Air Pollution

Control

C D

GASEOUS

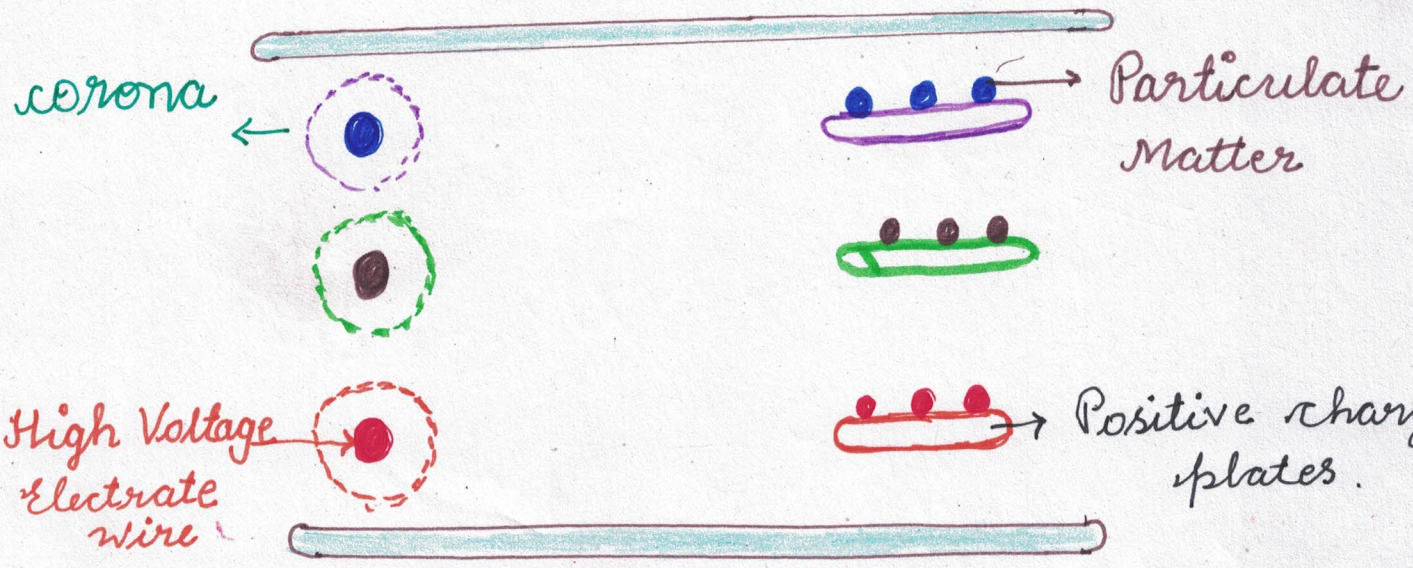
PARTICULATE

Arrester

Scrubber

E.S.P

Electrostatic Precipation



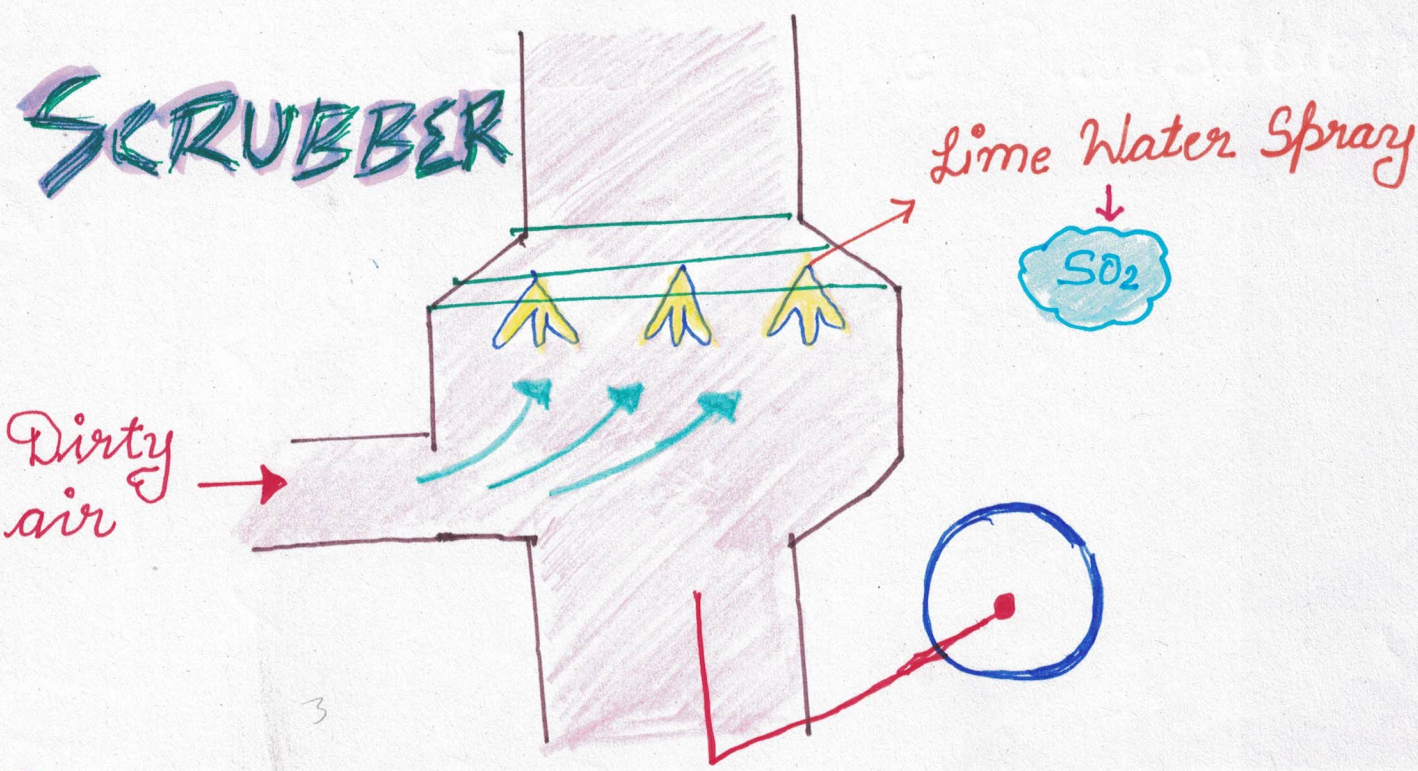
Dirty air :→

Velocity of air between the plates must be low enough to allow the dust to fall.

Clean air :→

Electrostatic precipitection device work on the principle of Electrical charging of dust particles and collecting it on a differently charged platform.

Electro Static Precipitation



- Euro I → June 1999
