Park's boundary.

- Granda la - a high mountain pass - lies within the hemis national park.



### 3. > Kishtwar National Park:-

- Located in the Kishtwar district

• Total area of the Park is 425.00 km<sup>2</sup>



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Srinagar National Park in 1981.

The national park was basically made to protect the endangered species of snow leopard.



### SNOW LEOPARDS

- Park is famous for its unique and rich wildlife and bird species.

- Flora - Coniferous, alpine, meadows and scrub forests.

#### Rich Wildlife

- Rich wildlife - Brown bear, Himalayan black bear, musk deer, ibex, markhor, snow leopard, wild boar, Bharal, Indian muntjac, serow, and Rhesus macaque.

- Hangul (Kashmiri stag) that migrates in winter from Dachigam national park.



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- Also home to a variety of bird species like Himalayan monal, Kokilash, Himalayan snowcock, western tragopan, Himalayan jungle crow, bearded vulture, griffon vulture, Paradise flycatcher, golden oriole, white ~~cheeked~~ cheeked bulbul and Indian mynah.

#### 4. > City forest (Salim Ali) National Park

- Name - honour of Salim Ali, the famous Indian Ornithologist.

- Located in Srinagar, Jammu and Kashmir.

- The total area of ~~the~~ this national park is about 9 km<sup>2</sup>.

- Name Officially - year 1986

- The Park - converted into a golf course named **Royal Spring Golf Course**.

- Wild  
hangul  
black



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- wildlife species such as the hangul, musk deer, himalayan black bear, leopard, Himalayan serow.



# start (Diversity)

Living world

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Taxonomy, classification

Biodiversity

life → variation

Diversity of organisms present on earth.

5 - 30 million - estimated value  
(10 lakh)

1.7 million - Nomenclature  
(43% organism)

→ 1.2 million - animals

→ 1.005 million - Insects  
(maximum diversity)

→ 0.5 million - plants

⇒ 15,000 species are discovered each year



# (Microbiology)

## Classification

↓ (Based on similarities and dissimilarities)

Process to place organism into groups in sub-groups

## Taxonomy

- Rules for classification
- Principles and Procedure

→ characterization study of character

→ Identification - identify - based on character

→ Nomenclature - designating a name

→ classification - group / sub-groups

## Types of taxonomy:

### classical taxonomy

→ Based on morphology

### modern taxonomy

→ Anatomy / Biochemistry  
Physiology / molecular biology & genetics / cytology

→ [General branches]  
- [Phylogenetics]

ontogeny

phylogeny

(classical)

→ morphology

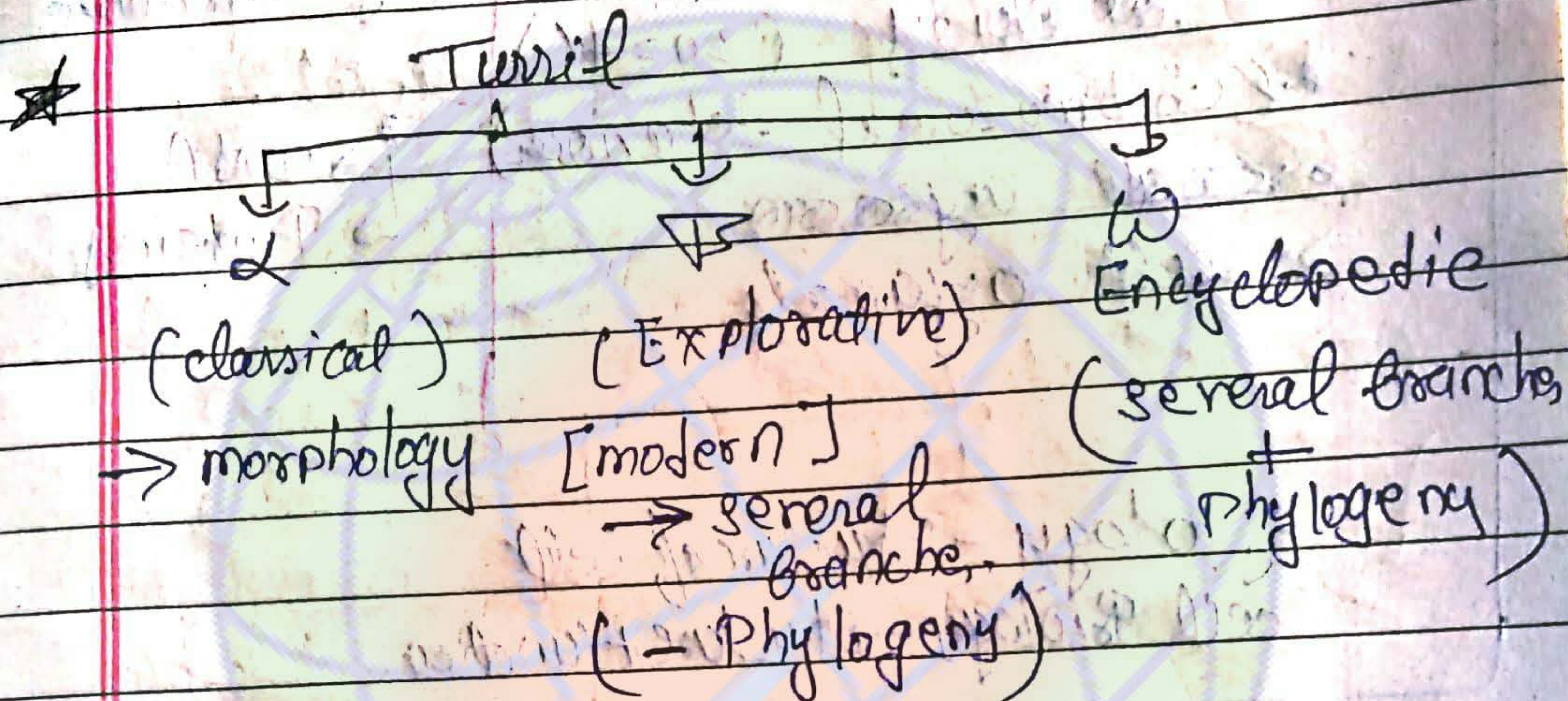
Taxonomy

100



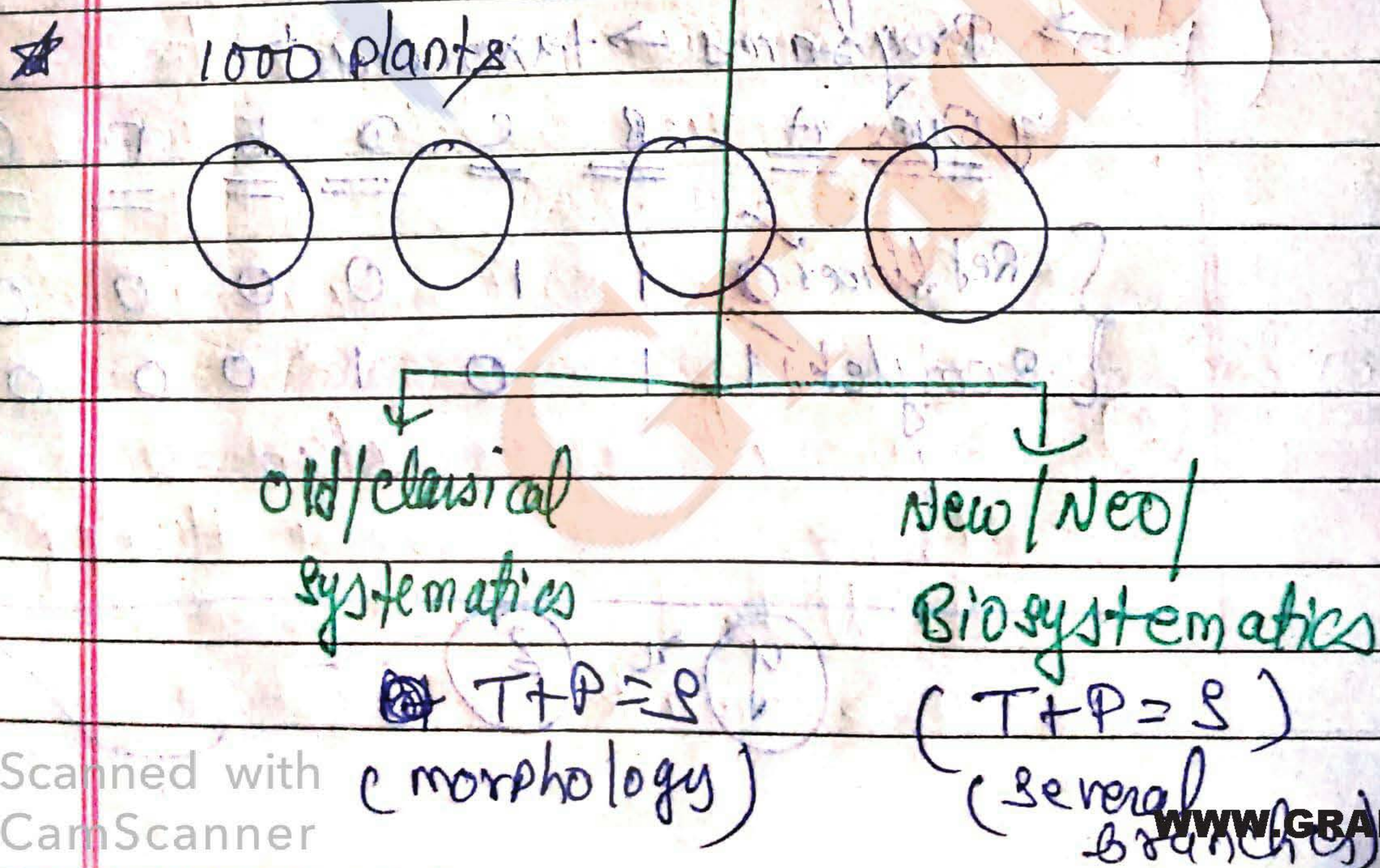
● ontogeny - life history

● Phylogeny - Evolutionary history



★ Systematics (Linnaeus)

Taxonomy + Phylogeny → Systematic





Structure

cyto

cyto taxonomy

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Chemical

Chemotaxonomy

✓ chromosome structure

✓ VLI - shape

✓ arm/chromatid length

✓ ploidy ( $2n=46$ )

• chromosomal behaviour

• cell organelles

• cell organelles

→ Chemical analysis

→ Bio-chemical

eg. chromosome

→ DNA

→ Proteins

cytology - structure of cell

cell Biology - structure + function

Numerical taxonomy

Number

→ Use of computer

→ Programs → taxonomist

eg. Quercus

A B C D E F G

Red flower	0	1	1	0	0	0	0
2 cotyledon	1	1	0	1	0	0	0

① ②

(2/4) (1/1)

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Nucleus

cyto taxonomy

→ Nucleus + Chromosome

31% DNA

36% histone

cotyledons

2 - Dicotyl/Gymno

1 - monocot

each character is given equal weightage and importance

→ taxometrics

→ phenetics

→ Numerical taxonomy

Numerical taxonomy is also known as



# # Nomenclature

(Assigning standard name)

vernacular

- local names
- more in number
- misleading
- confusing
- error

synthetic names

→ Based on Rules

- Poly nomial
- Trinomial
- Binomial

① Poly nomial :-

→ multiple words

eg. Caryophyllum saxicale folium  
graninees limbatae corymbatae

\* Based on morphology + habitat

② Trinomial nomenclature :-

→ It was proposed by Huxley & Strickland

→ Use ~~al~~ mark



Genus

species

subspecies/  
variety

→ It is also used when species have great diversity

eg. ~~Brassica~~ ~~Brassic~~ ~~olizae~~ ~~Bohytin~~  
genus sp  
variety

~~Brassica~~ ~~olizae~~ ~~Bohytin~~ - coliflower  
genus species - capitata - cabbage  
- to chulapha - knol - khol  
- italica - Broccoli  
Potamus

Totonym (ICBN X  
ICZN V) Zoology

Genus

species

sub. species

(G)

(sp)

(sub. sp)

Autonym (ICBN V  
ICZN V)

eg. totonym - Gorilla gorilla  
G sp

- Rattus Rattus

- ~~Zoris~~ Nay'a Nay'a



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eg. Acronym:

Corylus splendens splendens  
sp. sub. species

Acacia nilotica nilotica

most popular nomenclature

Binomial nomenclature:-

→ Proposed by Gaspare Barvin

(Pinex Book)

→ (earliest known first fungus classification)

→ Establish - calculus lineae

① philosophy botany  
(Rules / Principles for nomenclature)

② systema nature  
(4326 animals)

(1st Publication - 1737)  
10th ed - 1768

③ Genera plantarum  
(plants classification)

Ecology

Eco log

Oikos

place to live

organism

• Ecology = study of

• Heackel

• Reiter =

★ General terms

1) organism

2) species -

3) population



# Ecology

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Eco logy

Oikos

logos

place to live

to study

Organism  $\rightleftharpoons$  Environment

- Ecology = study of interactions or inter relationship b/w organisms & environment
- ~~H~~ Haeckel = first use ecology words
- Reiter = father of ecology

## General terminologies of ecology:-

1) **Organism** - Basic unit of ecology

2) **Species** - group of organisms which can inter breed & can produce fertile offspring.

3) **Population** - No. of organisms of same species in given area.



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4) **Community** - all species present in given area.

~~5) **Biosphere**~~

5) **Eco system** - Community + Physical environment.

6) **Biome** - large ecosystem  
eg. forest, aquatic, desert, tundra etc.

7) **Habitat** - Place where organism live and interact with environment.  
eg. A bush where an insect lives.

8) **Ecological Niche** - Functional status of any organism in a habitat.

Role of <sup>or</sup> species in ecosystem/habitat

9) **Ecological equivalence** -

species performing similar functions in different ecosystem.

eg. Arctic fox & African Jackal

plank

10) **plankton**

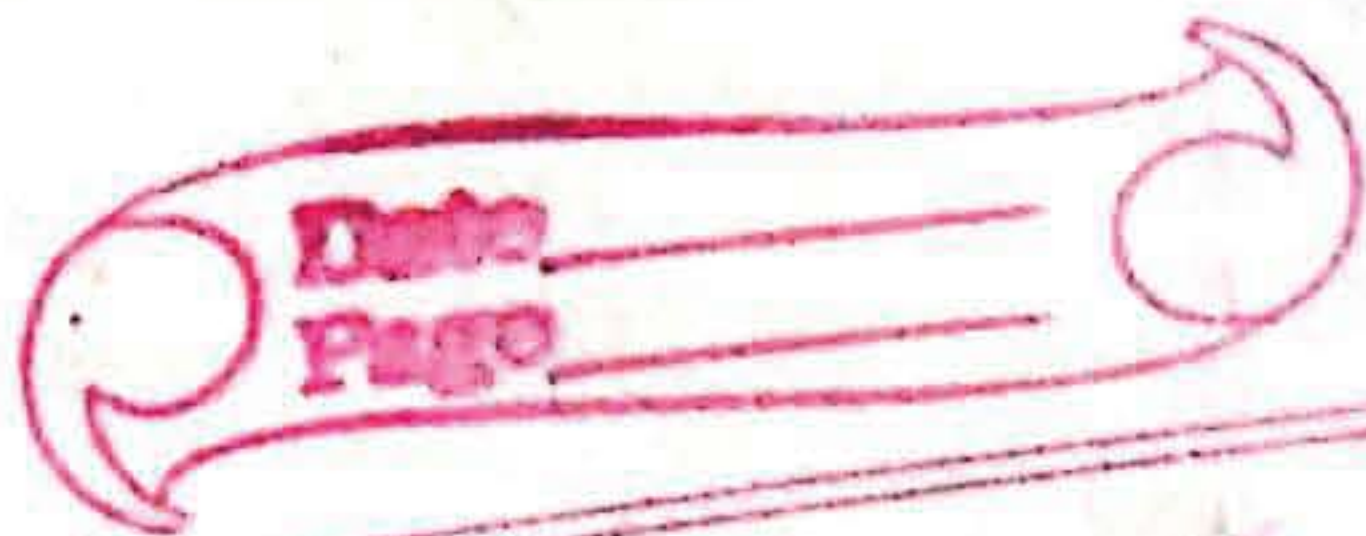
(i)  
(ii)

Nector

11) **Eco**

~~12) **Edge**~~





~~plankton~~ <sup>small</sup> ~~small organism~~

10.7 plankton - small free floating organisms

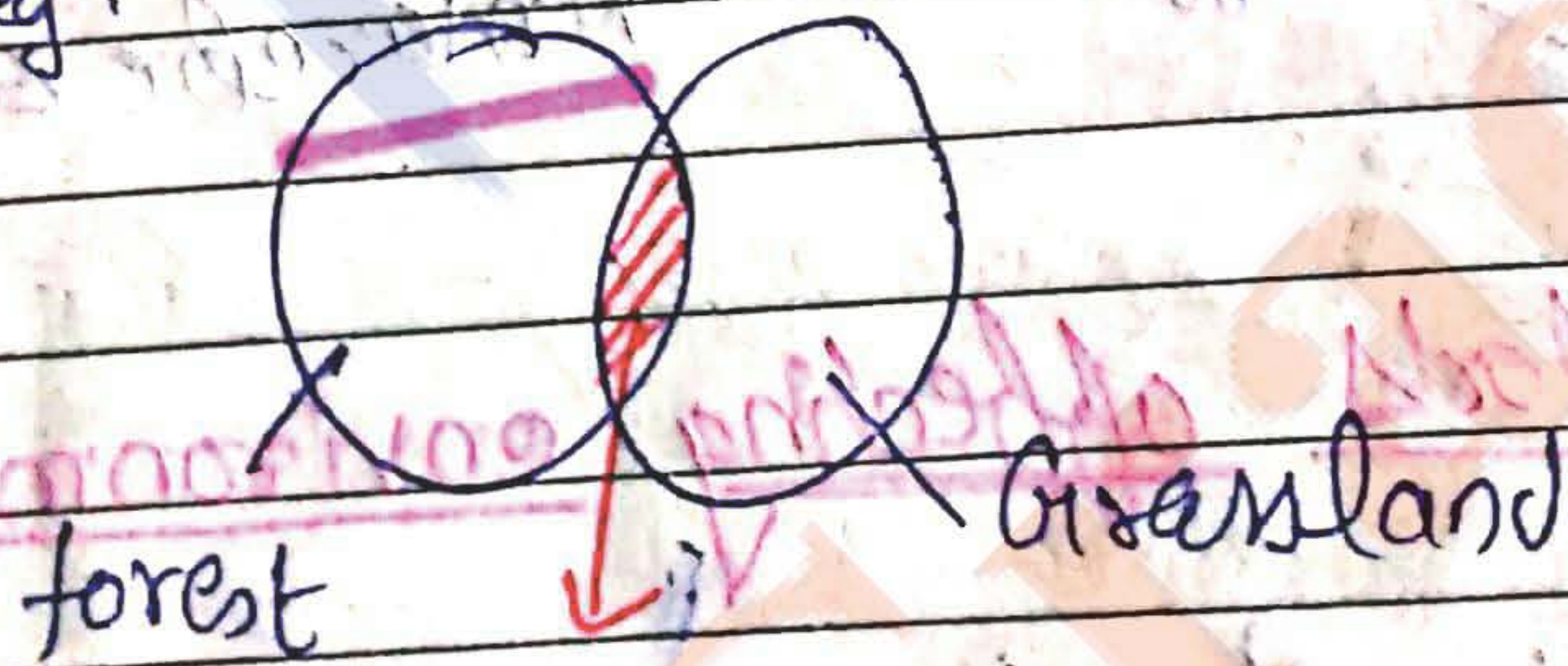
- (i) Phyto plankton - eg. Diatoms
- (ii) Zoo plankton - eg. Protozoa

Necton - organism which can swim

- (i) Phytonecton - eg. Dinoflagellates
- (ii) Zoonecton - eg. fishes

11) Ecotone - Transitional area b/w two communities

eg.



forest

Grassland

ecotone

Edge effect - Biodiversity is more in ecotone, this effect is called edge effect.

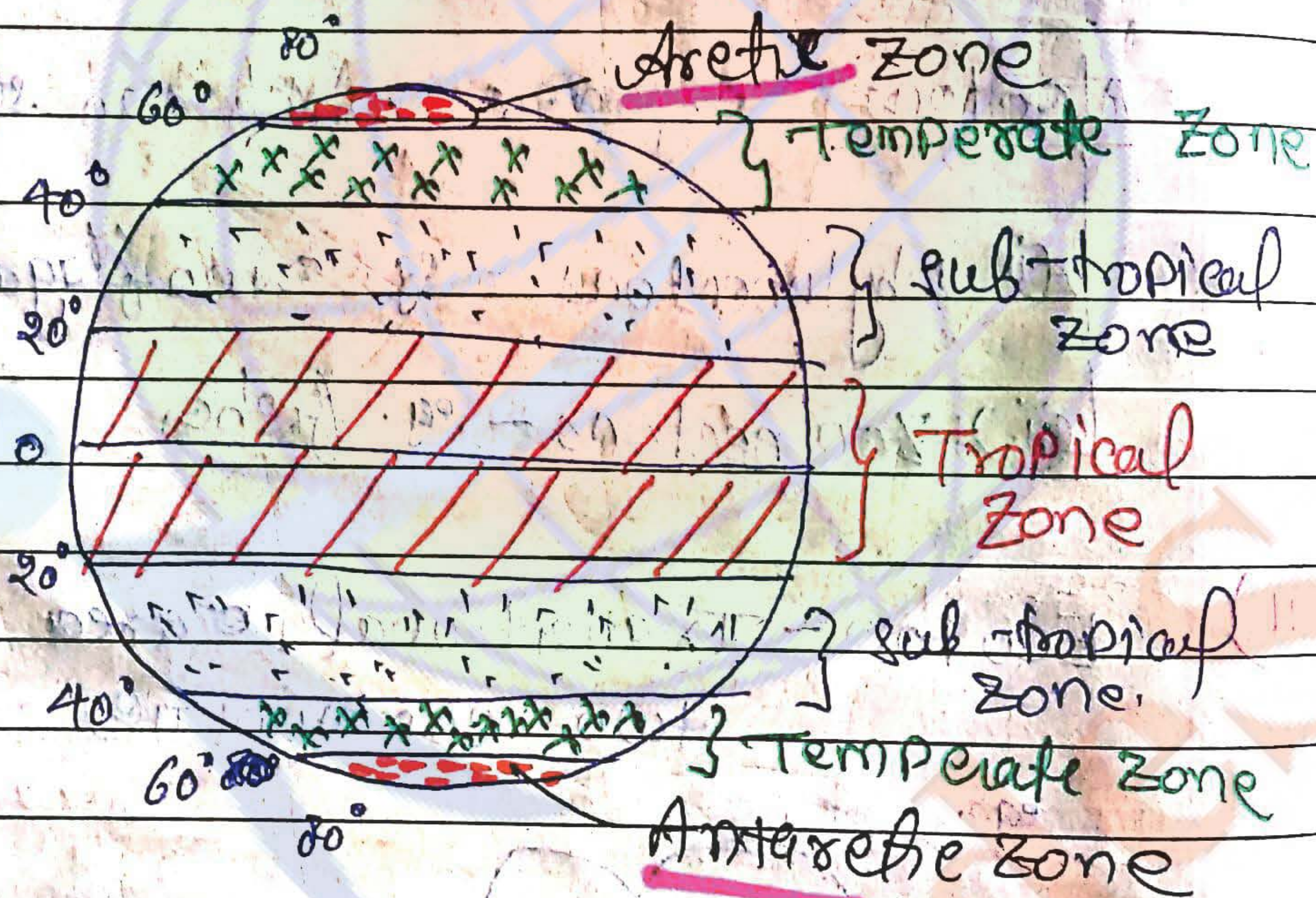


## 12. Weather & Climate -

Weather - short term environmental conditions.

climate - long term environmental conditions.

### climatic zone -



## ★ Factors affecting environment -

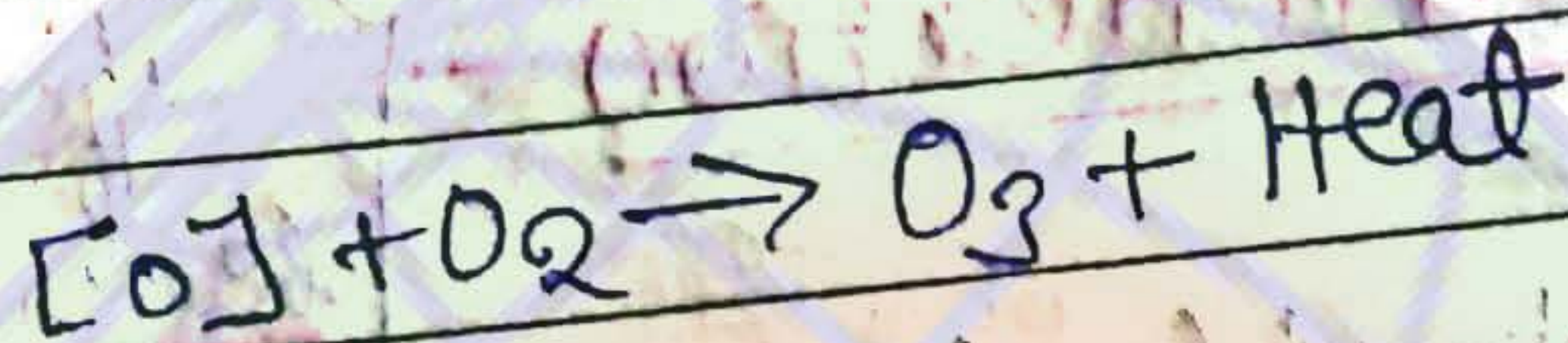
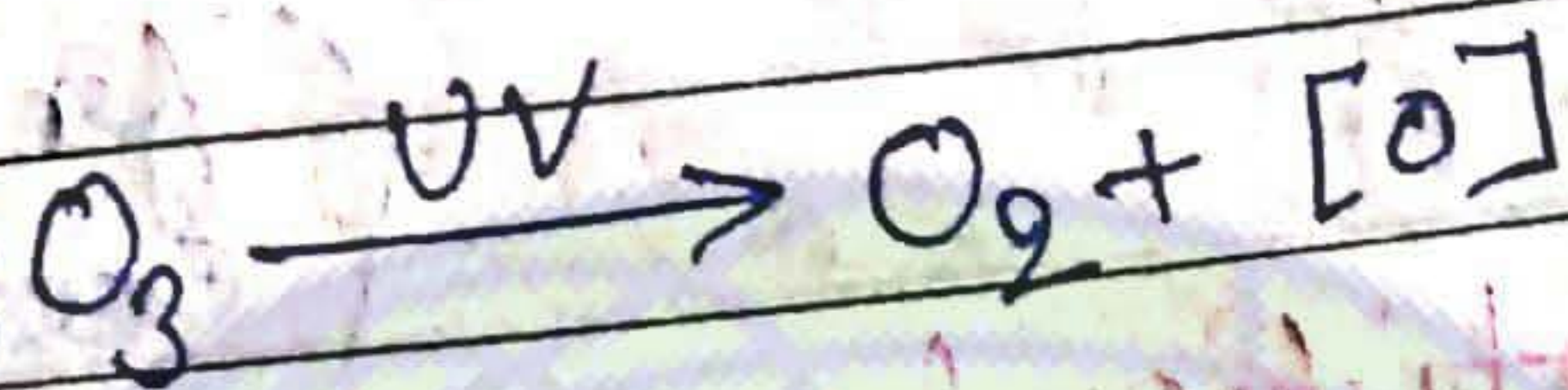
1. Atmosphere -

- (i) Troposphere - surface to 16 km height
  - 90% gases
  - Temperature decreases with increase in height



• lapse rate -  $6.5^{\circ}\text{C}$  decrease with increase of 1000 m

(ii) stratosphere - 16 to 50 km height  
- Ozone layer is found



(iii) Mesosphere - 50 to 80 km height  
- temp. decrease with increase in height

(iv) Ionosphere - above 80 km  
- temp. increase with increase in height

## 2. Light

→ Photosynthesis - plant light or process of food formation using light

→ Photokinesis - speed of locomotion of organism because of light

→ Phototropism - ~~kind of~~ movement of plants because of light

→ Photoperiodism - flowering of plants because of day and night period.



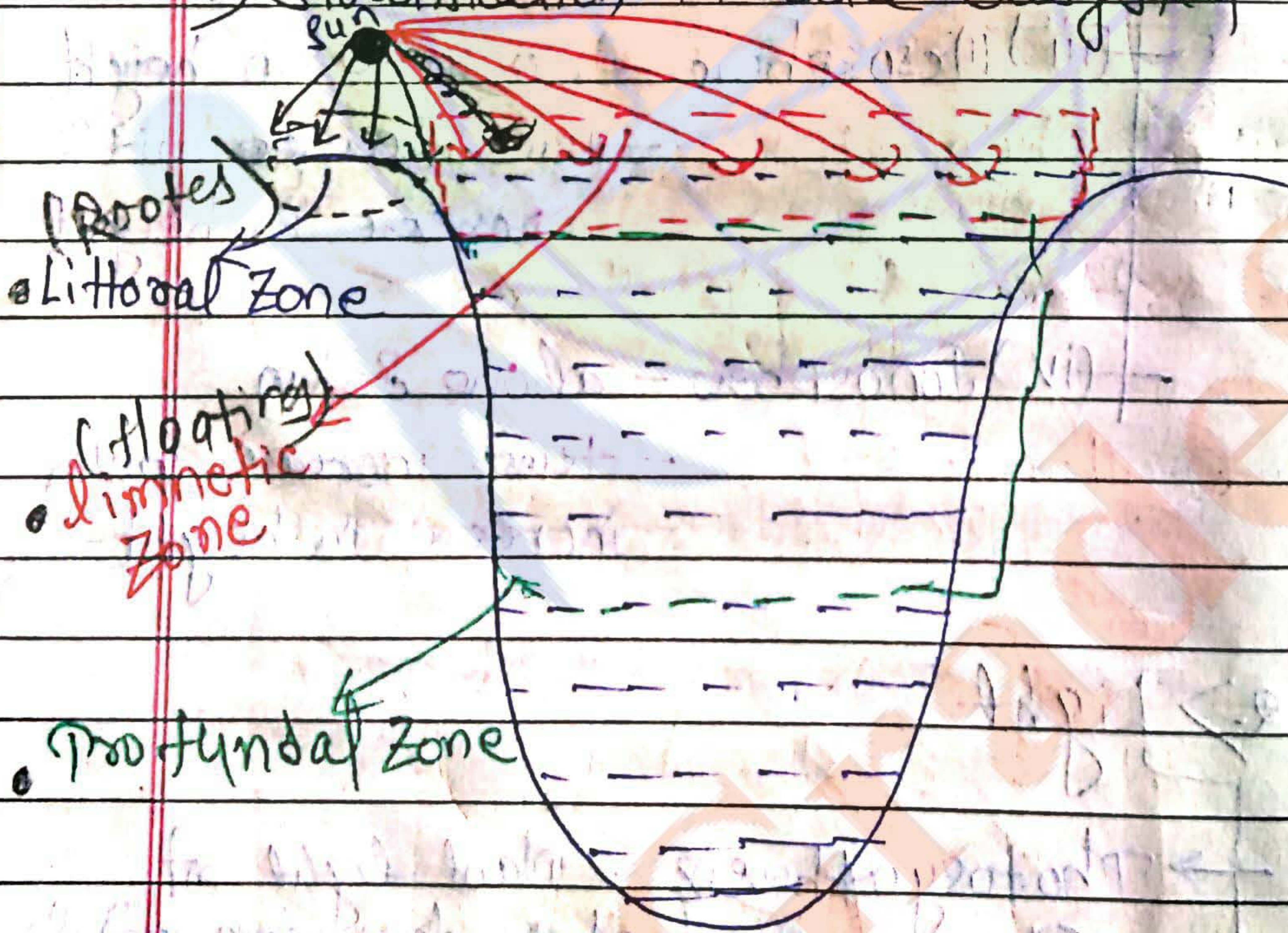
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Heliophytes: → need high intensity of light eg. bigger trees

Sciophytes - plants which are shade loving  
(Not need more light)

• stratification - formation of diff. diff. layers / levels of ecosystem organisms because diff. intensity of light present

1) stratification in lake ecosystem



(lake ecosystem)

2) stratification

• Photic Zone

• Aphotic Zone

(No light is sufficient light is not present)