- Euro II → 1st April, 2000
  - = Bharat Stage II 11 Major polluted cities :→
- Euro III → April 2005
  - ↓
  - 11 Major polluted cities.
  - Rest of India = Euro II
- Euro IV → April 2010
  - ↓
  - 13 Major polluted cities.
    - Lucknow (UP)
    - Solapur (Maharashtra)
- Oct. 2010 → Rest of India

EURO I / II

Sulphur

Petrol 150 ppm

Diesel 350 ppm

HC = 42%.

EURO III / IV

Sulphur

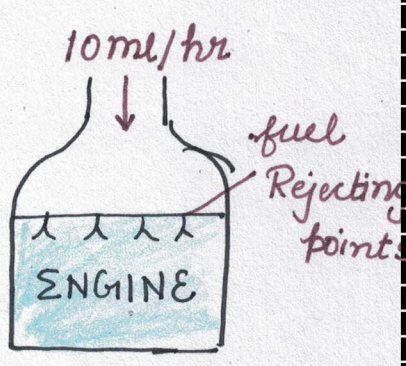
Petrol → 50 ppm

Diesel →

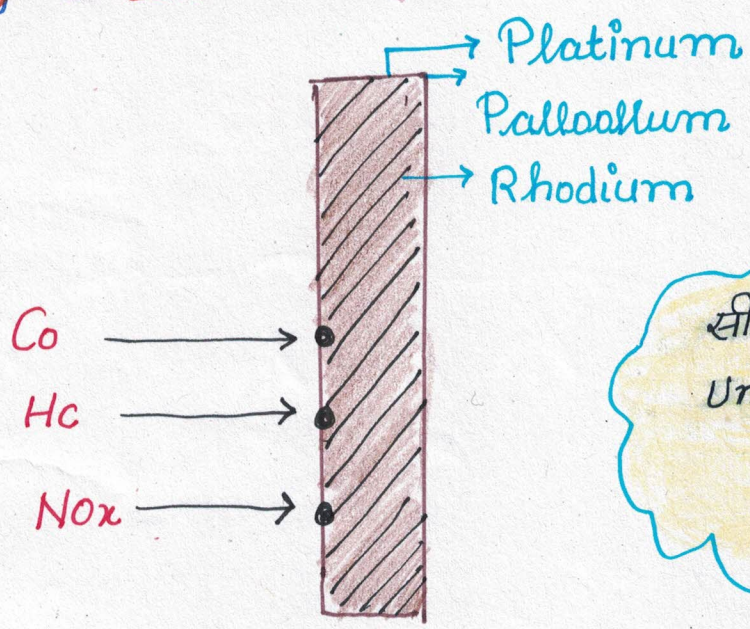
HC = 35%.

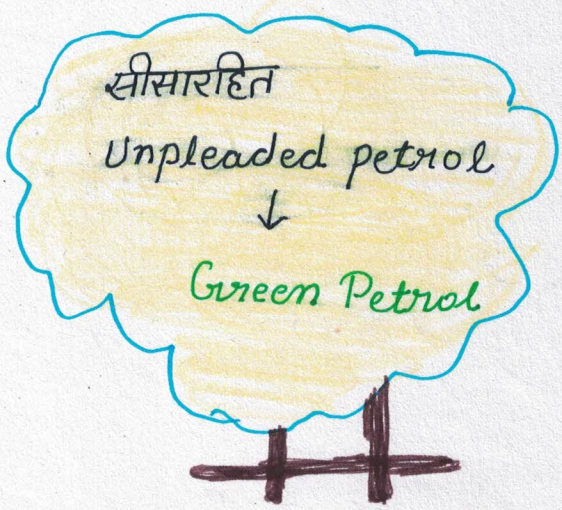
Engine

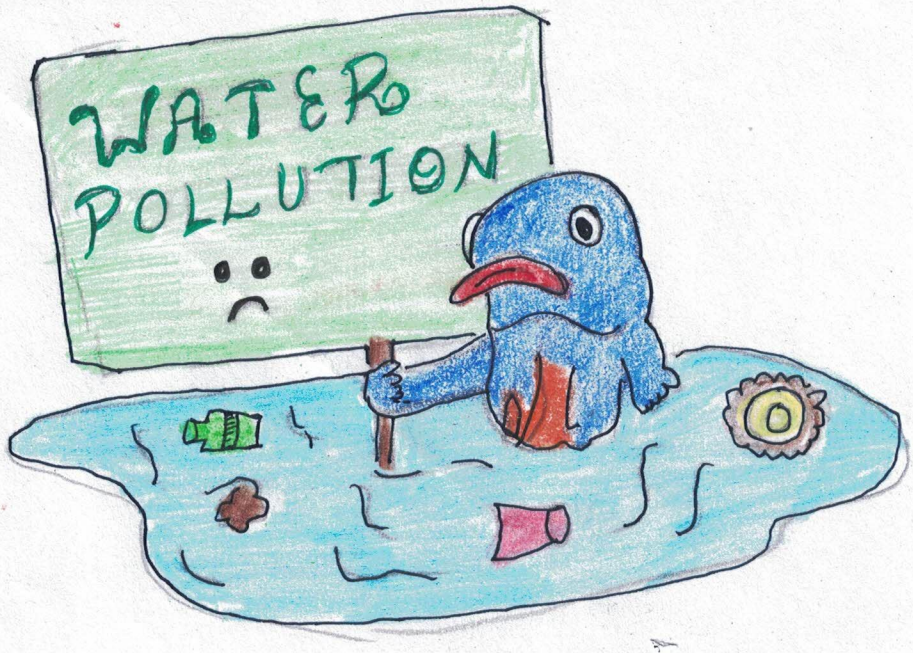
- Multi point fuel Injection.
  - ↓
  - for Efficient burning of H.C.



- Catalytic Converter :→

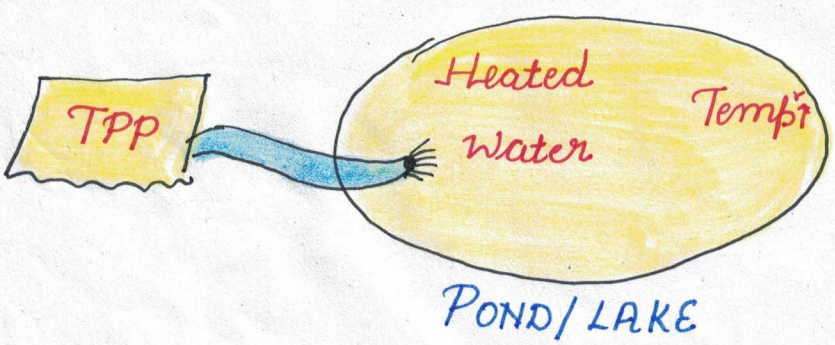






- Physical → Turbidity (मटमैला)
  → Temp° ↑
- chemical → Acid Rain
- Biological → Microbes ↑