• Abyssal

3) Temperature

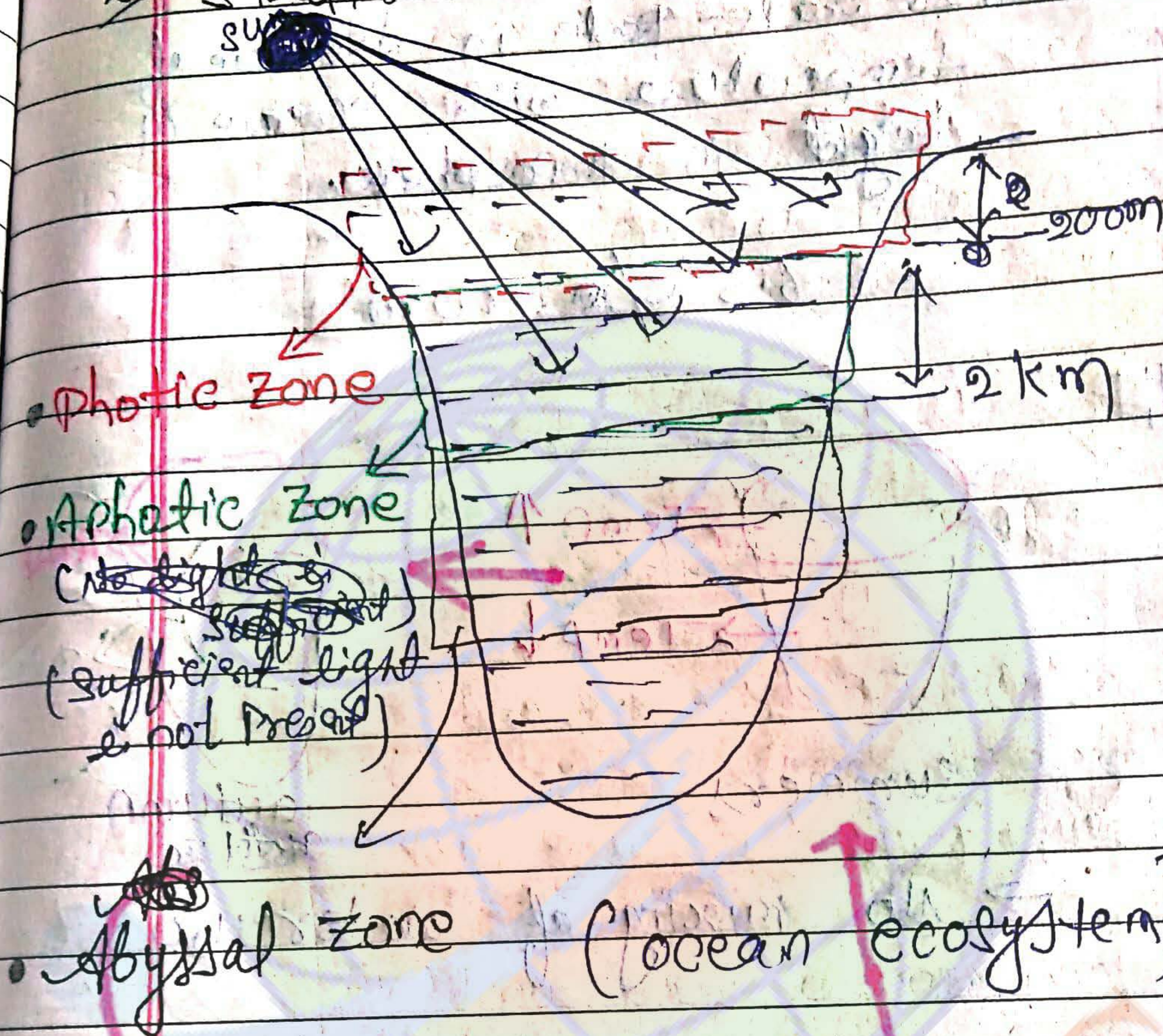
a) stratification

• Epilimnion

• Metolimnion

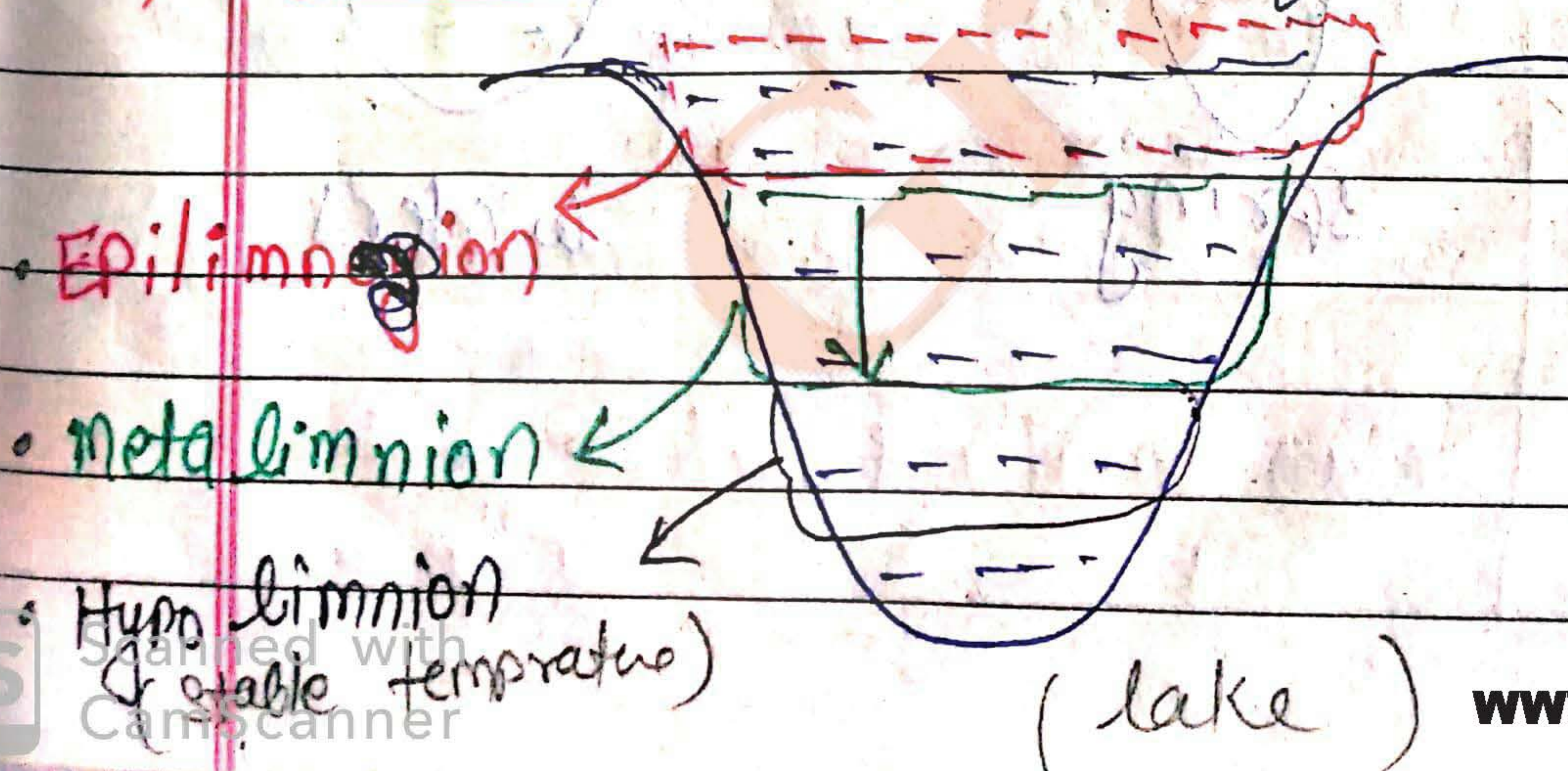


## 2) stratification in ocean ecosystem



## 3) Temperature:

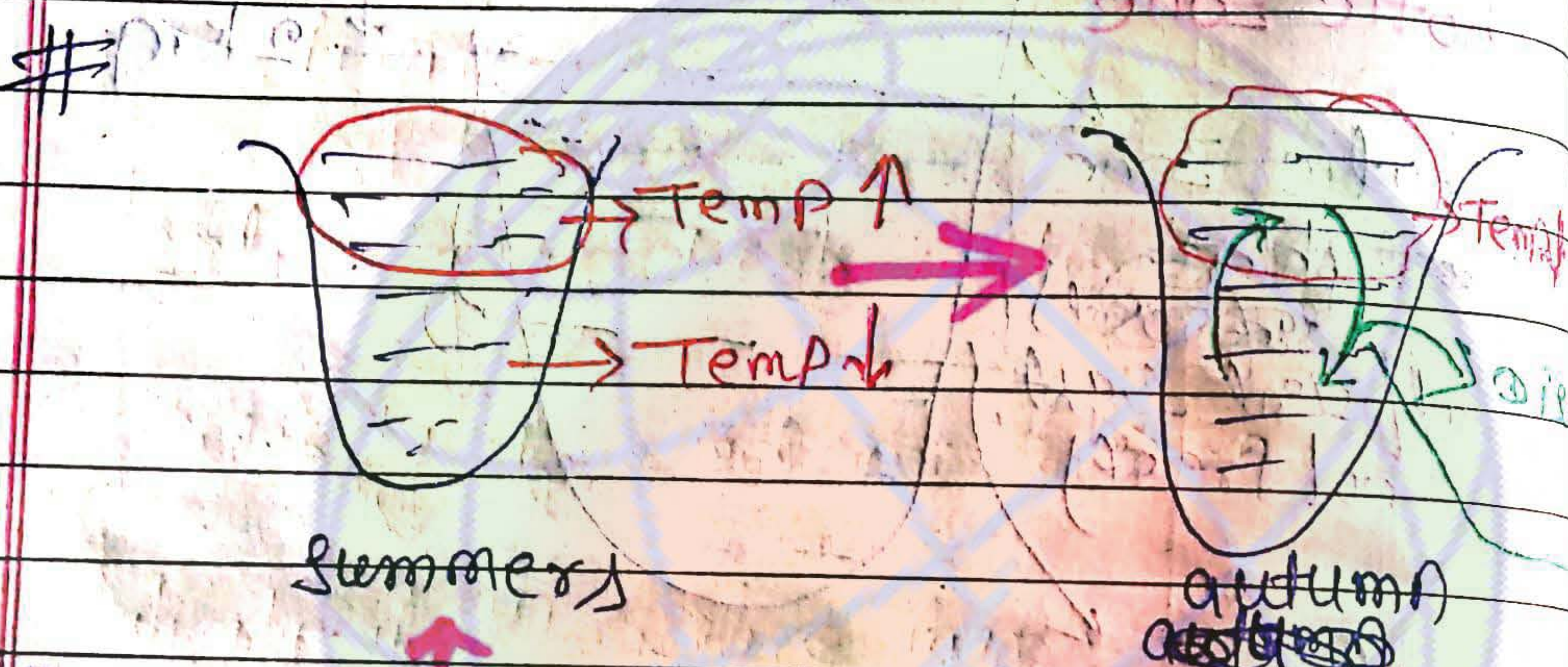
### a) stratification on basis of temp:-





⇒ Large rate- Rate in decrease of temperature with increase in height in troposphere

$6.5^{\circ}\text{C}/1000\text{m}$



→ No mixing of water ( $\text{H}_2\text{O}$ )



# Types of

i) megather area of the year eg. To

2> Mesother area

Distribution of oxygen  
→ Distribution of organic matters

3> eg.

4> He kisto in area of eg.

# Types of temperature

i) warm

(1) animal homeo

eg. A

eg. A



## # Types of vegetation on basis of temperature:-

1) megatherms - plants growing in area of high temperature throughout the year  
eg. Tropical rain forest

2) Mesotherms - Plants growing in area of medium range of temperature,  
eg. Deciduous forest

3) microtherms - Plants growing in area of low temperature.  
eg. coniferous forest

4) Heterotherms - Plants growing in area of extreme low temp.  
eg. Alpine forest

## # Types of animals on basis of temperature:-

i) warm blooded/ Eurythermal animals which can regulate homeostasis

eg. All mammals & Birds



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3. > cold blooded / ectothermal

Animals which can not regulate homeostasis.

eg. 90% of animal species and all plants

4. > Water

salinity of fresh water  $\rightarrow$  5% ppt

salinity of sea water  $\rightarrow$  30-35% ppt

salinity of hypersaline lagoon  $\rightarrow$  more than 100% ppt  
( $> 100\%$  ppt)

Soil water  $\rightarrow$

$\rightarrow$  (i) Total - Total amount of water available in soil.

$\rightarrow$  (ii) Gravitational water  $\rightarrow$  Available deep in soil in which plants can not absorb it.

$\rightarrow$  (iii) Capillary water  $\rightarrow$  water present in capillaries in

between  
(plants)

$\rightarrow$  (iv) Hygroscopic

water and particles

(Plants)

$\rightarrow$  (v) Chemically bound water with

$\rightarrow$  (vi) Free

5. > Soil

layers

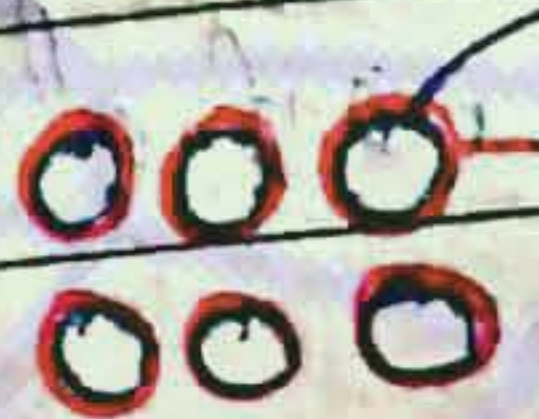
$\rightarrow$  (i) O  
(3A)



between soil particles,  
(plants can absorb this water)

→ (iv) Hygroscopic water -

soil particles  
hygroscopic water



water available around soil particles in form of thin films.

(Plants cannot absorb it)

→ (v) Chemically bound water -  
waters which are bound  
with chemicals

(Plants cannot absorb it)

→ (vi) Field capacity = Total - Gravitational water

5. Soil : → (minerals + decomposed organic matter)

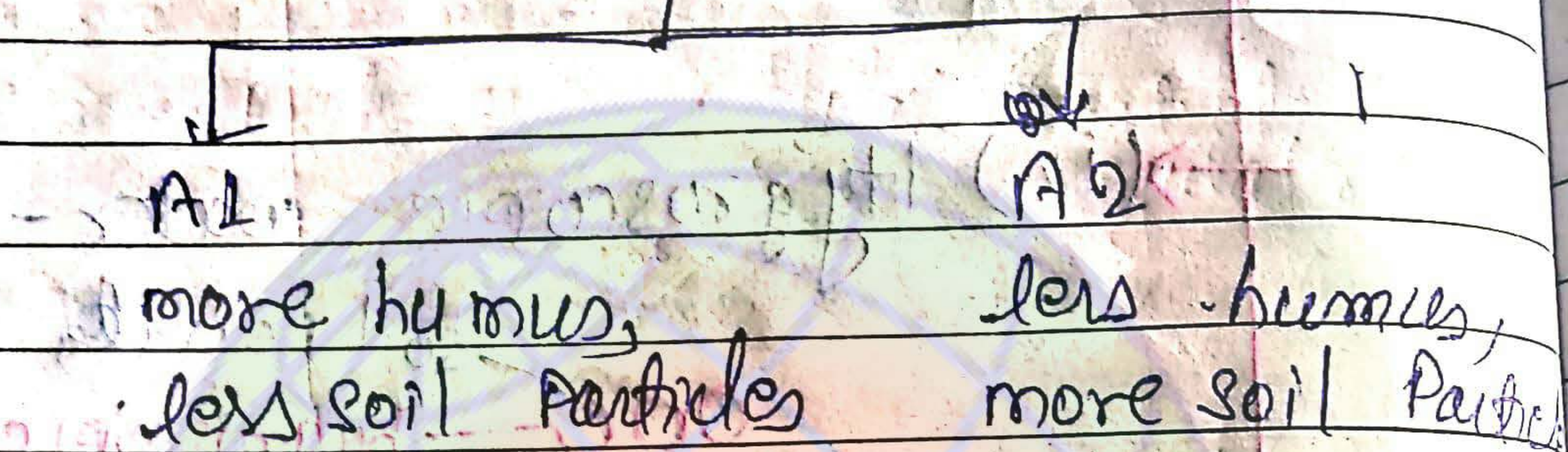
Layers of soil :-

→ (i) O layer / Zero layer → uppermost layer of soil.

(3A)



→ (ii) 'A' layer:-



Soil erosion:- Removal of 'A' layer is called soil erosion.

→ (iii) B layer - less humus, Bigger soil particles,

→ (iv) 'C' layer - Partially weathered  
rocks

→ (iv) R layer - Unweathered rocks



# Response of organisms to Abiotic factors! -

## Four types of Responses!

Regulators  
Conformers  
migrators  
suspensors

### → (i) Regulators :-

Those organisms which can maintain their internal environment.

or  
Animals which can regulate internal environment of body (Homeostasis)

eg. mammals, Birds

### → (ii) Conformers :-

organisms which can not regulate/maintain internal temperature.

eg. all plants & 90% of Animal species

### → (iii) migrators :-

Animals which migrate from one place to another to avoid stressful environment

eg. Siberian crane

### → (iv) Suspensors :-

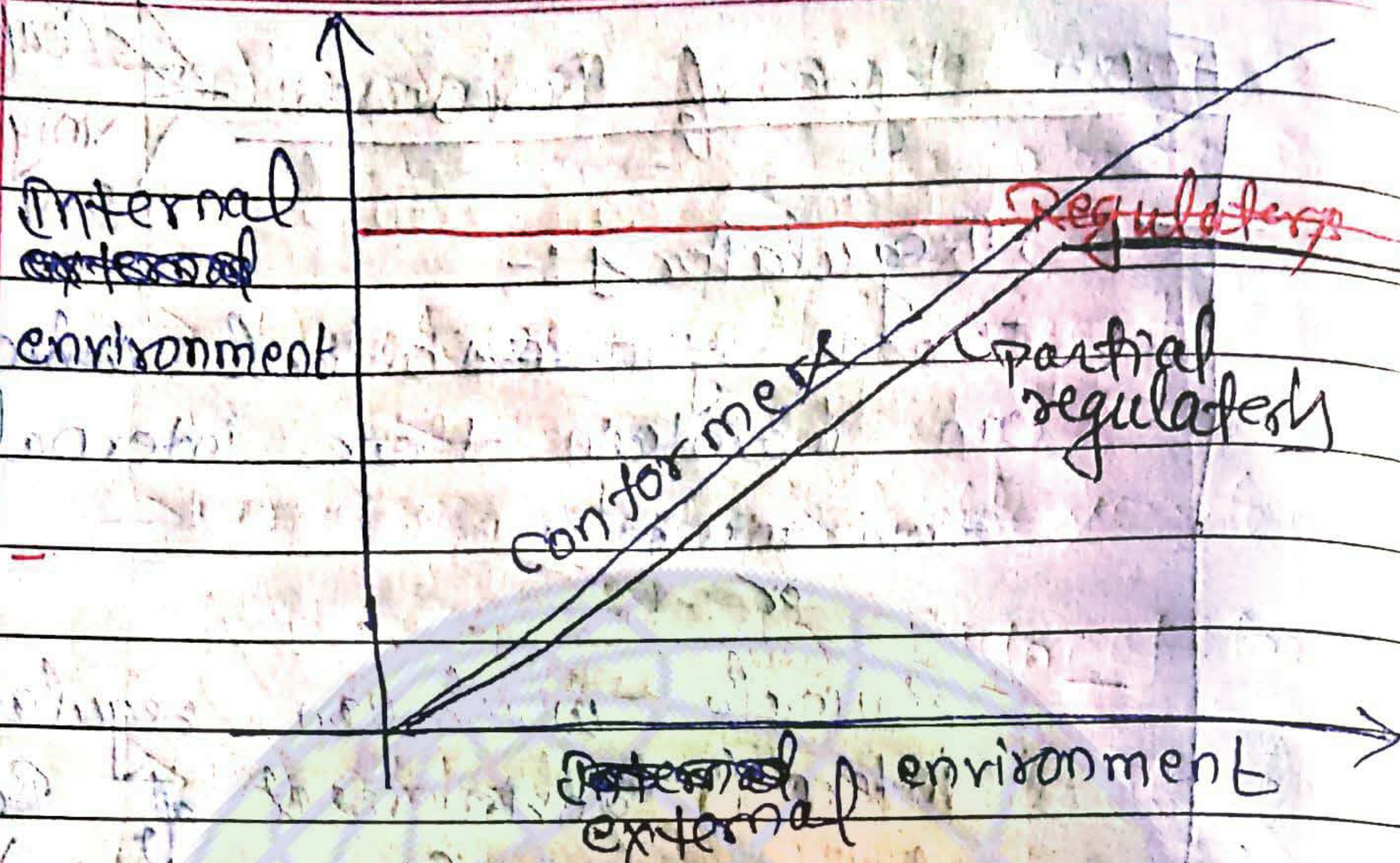
\* Hybernation - winter sleep

eg. polar Bear

\* Aestivation - summer sleep

eg. lung fish





## # Adaptation in Animals - (अनुकूलन)

i) Presence of thick layer of fat (Blubber) -  
→ cold climate animals

2) Physiological adaptation -  
→ high RBC counts on heights

3) Camouflage →  
Ability to get blend with  
surrounding  
eg. chameleon

4) Mimicry →  
when one species looks like  
(mimic) other species for protection.

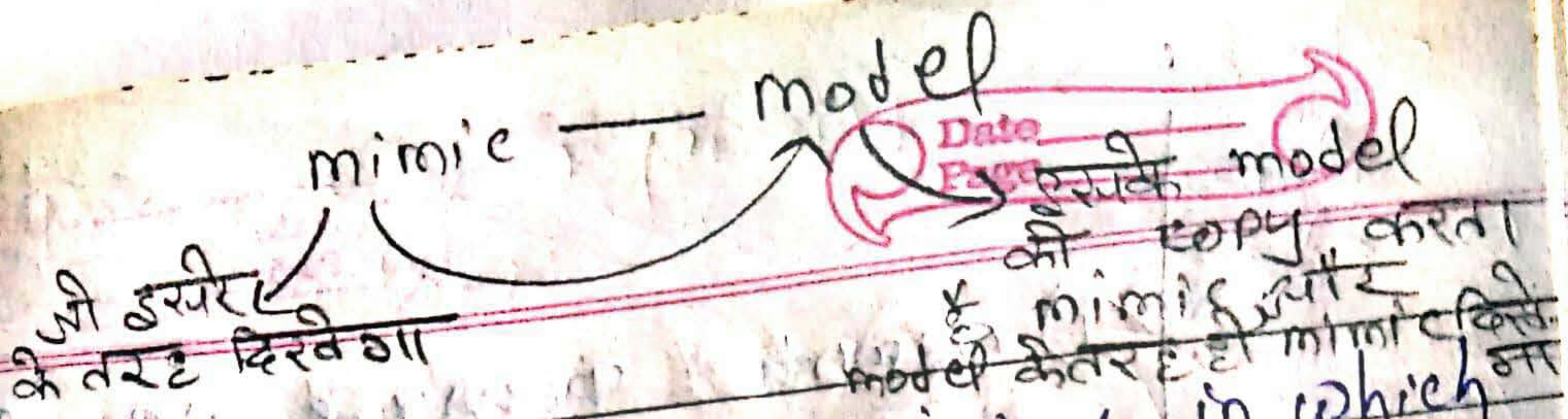
(Note: Mimicry की सहायता से प्रजाति का रक्षा)

## # Adaptation

1) ...