COLD AREA



Major Causes of H_2O Pollution

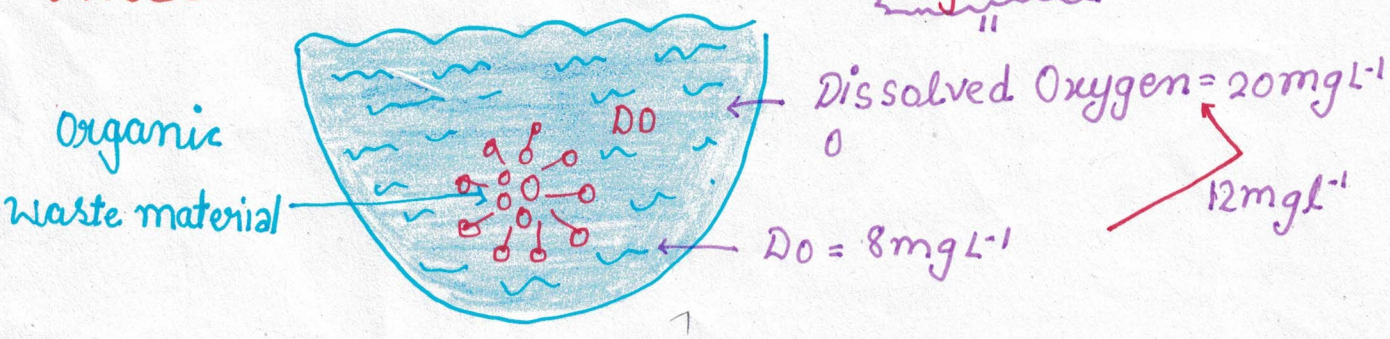
Domestic Sewage

- **Suspended** → Sand, Salt, clay.
- **colloidal** → cloth, paper, Bacteria, faecal matter.
- **Dissolved** → Nitrate, phosphate, Amonia, Sodium calcium.

> **NOTE**
>
> A mere 0.1% impurities of domestic sewage make water unfit for human use.

BOD → Biochemical Oxygen Method

oxymeter

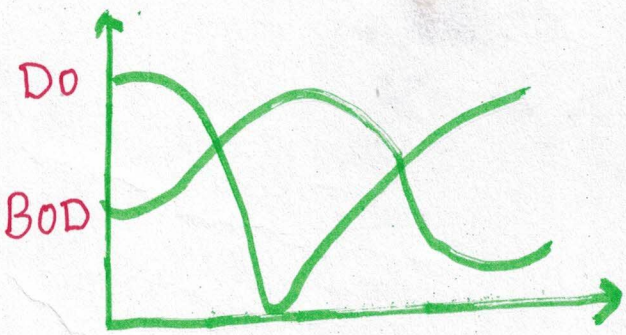


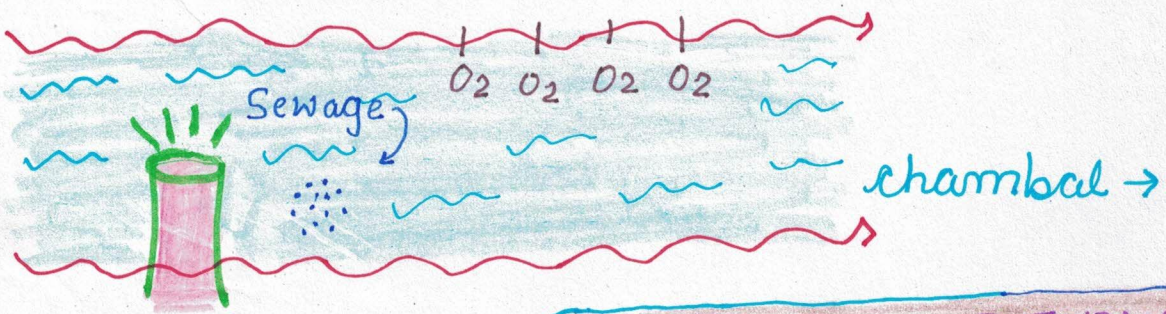
Organic waste material $\propto$ BOD $\propto \frac{1}{DO}$

DO < 8 mg l^{-1} = Polluted Water.

DO < 4 mg l^{-1} = Heavy polluted Water.

Fresh Water BOD < 1 mg L^{-1}





fresh Water Indicator

→ Daphnia

→ Trout fish

→ Larva of stone fly.

POLLUTED WATER INDICATOR

→ E. Coli.

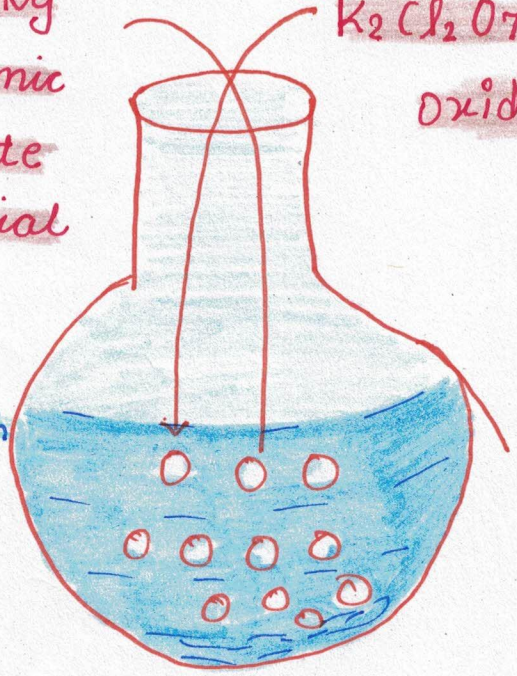
→ Tubifex (Annelid)

→ Shedge worm.

COD - Chemical Oxygen Demand.

1 kg Organic Waste Material

$K_2Cl_2O_7$ Oxidizing Agent.



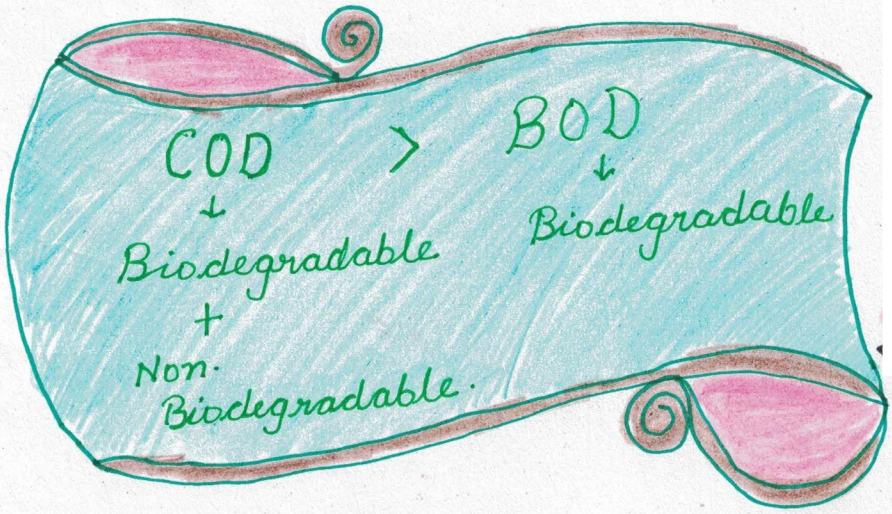
- 10 ml
- 20 ml
- 30 ml
- 40 ml
- **50 ml**

It can be done by titration process

1 Kg Oven 1 = 800 gm + 200 gm

" "

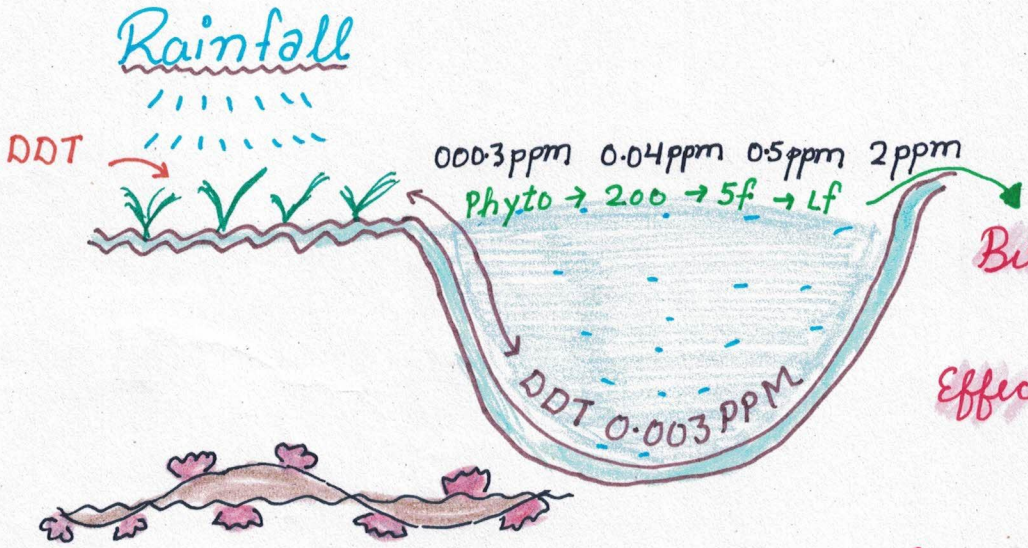
Biodegradable Non Bio-degradable



BioMAGnification

Non-Biodigradable: DDT, BHC, ABS, Al, Hg, cd, PCB.