Hy...





i) Batesian mimicry → mimicy in which  
mimic does not have any  
protection measure like model.  
eg. viceroy Butterfly &  
monarch Butterfly

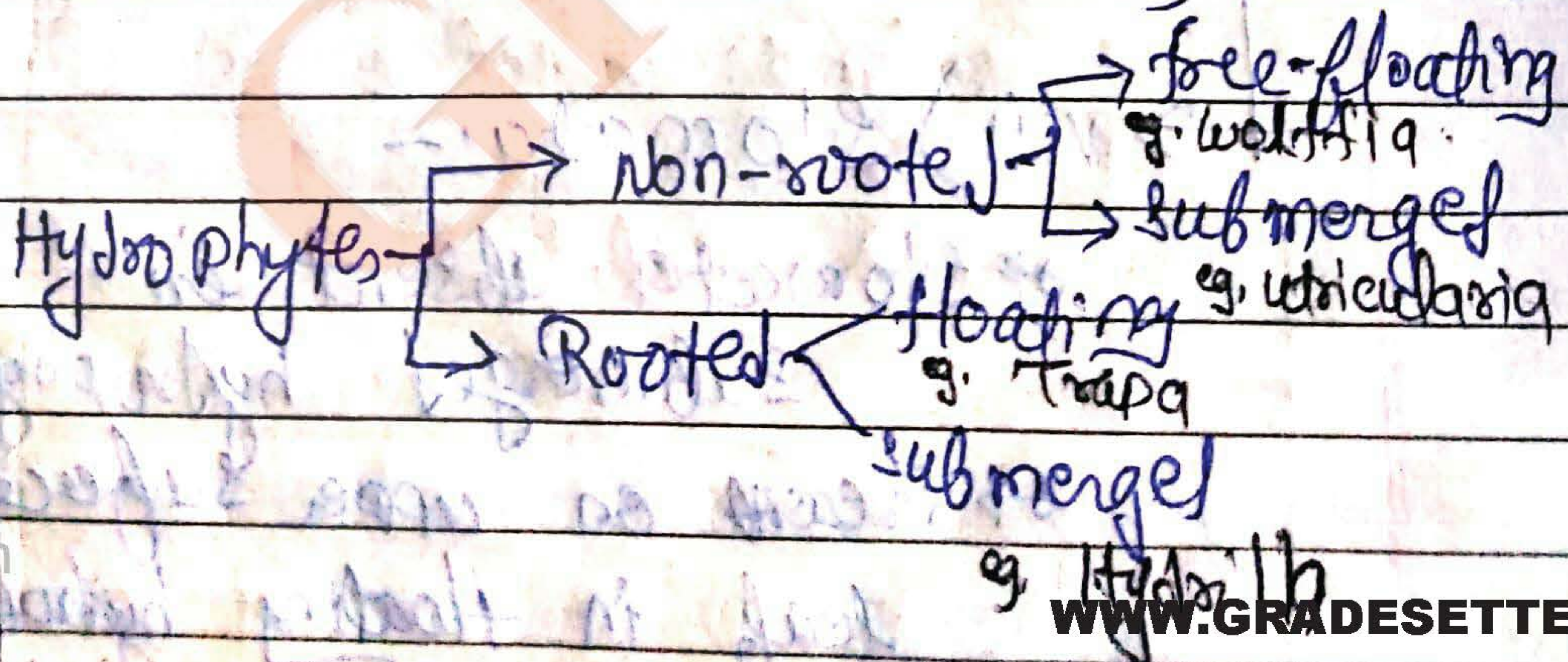
ii) Mullerian mimicry →  
mimicy in which both mimic  
and model have some protection  
model.  
eg. monarch butterfly & Queen  
butterfly

5) Hibernation & Aestivation

↓ winter sleep      ↓ summer sleep

## # Adaptation in Plants:

1) Adaptation in hydrophytes  
(जलीय पौधे)





- i) Osmotic pressure → very less  
(osmotic pressure)
- ii) Cuticle → Cuticle absent
- iii) Aerenchyma → well developed  
(It provides buoyant force)
- iv) Chlorenchyma → well developed  
(~~because~~ light is limiting factor)
- v) Sclerenchyma → less developed  
(less mechanical strength)
- vi) Roots! - less developed  
Isa - green photosynthetic roots present
- vii) Vascular Tissue:-  
xylem & Phloem is less developed
- viii) Stomata:-
  - Stomata absent in submerged hydrophytes.
  - Present on upper surface of leaf in floating hydrophytes (Pistomatic)

2. &gt; Ada

• Physical

Type

i) Dr

ii) S



## 2.) Adaption in Xerophytes (सूखे की स्थिति)

• Physical dryness → water available but not in a form that can be used

↳ Unavailability of water

eg. Desert

• Physiological dryness → water available but not in absorbable form.

eg. extreme cold environment,

eg. mountain slopes

### Types of xerophytes & adaptation:-

i) Drought escapers:- These plants are not true xerophytes.  
eg. Argemone mexicana

ii) Succulent xerophytes:-  
(flexi)  
(सूखे के प्रति लचीले)

adaptation:-

a) Root - Deep roots absent

b) Stomata - ~~scoto~~ scotoactive stomata



low osmotic Press  $\xrightarrow{\text{to}}$  high osmotic Press

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- c) leaf - Reduced, spine like
- d) stem - photosynthetic

iii) Non-succulent xerophytes -  
 $\rightarrow$  True xerophytes  
 $\rightarrow$  Drought endurers

Adaptation:

a) Roots - very well developed  
 - high root-shoot ratio

b) stomata (hypostomatic)

c) leaf - Ribbon like / spine like

Note: Halophytes

$\rightarrow$  Osmotic Pressure highest

$\rightarrow$  Pneumatophores Present



# Population & Community

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Population - count of organisms of one species present in given area.

## characteristics of Population -

→ (i) Birth Rate & Death rate -

$$100 \xrightarrow{20\%} 120$$

$$\frac{20}{100} = 20\% \text{ Birth rate}$$

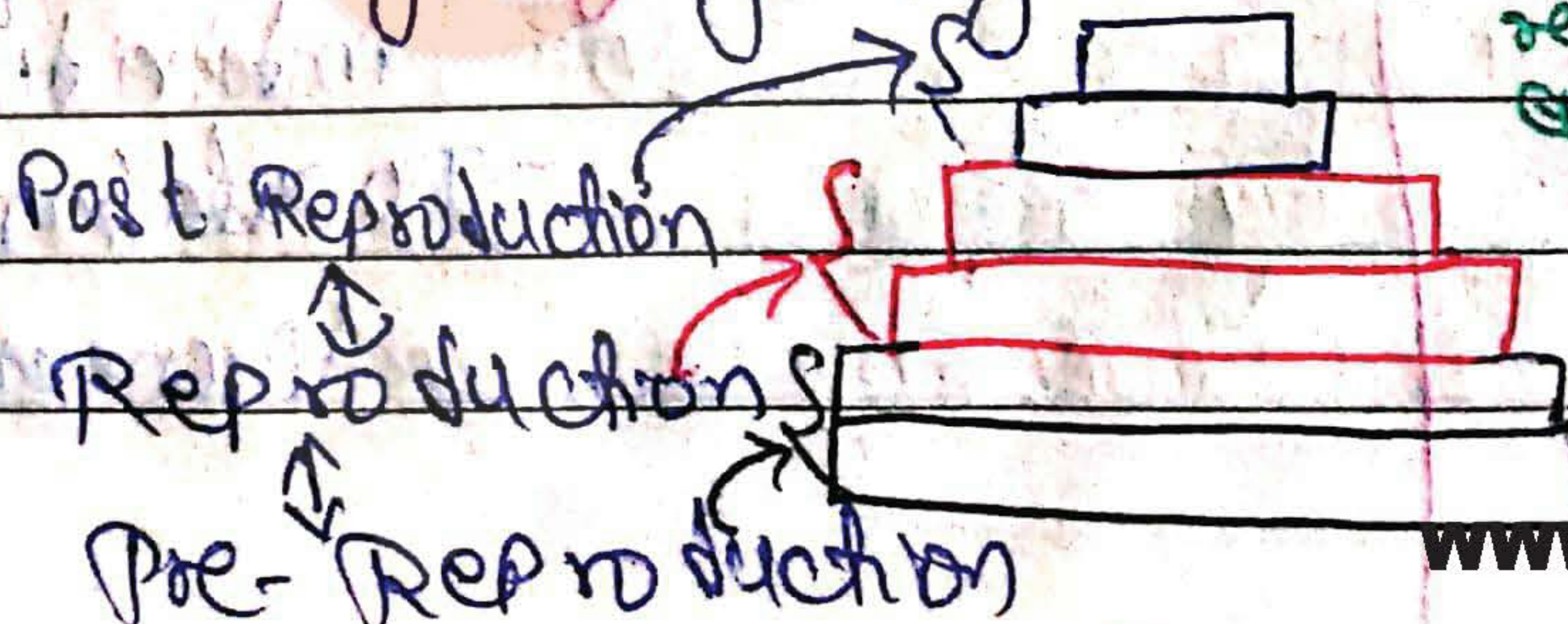
$$\text{Birth rate} = \frac{\text{No. of live Birth}}{\text{Population}}$$

$$\text{Death rate} = \frac{\text{No. of death}}{\text{Population}}$$

→ (ii) Sex ratio -

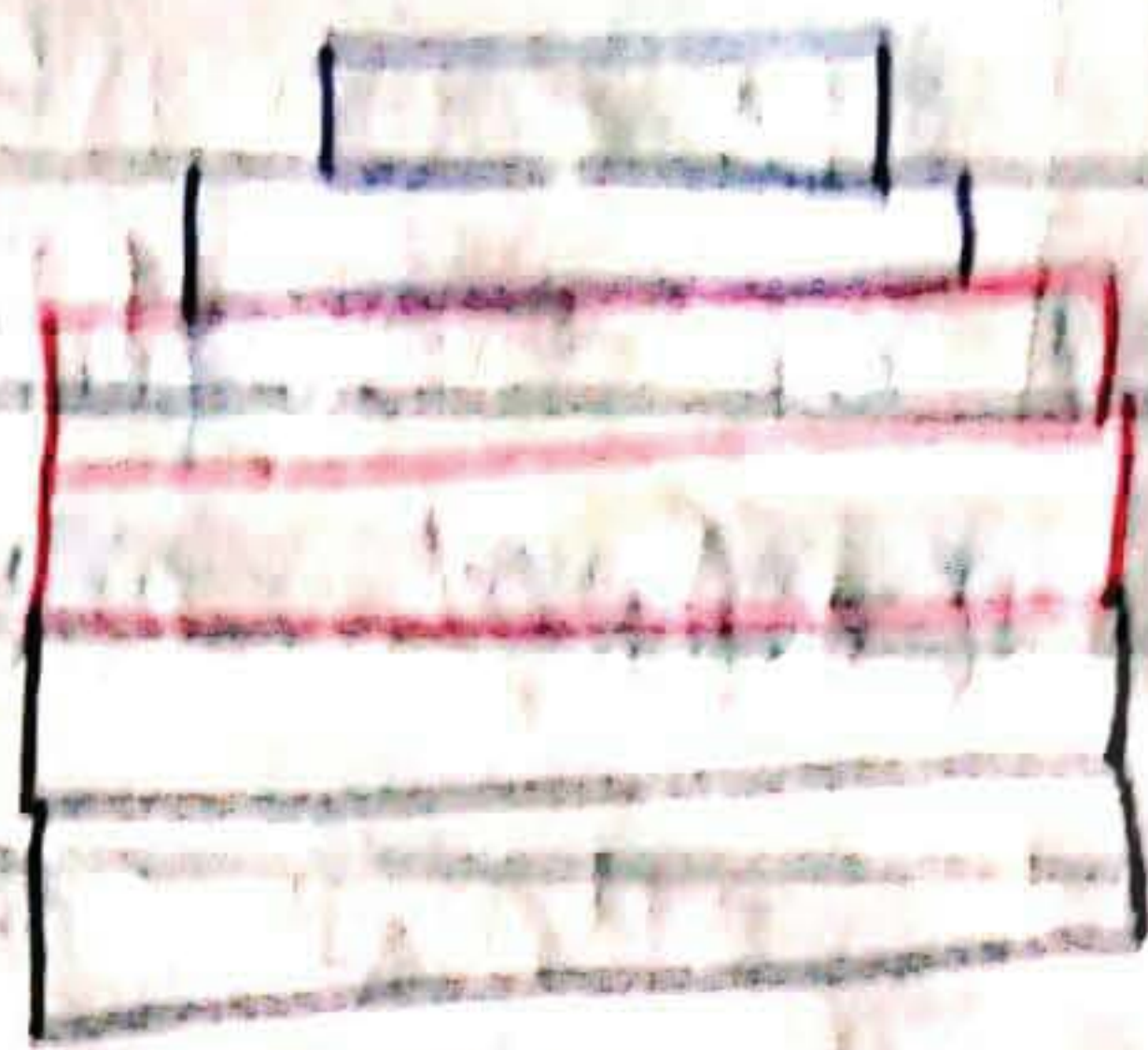
$$\text{sex ratio} = \frac{\text{No. of females}}{\text{No. of males}}$$

→ (iii) Age Pyramids -



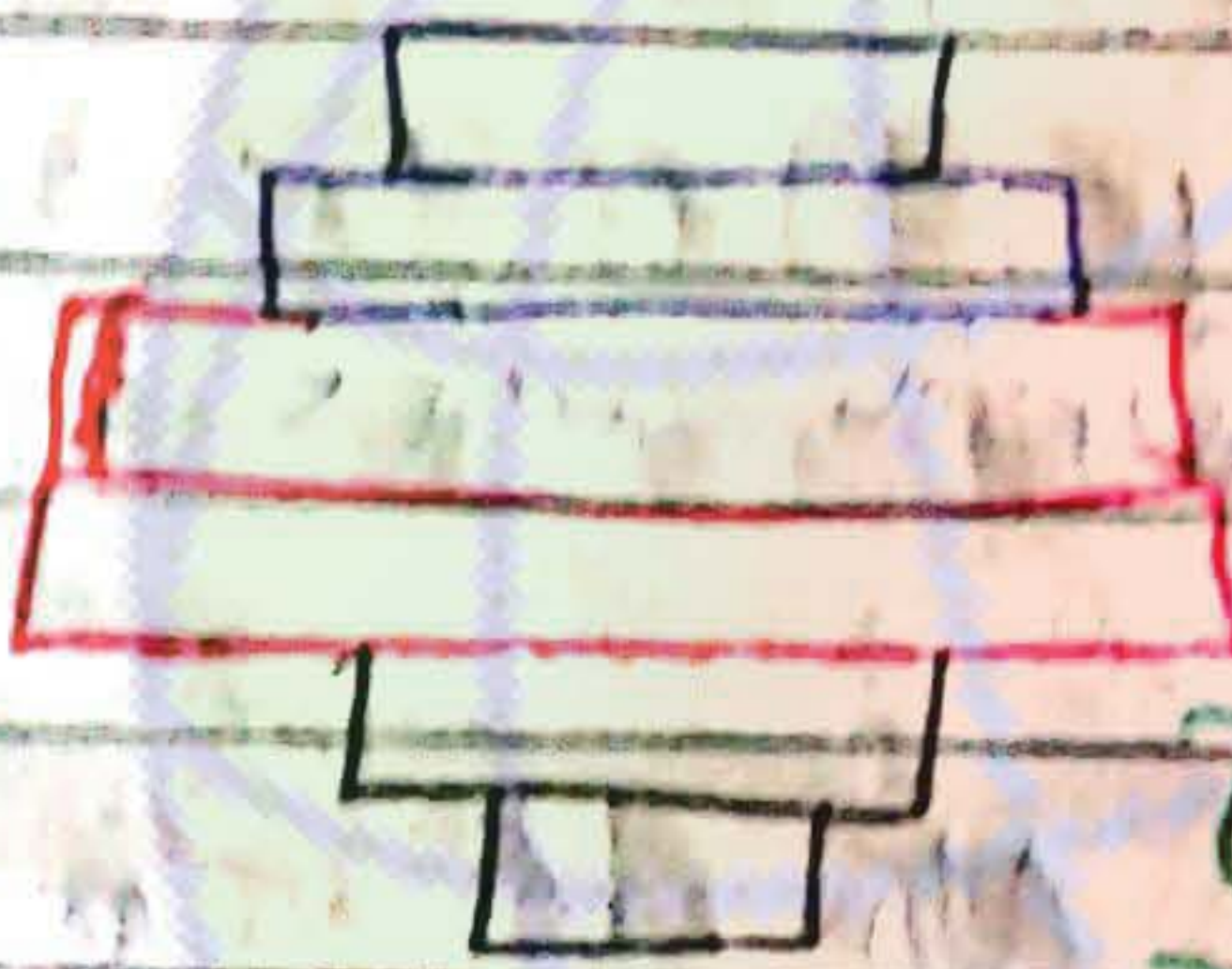
जब जनसंख्या में प्रजनन करने वाले की संख्या बढ़ती है तो जनसंख्या बढ़ती है।  
expanding population





reproduction की रफ  
सम है

(Stable Population)



reproduction क्षति  
वाले समय में वह  
जा रहा है।

(Declining)

→ iv) Population density -  
count of organisms of  
same species in given area  
in given time.