- BHC → Alkyl Benzene Sulphate.
- PCB → Polychlorinated Biphenyles.



Rachel Caison

↓

Book - Silent Spring

↓

Pesticide Pollution (DDT)

Bird (25ppm)

↓

Effect calcium metabolism

↓

Egg shell become thin

↓

Aemature breaking.

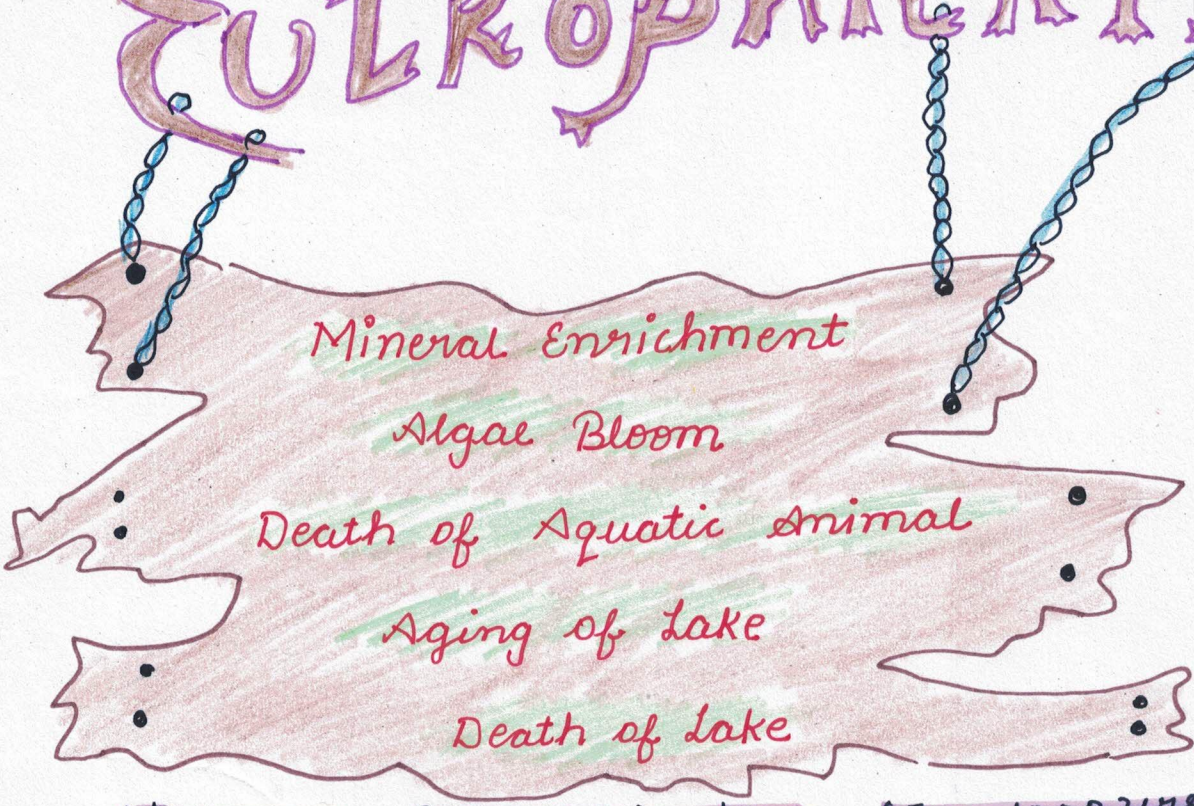
↓

Bird population ↓se.

Hg → Minemate Disease.

Cd → Ouch - Ouch Disease. (Itai - Itai)

Eutrophication

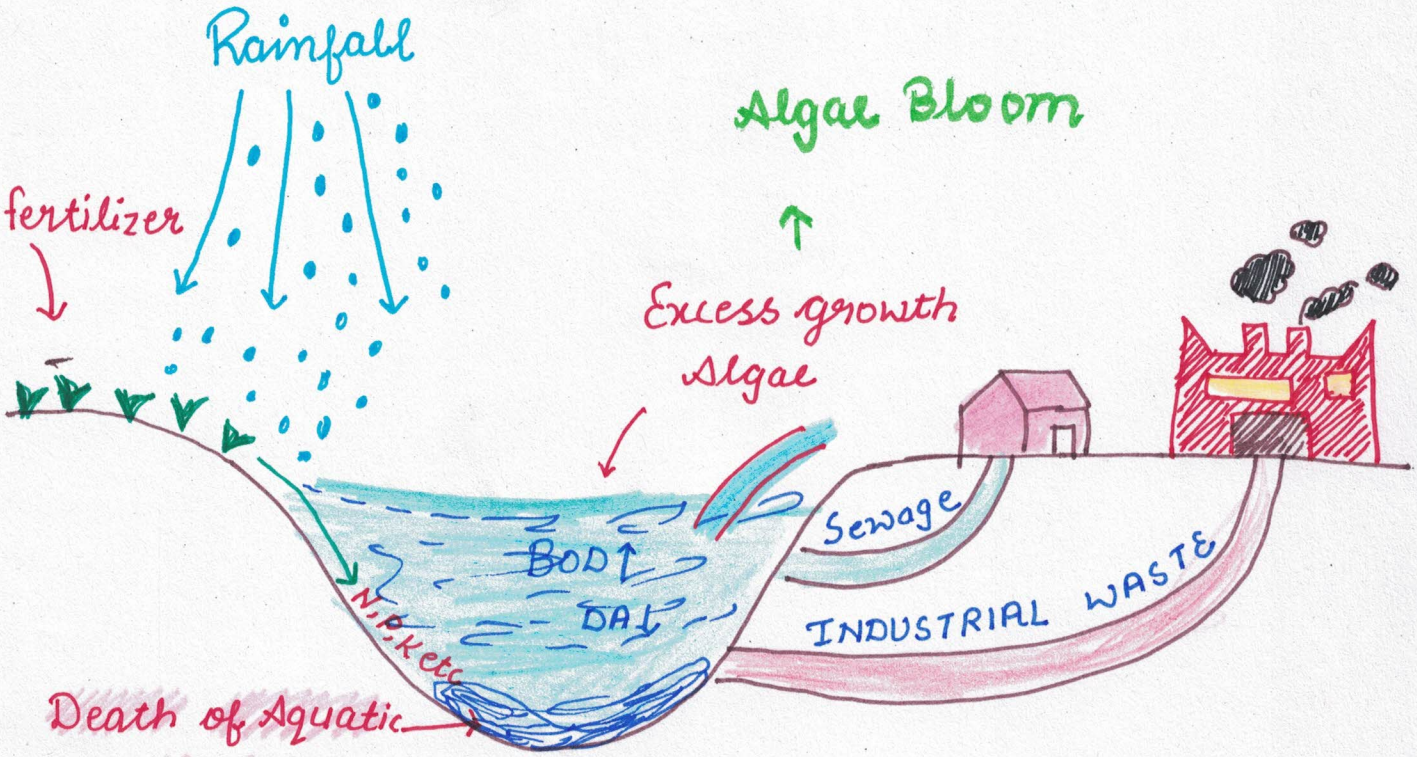


Natural Eutrophication (500-1000 yrs)

HUMAN Induced Eutrophication.

Accelarated Eutrophication.

Cultural Eutrophication.



Death of Aquatic Organism

↓

Lake water become shallower and warmer.