• Factor's affecting Population Density

→ (i) Natality :- Birth of new  
individual.  
- Population density  
increases (↑)



→ (ii) **mortality** = death of few individuals

- Population density will decrease. (↓)

→ (iii) **Emigration** = movement of few individuals from inside to outside of population/Habitat

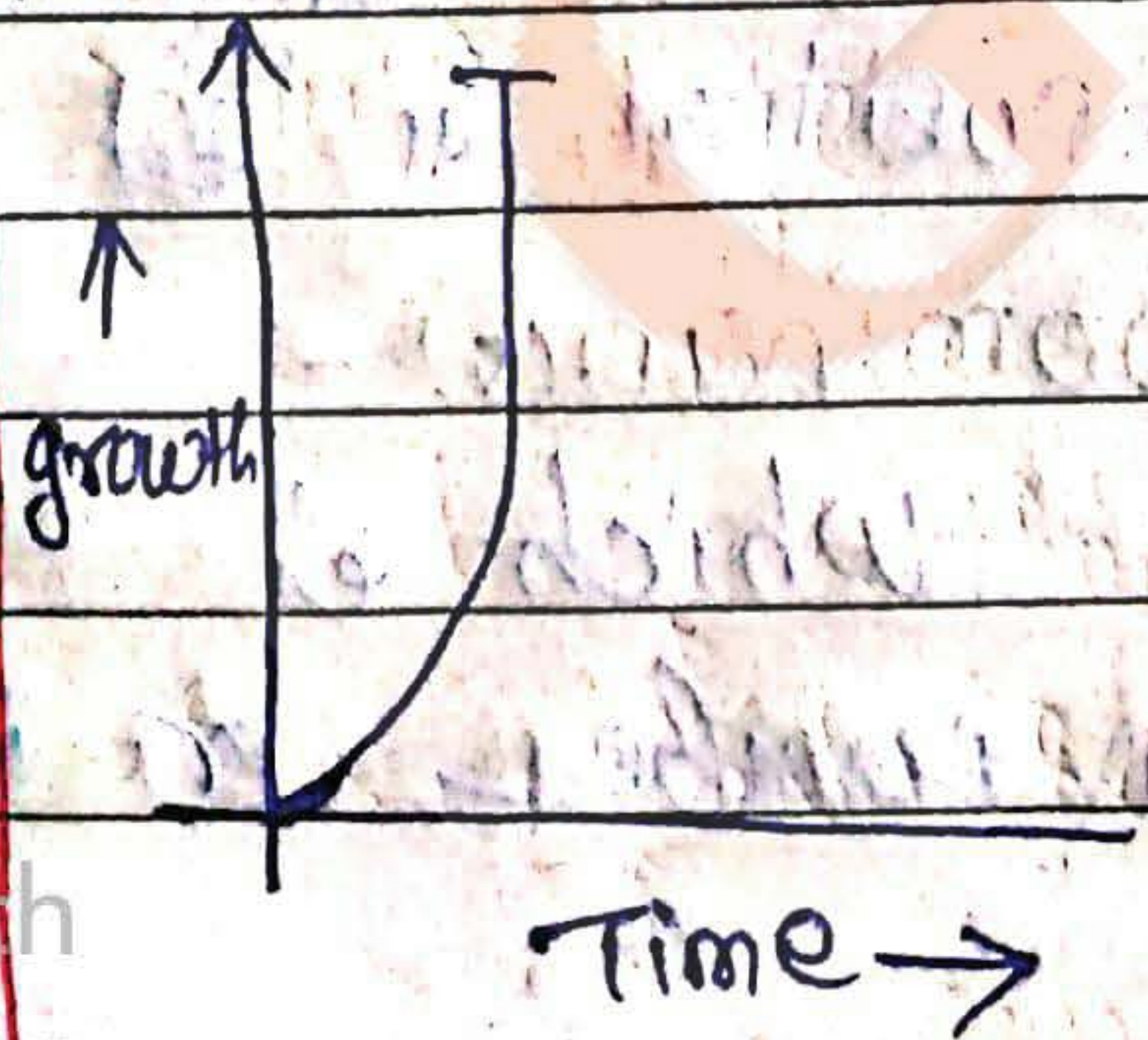
- Population density will decrease. (↓)

→ (iv) **Immigration** = movement of few individuals from outside to inside the population/Habitat

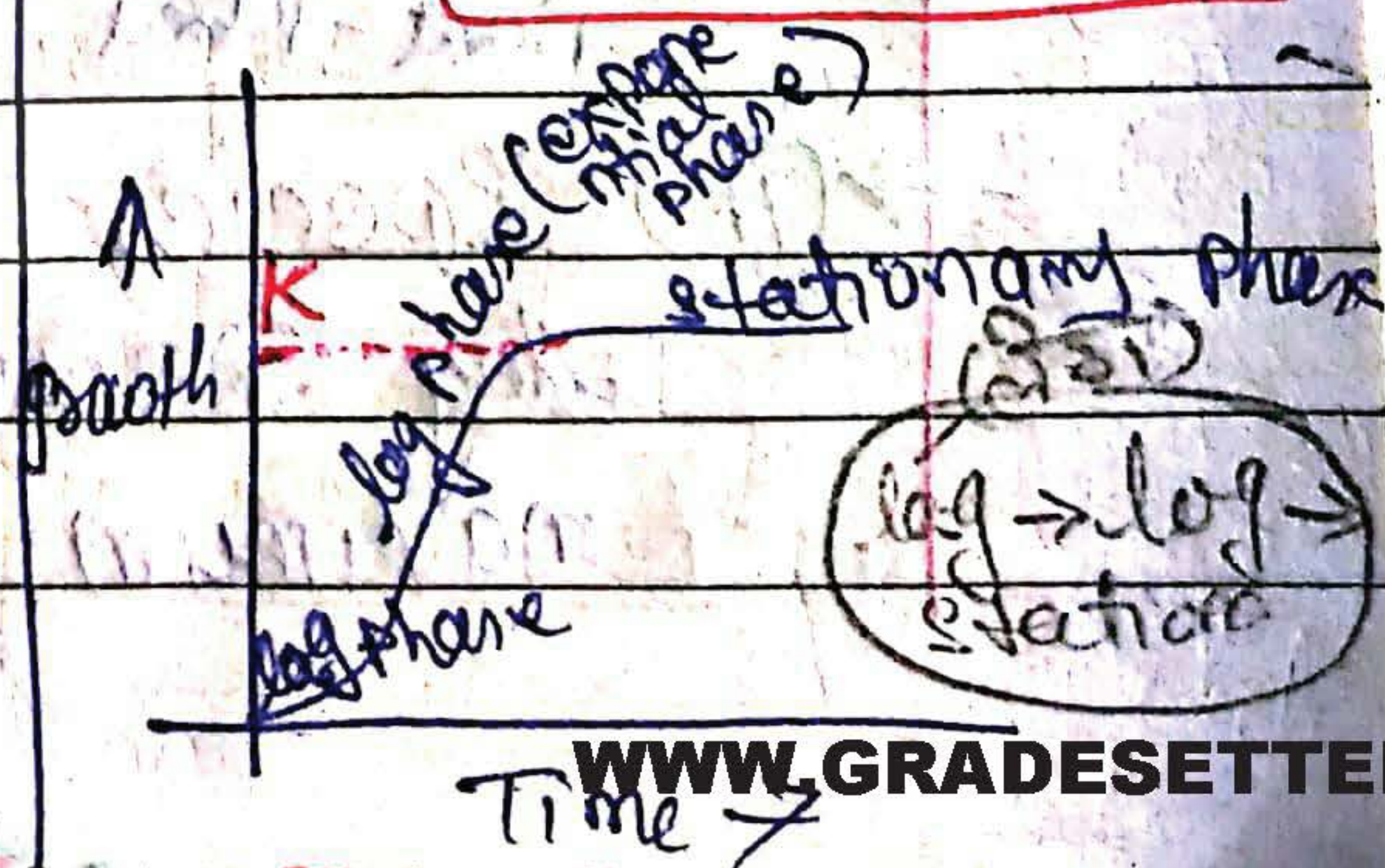
- Population density will increase (↑)

→ (v) **Growth curve of Population:-**

A. > J-shaped



B. > ~~S-shaped~~ S-shaped / sigmoid growth curve





$$\frac{dN}{dt} = rN$$

K = Carrying Capacity

N = Population density

r = Biotic Potential

most favourable

Condition in maximum

कितना reproduce  
करेगा

$$\frac{dN}{dt} = rN \left( \frac{K-N}{K} \right)$$



## Community:-

Presence of ~~different~~ different population in given habitat and sum of population is called community.

Presence of different Population & given Habitat & ~~sum~~ sum of population is called community.

### Characteristics of Community:-

→ (i) Species composition! - कौन कौन species  
है - किस composition में है।

→ (ii) Species Dominance! -  
any species which is  
maximum in number or intensity



of biomass is there in any community  
eg. Pine forest

→ (iii) Key ~~ston~~ species:-  
Species which is not dominant species but presence of that species is must for survival of ~~as~~ that ecosystem.  
eg. Fig tree in rain forests.

→ (iv) Link species:-  
Species which connect Biotic and Abiotic factors for other species.  
eg. Rizo bium.  
eg. Pollinating Insects.



# ★ Succession :-

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Continuous replacement of communities in any given habitat over a period of time.

Type of succession:-

i) Primary succession - Succession in such area where organic ~~matters~~ matters are not present previously.  
eg. volcanic area, nule rocks, ~~extremely~~ desert.

ii) Secondary Succession - succession in such area where vegetation was present previously, but was destroyed because of natural or artificial factor's.  
eg. forest fire

⊗ Pioneer Community - community which grows first during primary succession.

→ Aquatic habitat - Phyto planktons

→ land habitat - crustose lichen or blue green algae

⊗ climax community - most stable community during succession

eg. Fo

⊗ Seral communi-  
pioneer

# Succession  
Succession  
Rock se

# Steps

-(i) Nuda

-(ii) Mi

-(iii) Ec

-(iv) A

-(v) Co

-(vi) C



eg. Forest Community

Serial community:-  
communities develop in between  
pioneer and climax community

# Succession in Aquatic habitat - Hydrosere  
Succession in desert habitat - Xerosere  
Rock ecosystem Succession - Lithosere

# Steps in Succession:-

(i) Nudation - Formation of bare/ Bare  
area.

(ii) Migration - Arrival of living  
matter in form of  
seeds or spore.

(iii) Ecesis - development of living  
matter.

(iv) Aggregation - Increase in count and  
in Biomass.

(v) Competition & Coaction:-

Interaction with biotic and abiotic  
components

(vi) Reaction - change in environment  
because of community interaction.



+ (vii) stabilization - Formation of climax community

## # Succession in Aquatic Habitat! - (Hydrosere/Hydrosuch)

1) Plankton stage -

Phytoplankton & Zoo plankton will grow first

2) Submerged stage -

submerged hydrophytes will grow

3) Floating stage -

floating hydrophyte will start to grow & transpiration will take place

4) Amphibian stage -

Process of transpiration will get fast

5) Woodland plant stage -

Plants which can grow in moderate amount of water



6. > Forest stage -  
Formation of forest

# Xerogere & Lithogere  
(desert) (rock)

1. > Crustose lichen stage -

2. > Foliose lichen stage

3. > Mosses stage

4. > Annual grasses stage

5. > Perennial ~~grass~~ grasses stage

6. > Shrubs stage

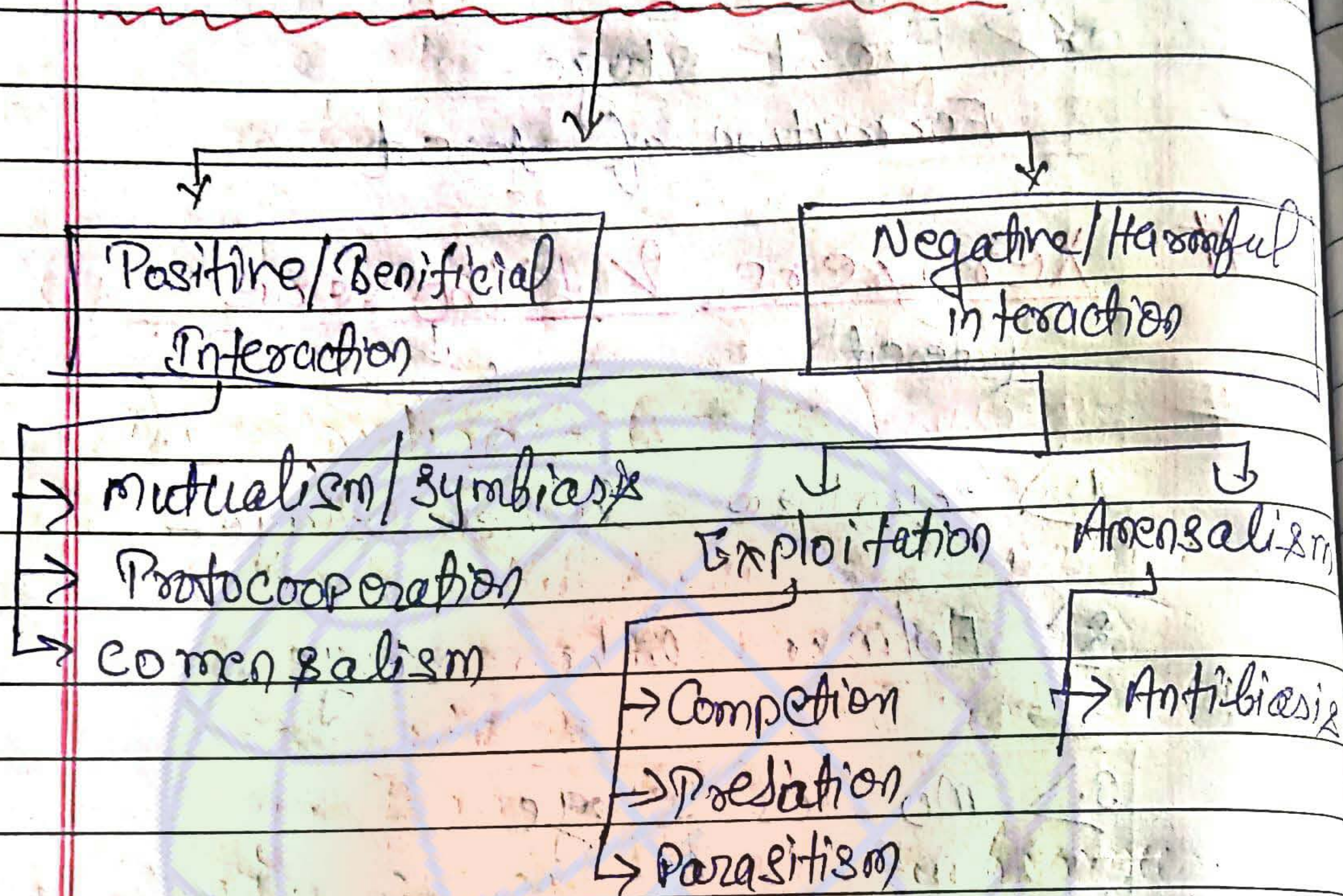
7. > Forest / Tree stage



# ★ Ecological Interaction

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## Interspecific Interaction :-



## ★ Positive Interaction

### 1) Mutualism/symbiosis (+/+)

\* When two species interact with each other and both get benefited

\* Individual survival is not possible.

\* obligatory interaction

example! Rizo bium — legume plants



Example: Anabaena Azolla plant

## 2) ProtoCooperation (+/+)

- when both participating species are getting benefited but individual survival is also possible

eg. Lichanes,

eg. crocodile & flash picking birds

## 3) Comensalism (+/0)

when one participating species is getting benefited and other has no harm, no benefit.

eg. Lianas



## Negative Interactions

1) ~~Exploitation~~ Exploitation: - when ~~two~~ one out of two participating species gets harmed.

2) Amensalism: - when one of the



two participating species harms the other and itself has no benefit.

## \* Exploitation

### i) Competition:- (-/-)

when both the participating species get harmed and compete for food and shelter.  
eg. Lion & tiger  
eg. ~~two~~ different herbivorous.

### 2) Predation:- (+/-)

When one species kills other species to eat that species.

eg. lion attacking on cattle.

### 3) Parasitism:- (+/-)

when parasite lives inside or outside (on surface) of host to complete its life cycle.

\* Amens

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eg. Ecto Parasite  $\rightarrow$  fungus  
Endo Parasite  $\rightarrow$  Plasmodium

## \* Amensalism (0/-)

### 1. Antibiosis:-

Phenomena in which one microbe secretes antibiotics which suppress growth of other microbes in that medium.

eg. secretion of ~~antibiotics~~ different antibiotics by different microbes.



# ★ Ecosystem

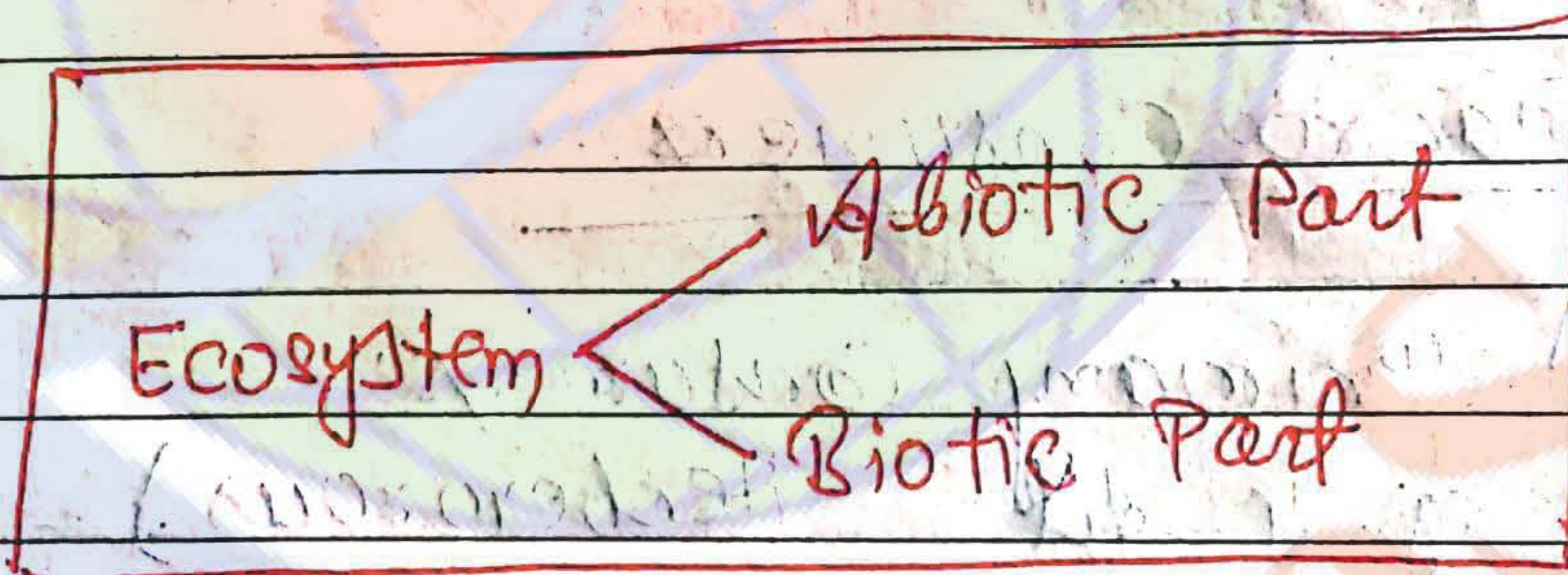
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→ Biotic & Abiotic factors with its surrounding are called ecosystem.

→ Flow of energy

→ Flow of nutrients

Example: water drop,  
forest,  
Pond



## # Biotic Factors of Ecosystem:



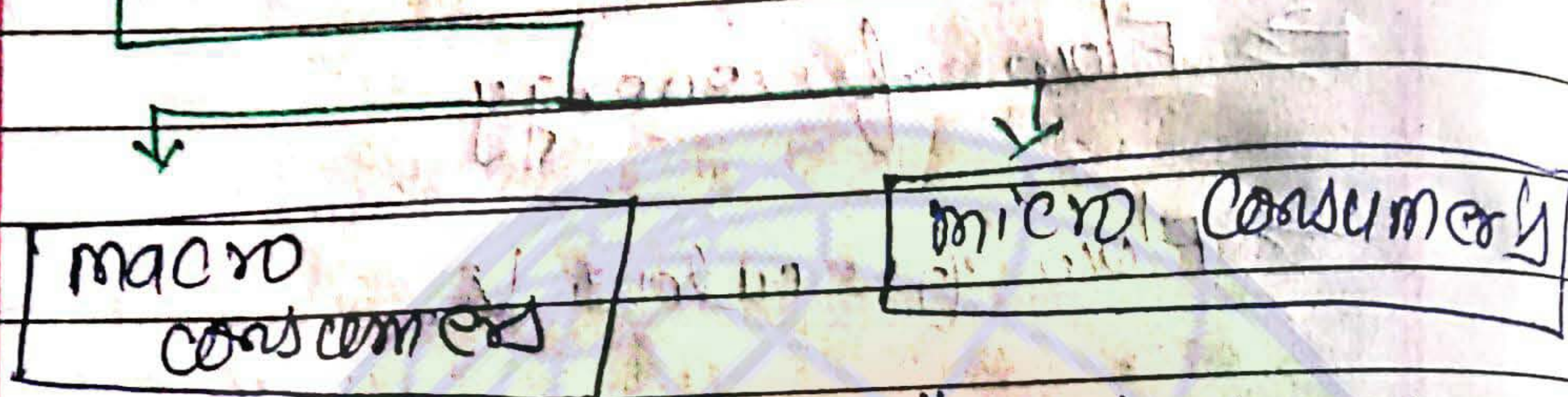
1) Producers: — Organisms which are autotrophs

→ photoautotrophs

→ chemoautotrophs



2) Consumers :- Organisms which are dependent on Producers to get food.



"First ingestion then digestion"

"First digest then ingest"

### 1) macro consumers :-

→ i) Primary consumers :-  
eg. (All Herbivorous)

→ 2) Secondary consumers :-  
eg. (carnivorous animals)

→ 3) Top consumers :-  
eg. lion, Human

### 2) micro consumers :-

→ eg. Decomposing bacteria & fungi

→ Scavengers :-  
eg. vulture, fox

## # Functions

- + Produce
- + Decom
- + Ener
- + Food

→ Produce  
Amount  
auto to  
a per

Higher  
Lower

### • Primary

Biom

en

in

(i)

(ii)

Se

Co

Am



## # Functions of Ecosystem

- + Productivity
- + Decomposition
- + Energy cycle
- + Food cycle.

1) Productivity:- Amount of Biomass produced by autotrophs in per unit area over a period of time, in an ecosystem.

Highest Productivity  $\rightarrow$  Tropical Rainforest  
 Lowest Productivity  $\rightarrow$  Desert ecosystem.

• Primary Productivity:- Amount of Biomass produced by producers in per unit area in given time in an ecosystem.

- (i) Gross Primary Productivity (G.P.P.)  
 (Total Production by Photosynthesis)
- (ii) Net Primary Productivity (N.P.P.)

$$NPP = GPP - \text{Respiration}$$

• Secondary Productivity:-

Production of Biomass by consumers.

• Community Productivity:-

Amount of biomass stored by



one topic level level of  
consumers for next topic  
level.

## 2. > Decomposition

Conversion of litter / debris into  
organic & inorganic nutrients or  
minerals.

### Steps of decomposition:

i) Fragmentation - Breakdown of large  
organic matter into particles into  
small particles.

2. > Leaching - Reaching of water  
soluble inorganic minerals deep  
inside soil

3. > Catabolism - In presence of  
Breakdown of large molecules  
into small in presence of  
catabolic enzymes.

4. > Humification - Humus formation  
by small molecules of organic  
matter

3. > Energy

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Food

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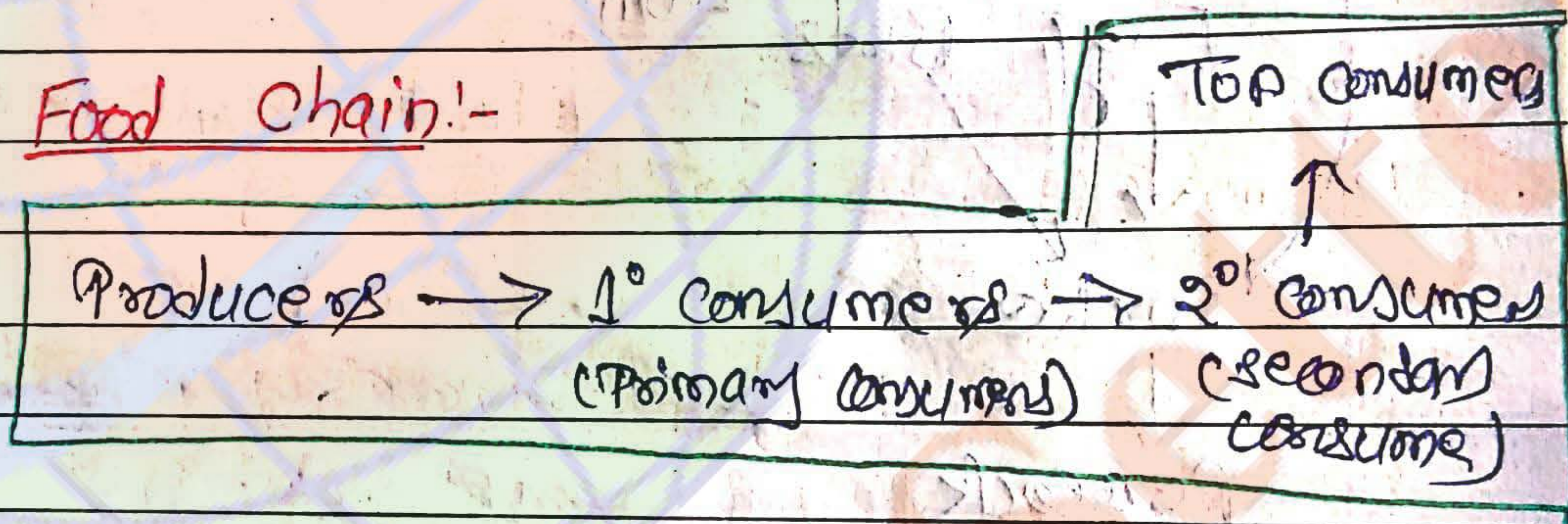


5) mineralization - Formation of minerals.

3.7 Energy flow!

- Transfer of energy is Unidirectional
- Energy loss takes place during transfer of energy from one trophic level to another

Food Chain:-



eg. (forest)

Green plants → Insects → Frog → Snake

eg. (aquatic)

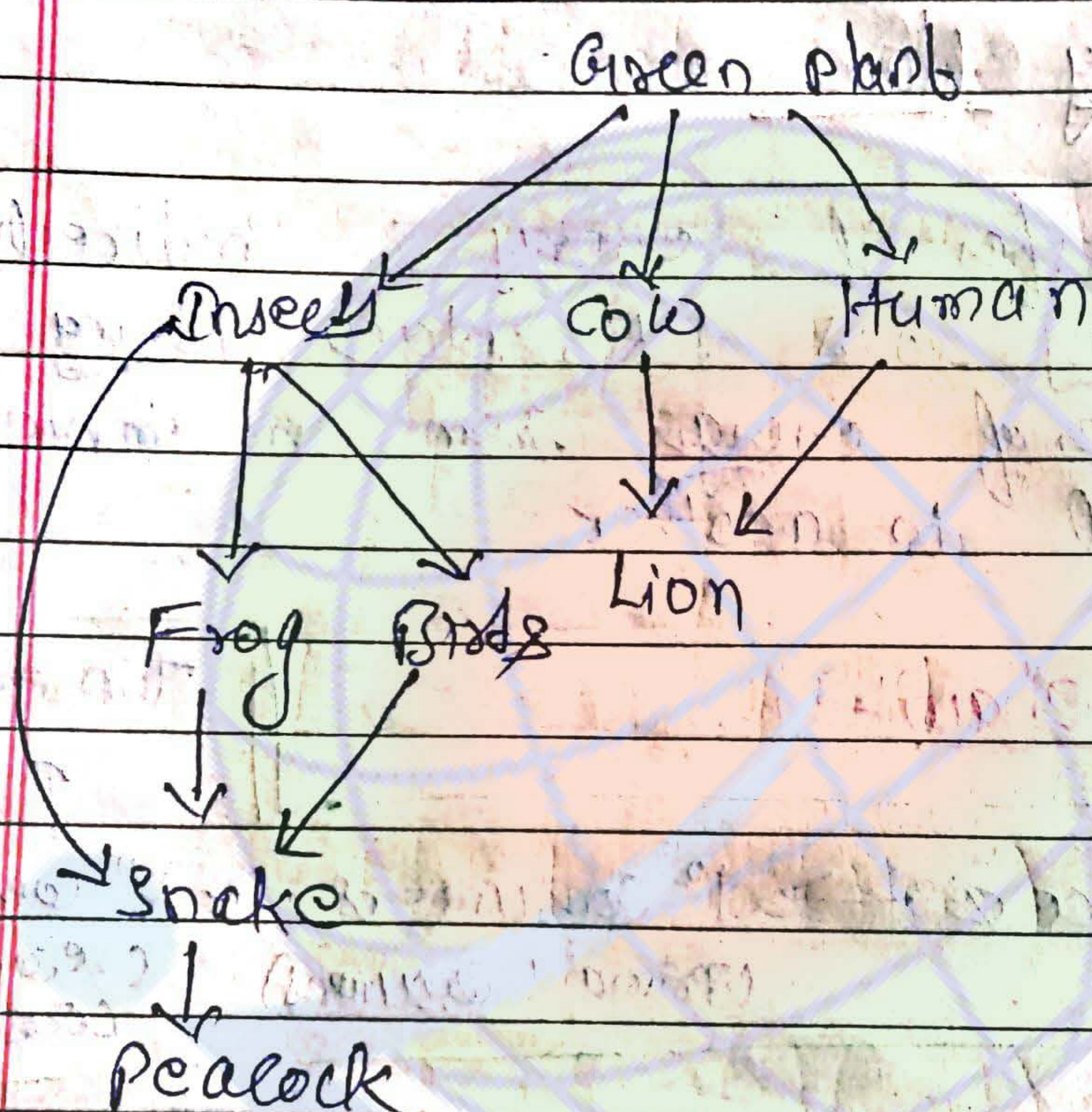
Phyto plankton/aquatic plants → Small fish

↓  
large fish

↓  
shark



⑥ Food web! when food chain get intermix.



Note: जितना ज्यादा food chain  
intermix होगा उतना ही ज्यादा  
stable होगा।



# Ecological Pyramids

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Graphical representation of ecological parameters in different trophic levels.

• Pyramid of Number/Count

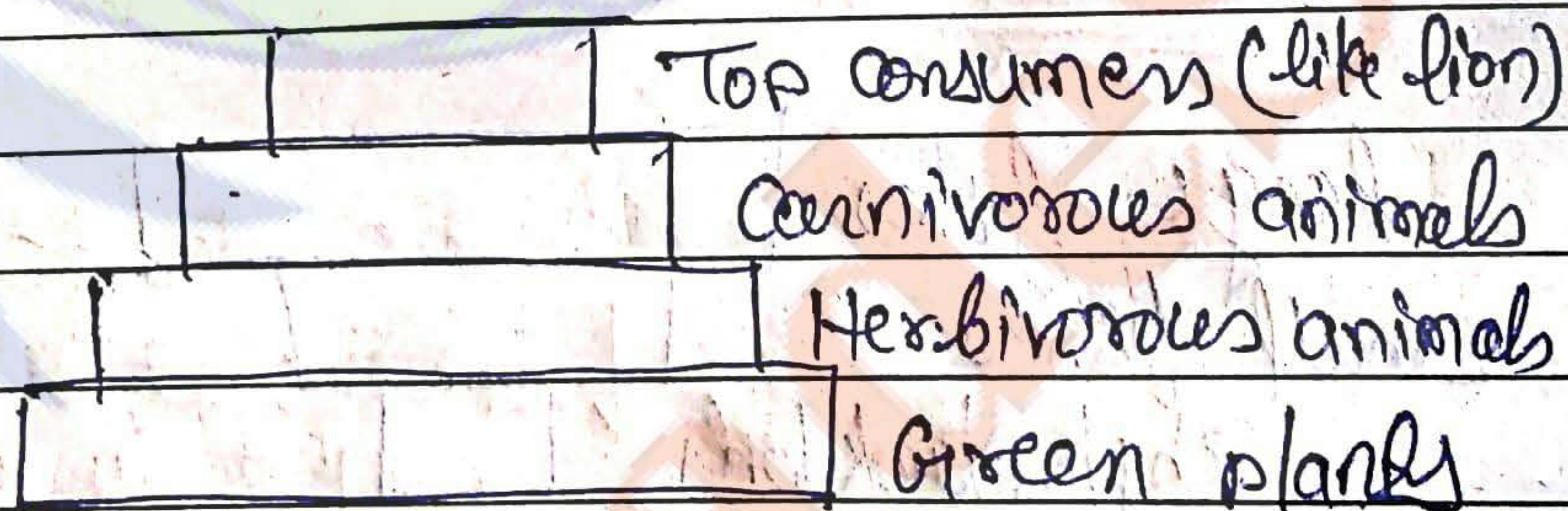
• Pyramid of Biomass

• Pyramid of Energy

## # Pyramids of Number:-

Representation of number of organisms in different trophic level in ecosystem

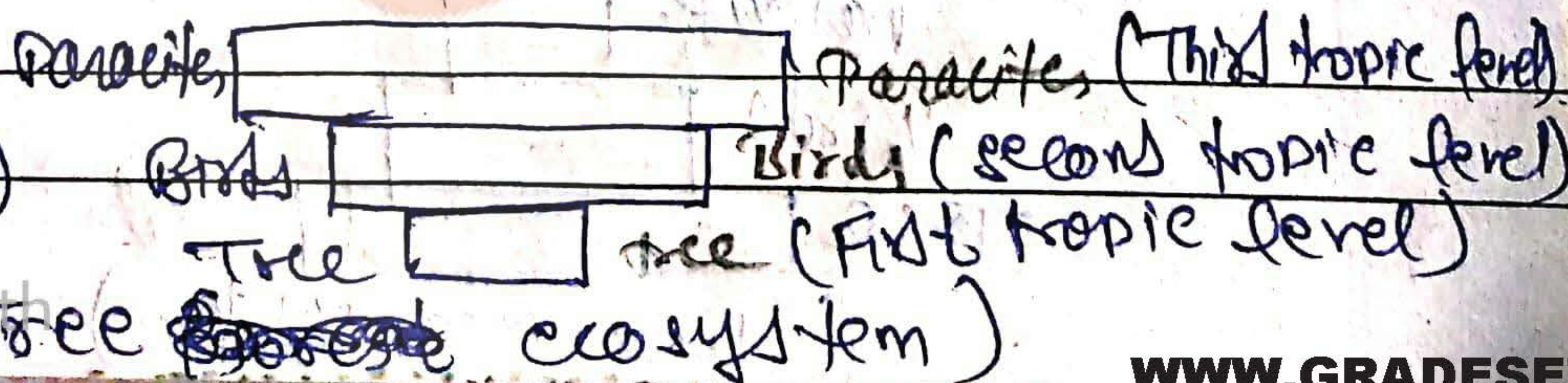
eg.



(forest ecosystem)

eg. →

(food chain of parasite & insects)



(Tree forest ecosystem)



# # Pyramid of Biomass

~~Represents~~ Graphical representation of amount of biomass in an ecosystem in different trophic level.

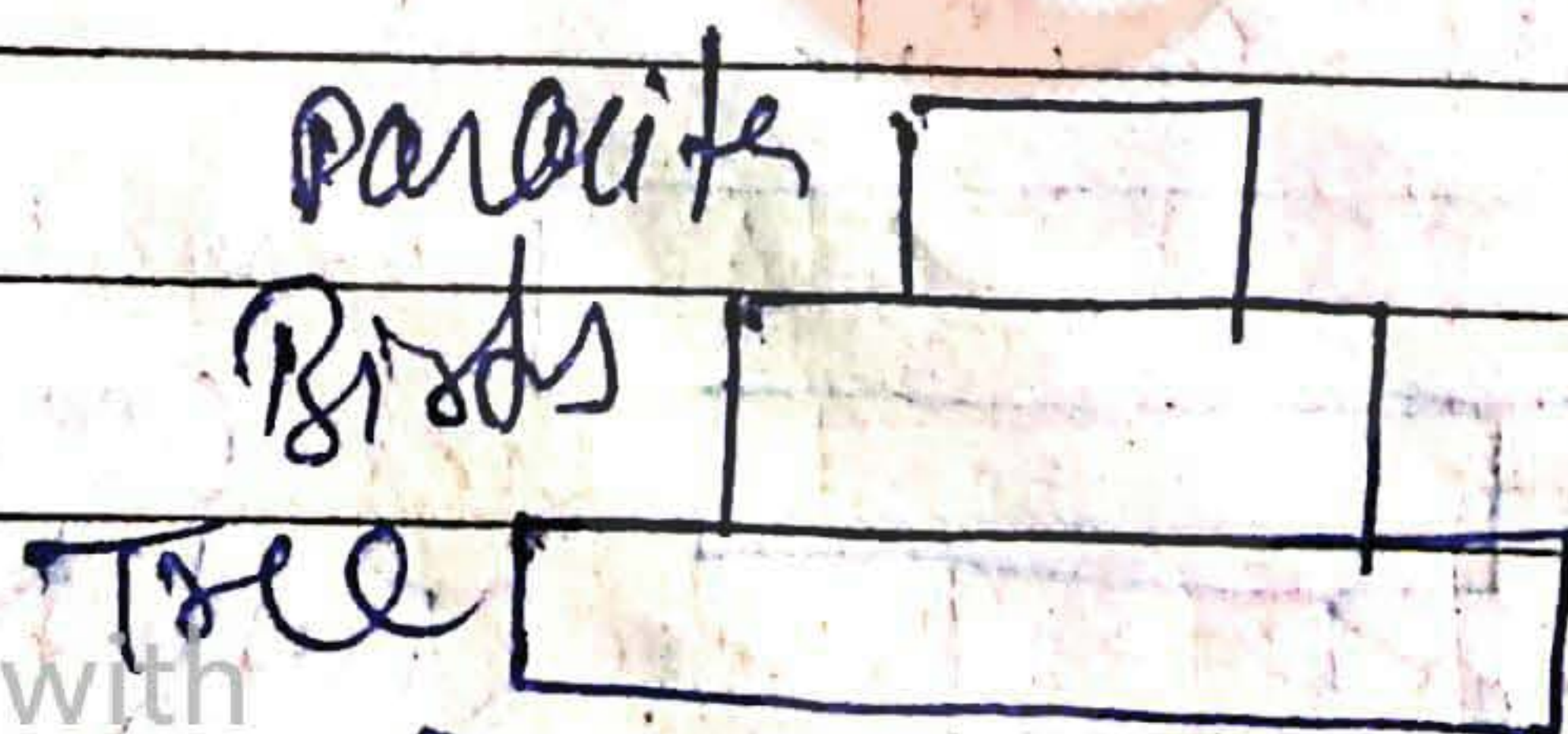


(Forest ecosystem)



Pyramid of Aquatic inverte

(Aquatic ecosystem)



(Tree ecosystem)

# # Pyramid

Graph of s in a

or

4

3<sup>rd</sup>

2<sup>nd</sup>

1<sup>st</sup>

Large f  
Small f  
Phyto pla



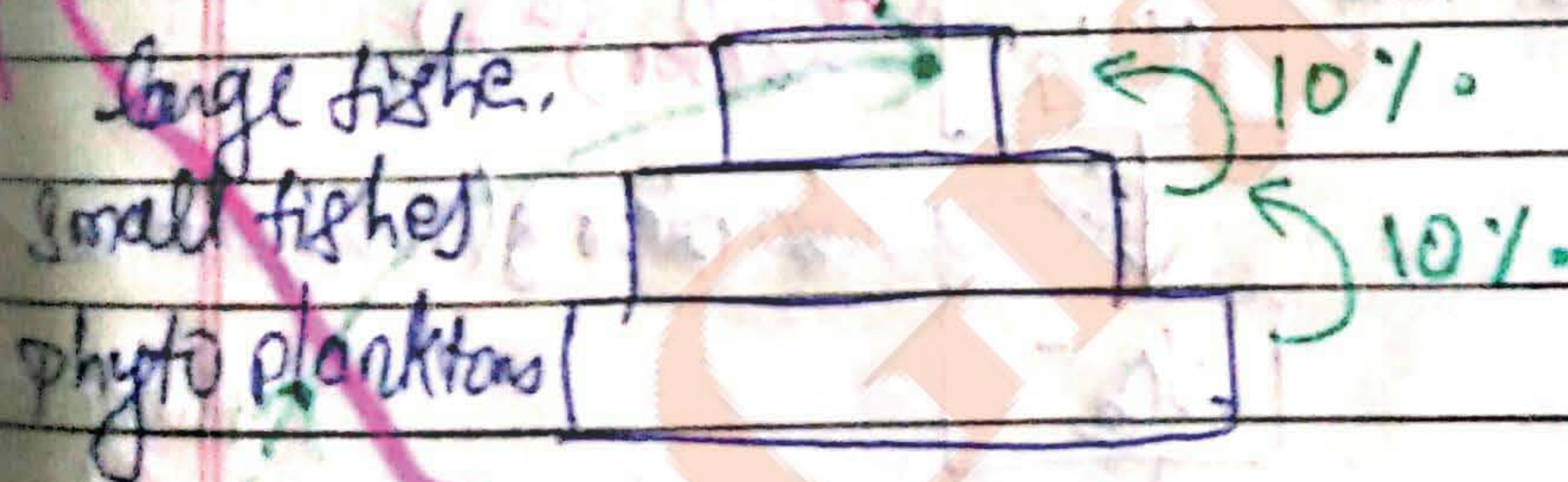
## # Pyramid of energy!

Graphical representation of amount of energy in different trophic levels in an ecosystem.

— only 10% of energy is transferred to next trophic level.

4TL	10 J	TOP consumer
3TL	100 J	2° consumer / secondary consumer
2TL	1000 J	1° consumer / primary consumer
1TL	10,000 J	Green plants

(Forest ecosystem)



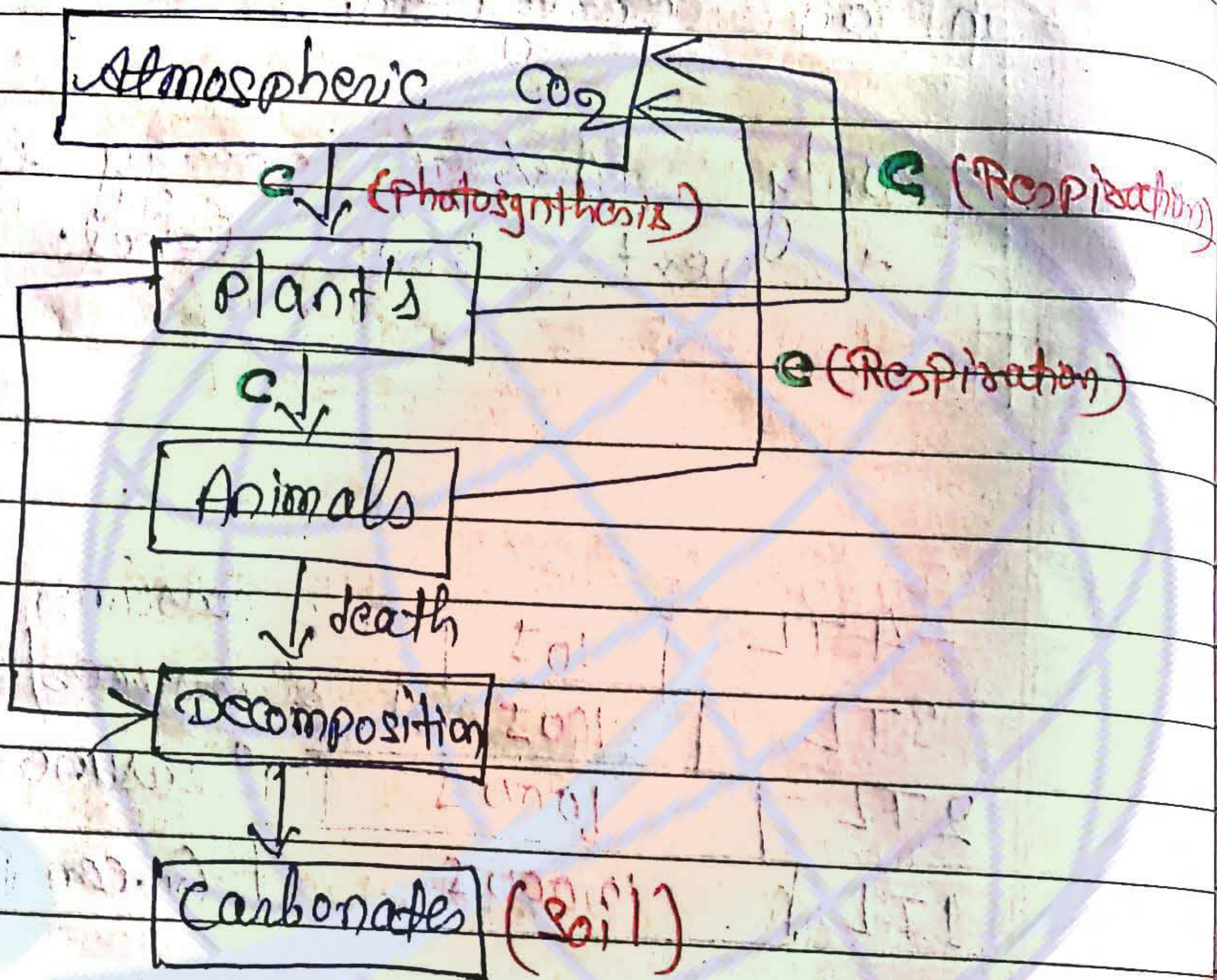
(Aquatic ecosystem)



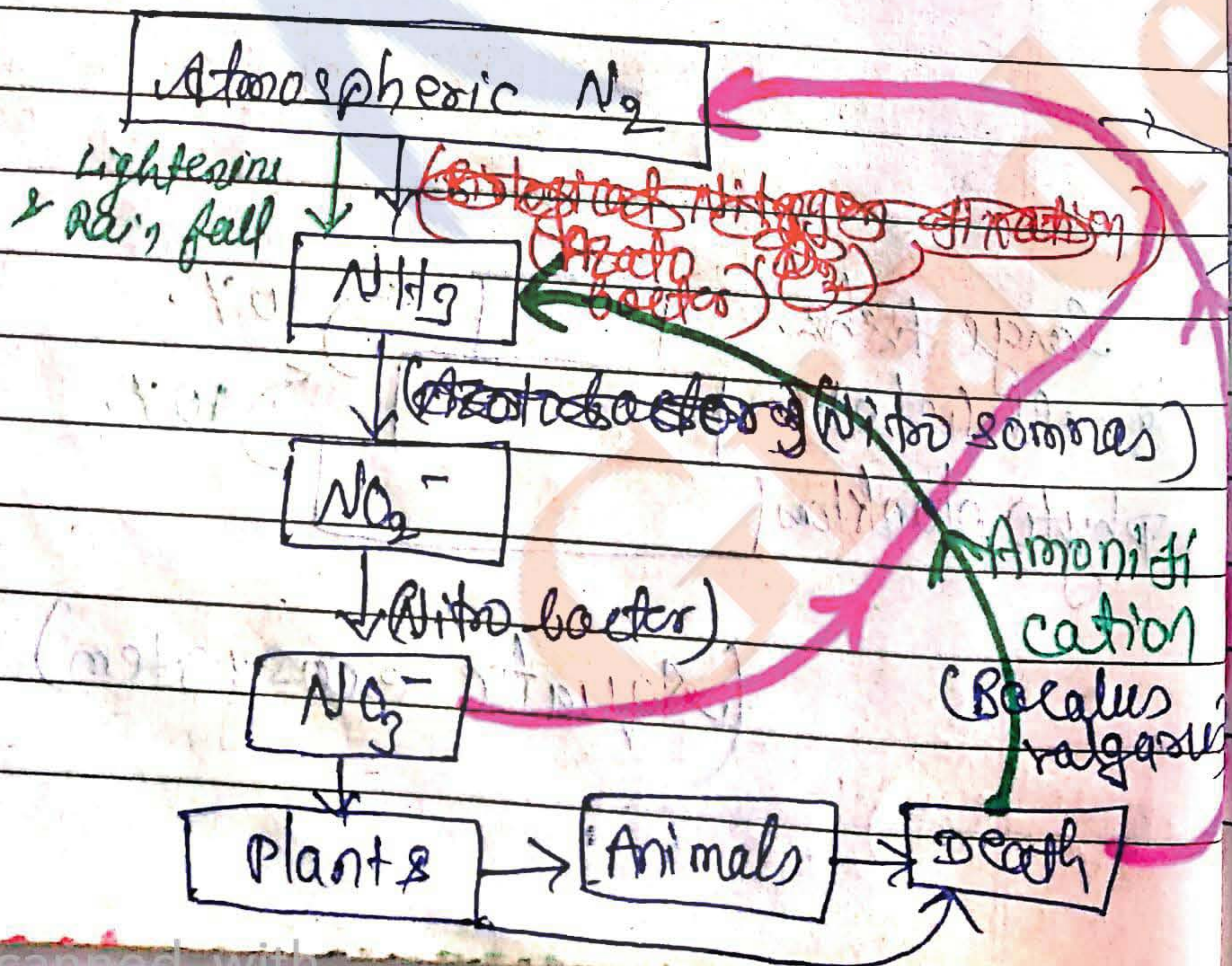
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## # Nutrient cycle:

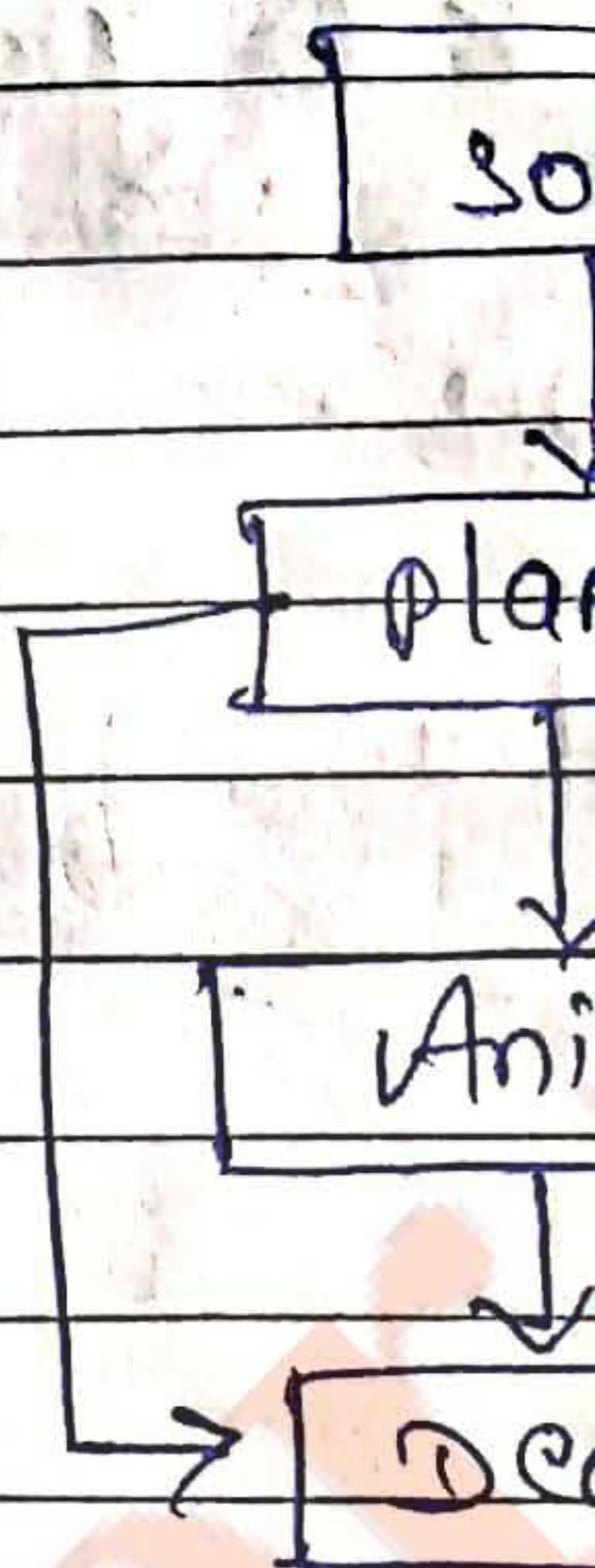
### 1.7 Carbon cycle:



### 2.7 Nitrogen cycle:

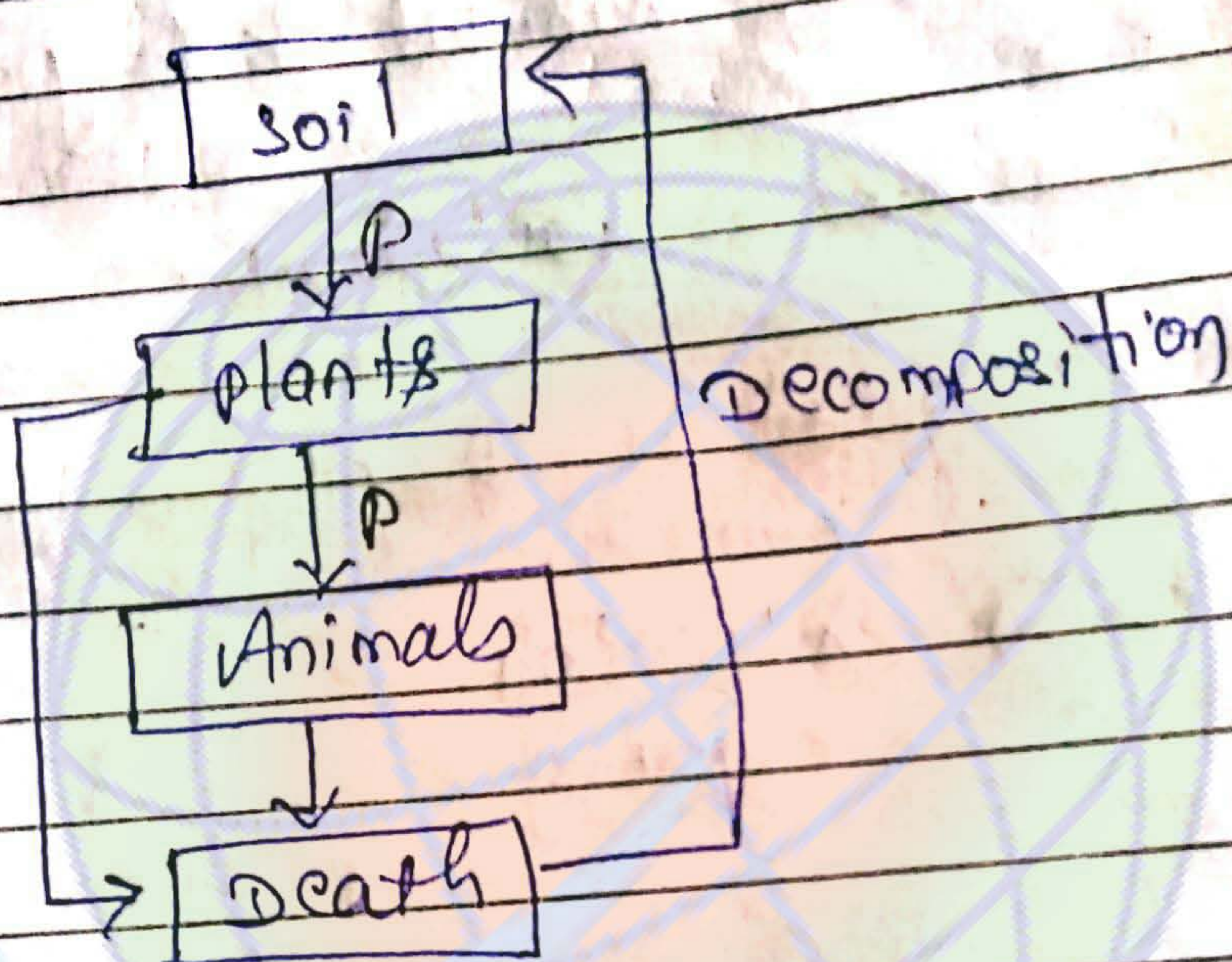


### 3.7 Phosphorus cycle:





# phosphorus cycle



autotrophs  
heterotrophs  
decomposers



#

# Biodiversity & Conservation

3 types:-

- (i) Genetic diversity  
Presence of variety of genes in any species.  
eg. 50,000 varieties of rice
- (ii) Species diversity:-  
Presence of variety of species in a community.  
eg. No. of species of animals in a forest.
- (iii) Community diversity:-  
Presence of variety of community in an ecosystem.  
eg. Different communities in India

## • Magnitude of Biodiversity

Species diversity is maximum → Arthropoda  
(7 out of 10 animals are arthropoda)

2nd highest → mollusca

3rd highest → Protozoa

## • In ~~coral~~ char data

highest biodiversity → Fishes



## # Loss of Biodiversity

1) Loss of habitat & fragmentation

habitat का क्षेत्र  
घटे से होता

2) Over exploitation

3) Introduction of Alien species Invasi

4) Co-extinction

(आप में निरुद्ध होना)





# Conservation of Biodiversity

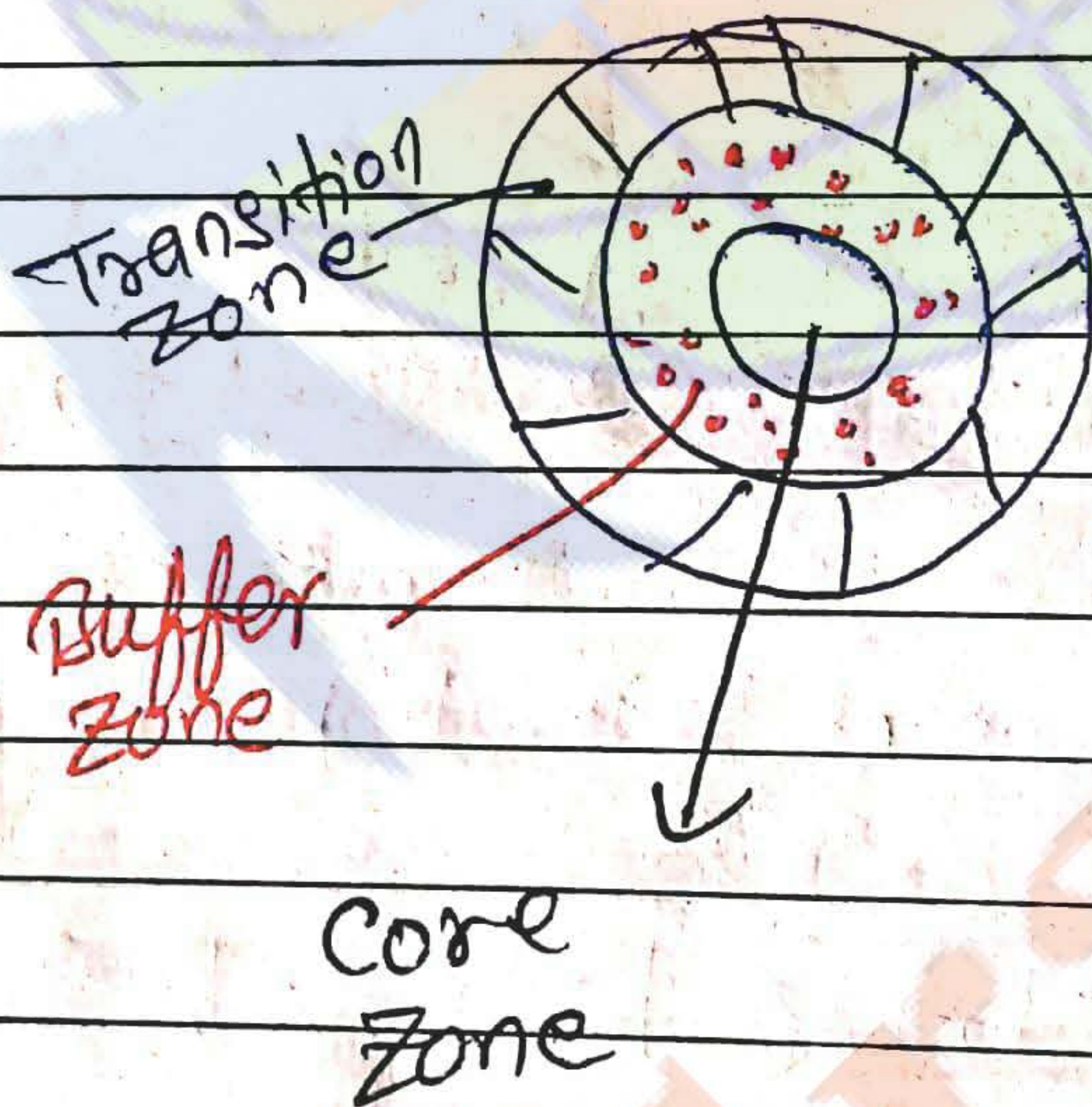
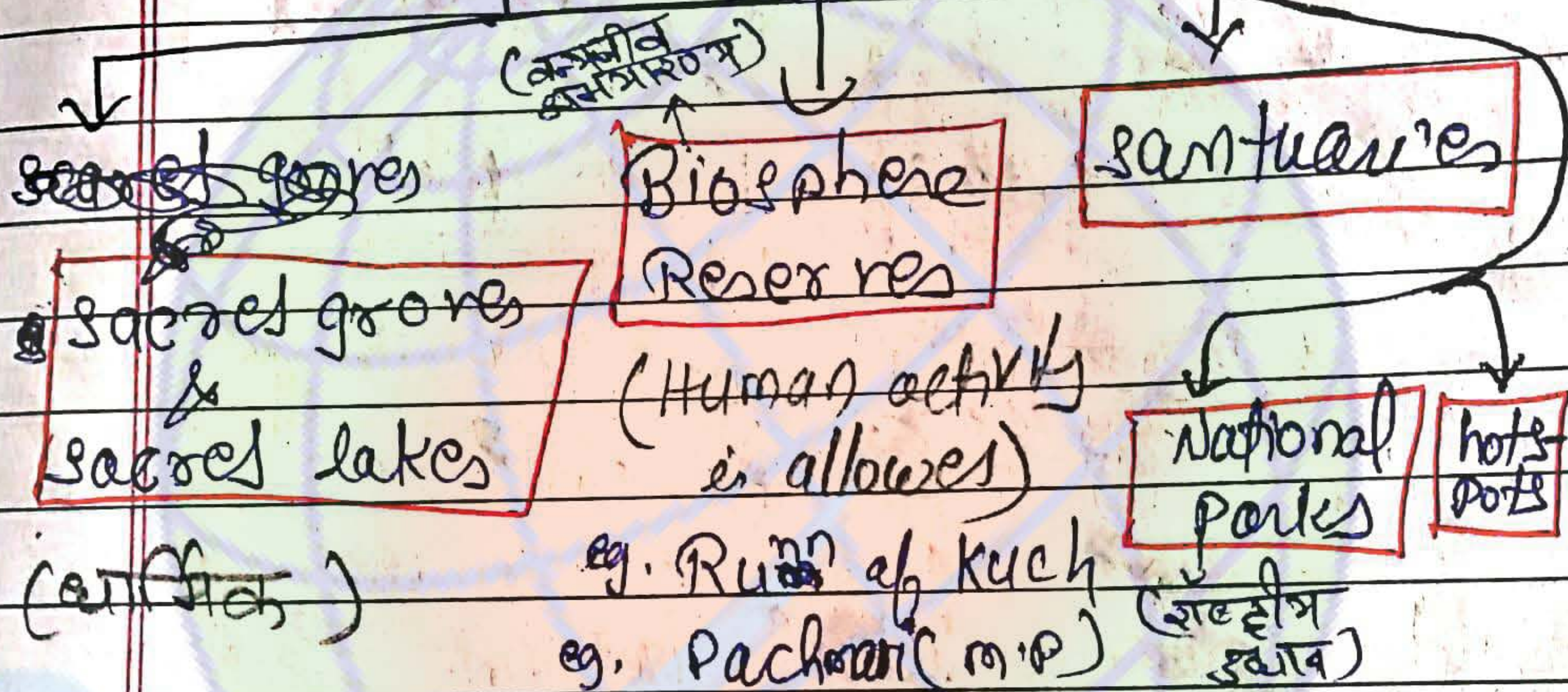
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**In situ conservation**

Conservation of species in its natural habitat.

**Ex situ conservation**

Conservation of species away from its natural habitat



**Seed Bank or gene bank**

- cryo preservation (-196°C)  
(liquid Nitrogen)

**Botanical garden**

[35] in India

**Home garden**

**Other Zoological parks**

[275] in India



# Environmental Issues & Pollution

• **Pollution**:- Undesirable change in physical chemical or biological composition of air, water, soil and this change is harmful for ~~species~~ community.

• **Pollutants**: Agents causing pollution  
(on basis of decomposition)

**Non-biodegradable**

"Decomposition does not take place".

eg. DDT

**Biodegradable**

"Decomposition take place"

**Pollutants**

1<sup>o</sup> Pollutant  
(Primary pollutant)

eg. DDT

2<sup>o</sup> Pollutant  
(Secondary pollutant)

eg. Photochemical smog  
eg. London smog

**Pollutants**

**Quantitative**

eg. CO<sub>2</sub>

(अधिक मात्रा  
हarmful है)

**Qualitative**

eg. DDT



## 1. > Air Pollution :-

Air pollutants :-

→ gases

→ Particulates  $< 2.5 \mu m$

(CPCB - Central Pollution Control Board)

Air (CPCB ~~2.5  $\mu m$~~ )

eg) CO (Carbon monoxide)

source - automobiles

effect - Respiratory Problems

ii) Unburnt hydrocarbon

effect - can cause cancer

iii) Nitrogen oxide - ( $NO, NO_2$ )

effect - It can block

Photosynthesis by

blocking P.S. II

- skin disorders

(iv) Sulphur Oxides

effect - lung cancer

- burning of eyes

## • Secondary air pollutants:-

i) Smog - (Smoke + fog)

1. □ Photochemical smog (Los Angeles smog)

(Nitrogen oxide)

→ Brown color smog

→ Per oxy acetyl nitrate (PAN) +  $O_3$



## 2. □ London Smog

→ white: smog color smog  
 (sulphur oxide) →  $H_2SO_4$

## 3. □ Acid Rain

$H_2SO_4 + HNO_3$   
 70% 30%

# Green house effect!

Because of presence of some gases heat is trapped in atmosphere

eg.  $CO_2$  - 60%

$CH_4$  (methane) - 20%

CFC - 14%

$N_2O$  - 6%

# Global warming!

- Control of global warming.

Kyoto Protocol

- Less use of fossil fuel
- Increase plantation
- Alternative of CFC



## # Control of Air Pollution

To remove particulates -  
 i) Arresters ii) scrubbers

→ Air filters

→ cyclonic arresters

→ Electrostatic (force)  
 arresters

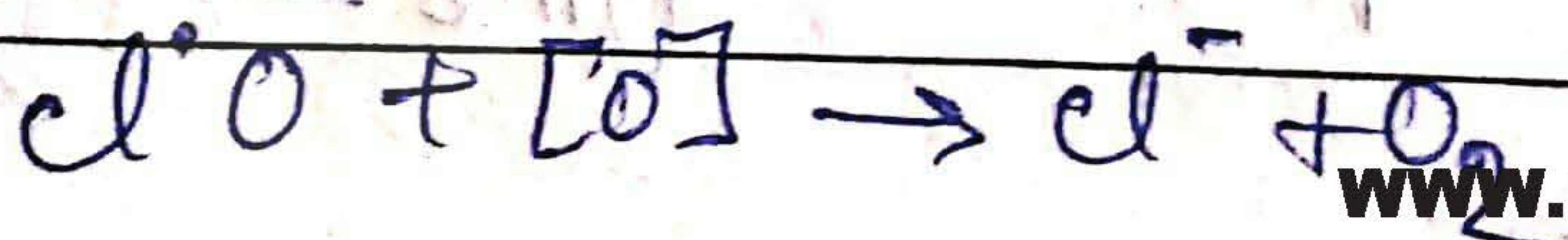
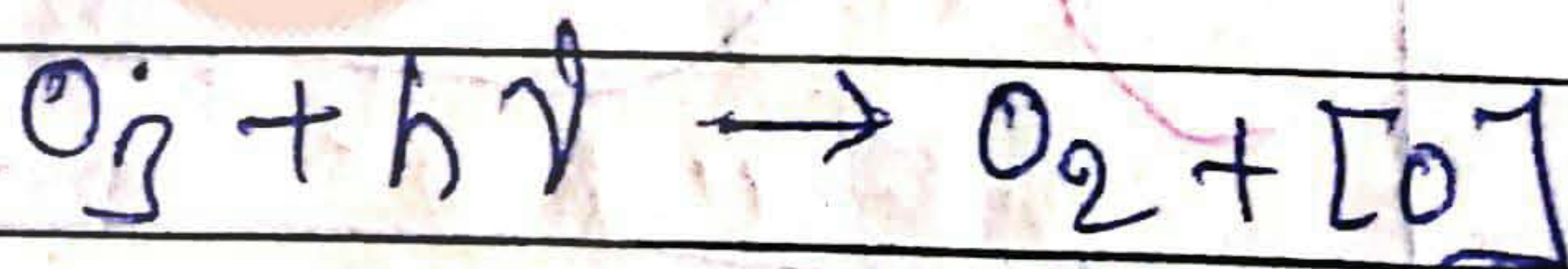
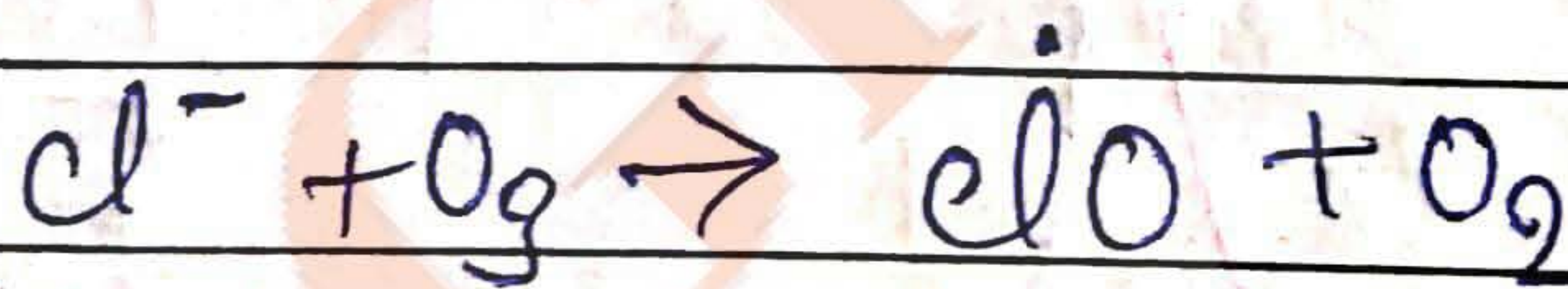
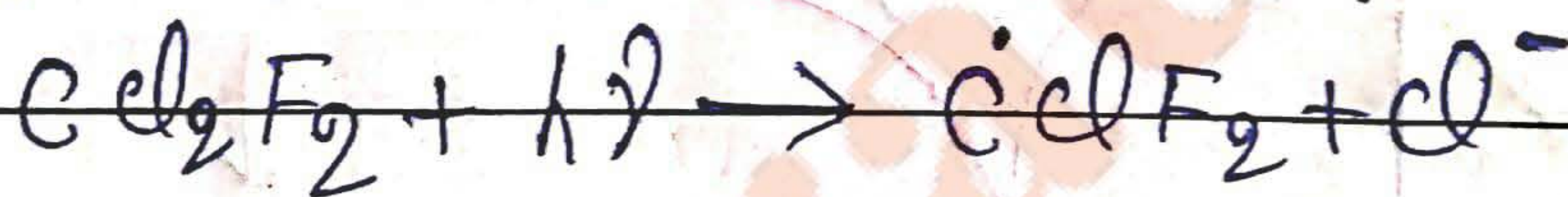
To Remove gases -

→ Absorption

→ chemical method

## # Ozone depletion

(CFC - chloro fluoro carbon)  
 (C<sub>2</sub>F<sub>2</sub>Cl<sub>2</sub>)





$$U.V. \text{ B} = 280-320 \text{ nm}$$

## 2. > Water Pollution

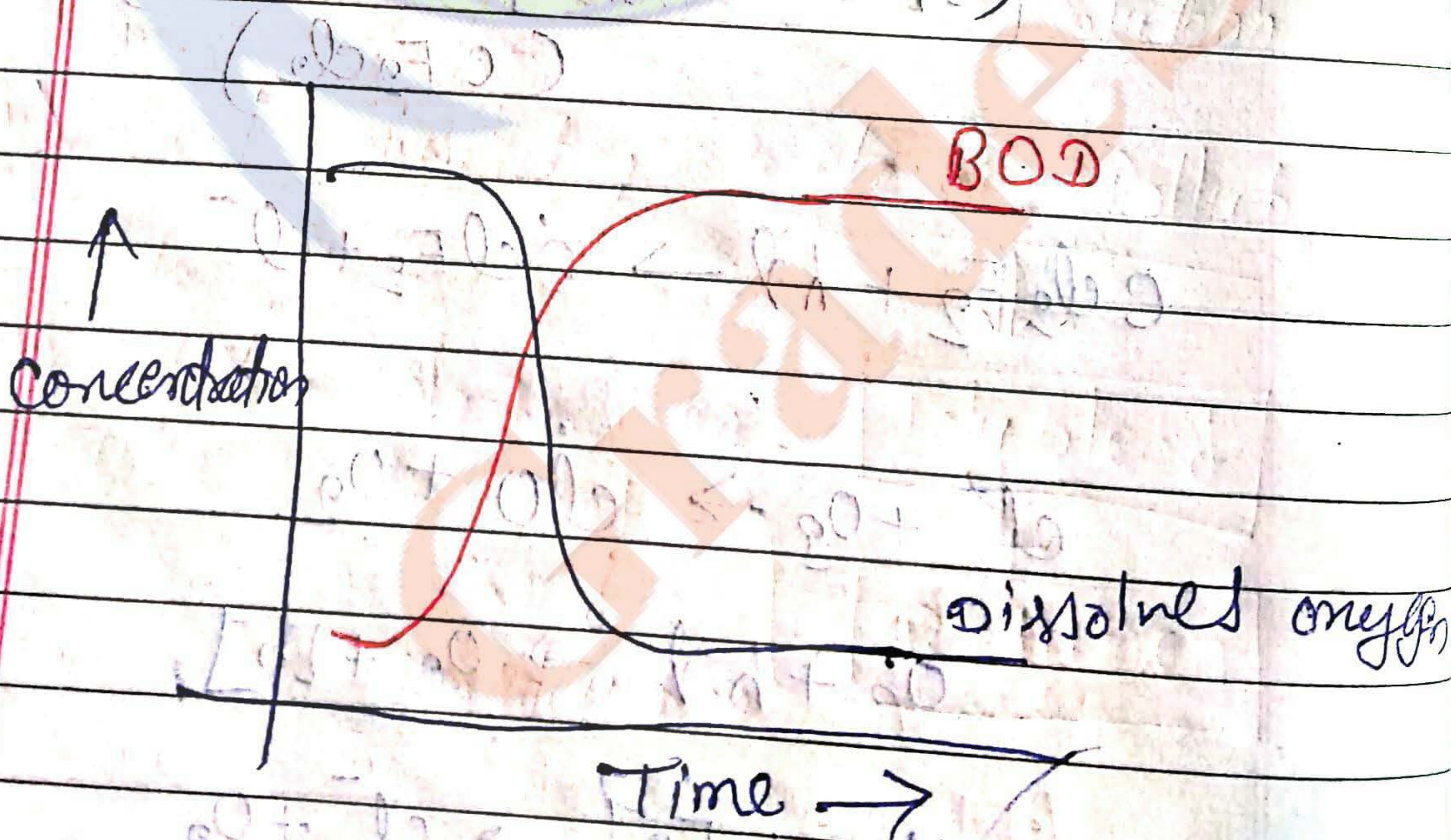
Any undesirable change in  
Physical, chemical or biological  
constituent of water which  
is harmful for health.

### \* Dissolved oxygen

Amount of oxygen present in  
water in dissolved form.

### ✓ Biochemical oxygen demand (B.O.D)

(Pollution Indicator)





~~Daphnia~~  
Daphnia is Indicator of water pollution.

## ⊗ Methods of water treatment:-

1) Primary Treatment:-

(large solid pollutants are allowed to settle as sediments)

2) Secondary Treatment:-

(Allow growth of decomposing bacteria and allow decomposition of organic matters)

3) Tertiary Treatment:-

(Chlorine treatment to remove turbidity)

## ★ Eutrophication:

Death of higher plants and animals because of high availability of nutrients.

→ (Algal Bloom) —

→ B.O.D (↑) —



## ② Biomagnification of non-biodegradable chemicals -

eg. DDT

→ Increase in concentration of non-biodegradable chemicals in subsequent trophic levels

→ Alter calcium metabolism

→ less developed egg shell

→ Premature breaking

## 3. > Sound Pollution / Noise Pollution - (25 decible) Normal Intensity

more than 80 decible sound is considered as sound pollution

## 4. > Soil Pollution & Plastic Pollution

less use of pesticides

Plastic can be used in road construction

Polyblend

Bitumen