↓

Ageing of Lake

↓

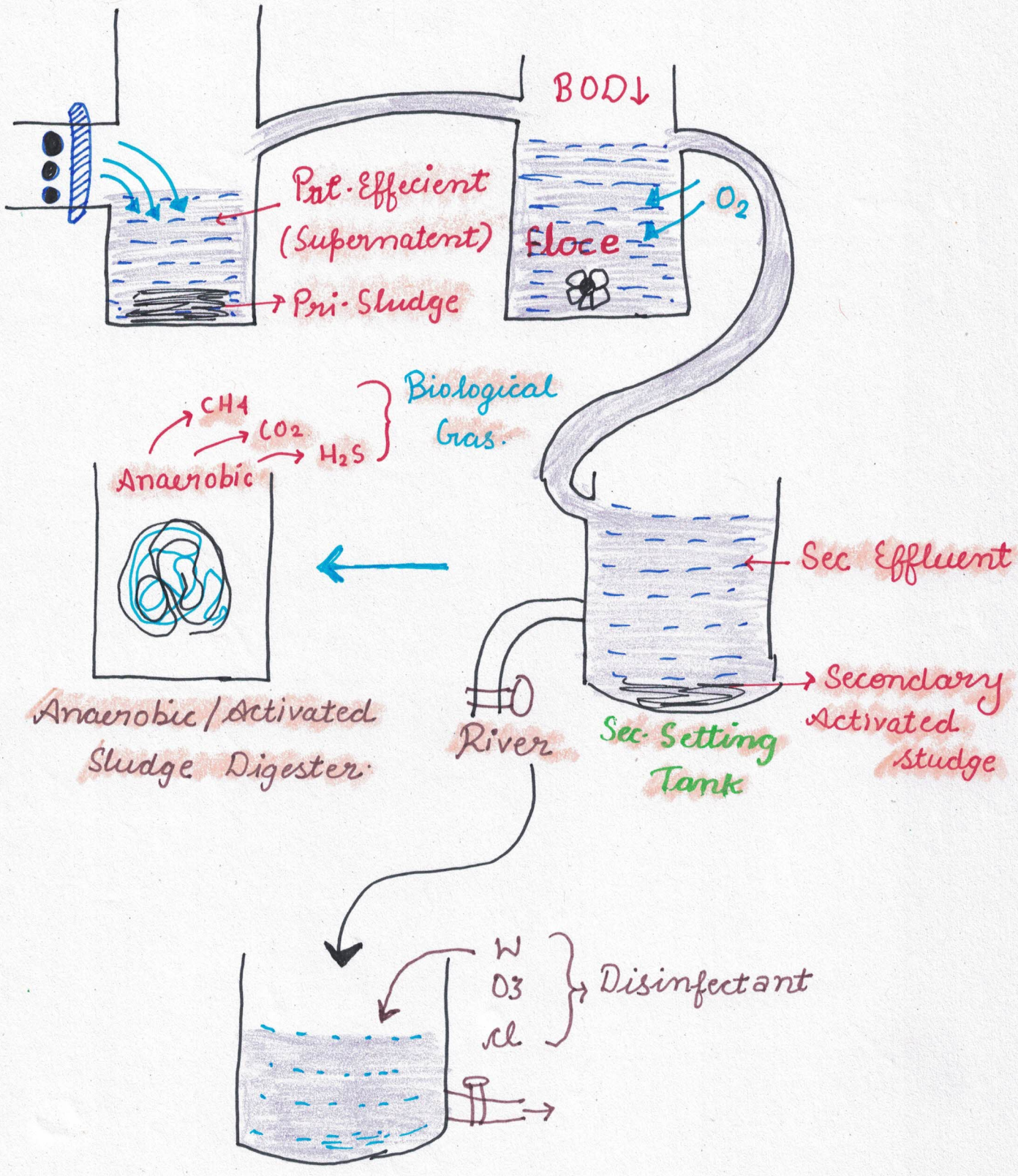
Death of lake

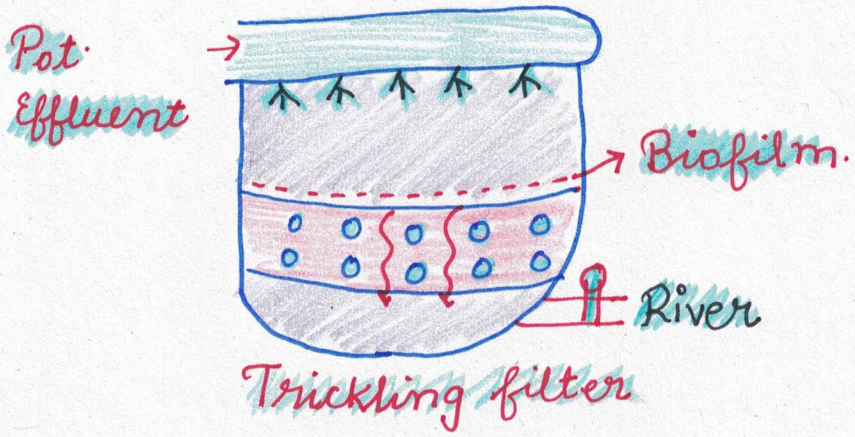
Primary Treatment (Physical)

- filteration.
- Sedimentation.

Secondary Treatment (Biological)

- Aeration.
- Sec. Setting tank.
- Anaerobic / Activated Sludge / Digaster.





Demography:

Scientific study of human population.

census :→ official counting of human population.
- Each decade
- Very first year, first four months.

India

2001 → 1.02 million

2011 → 1.21 billion

World

6-billion.

7-billion.

POPULATION DENSITY

N

P.D = Total no. of Individuals / unit Area

Km² = human
hec. = Trees
m² = Grass
Cm² = Bacteria.

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India → 382/km²

World → 33/km²

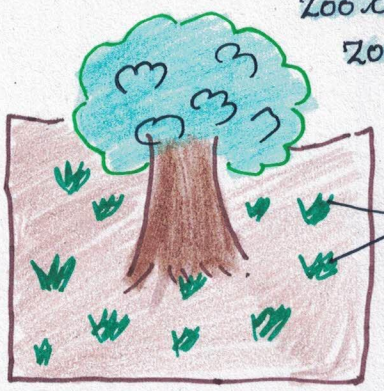
Max → Bangladesh = 1142/km²

Greenland = 15/km²

SPECIAL

400 - Pinus
200 - Deodar
100 - Abies
→ Max

1 Brown Tree → Biomass or Zoo cover Area Zoo



Population Density

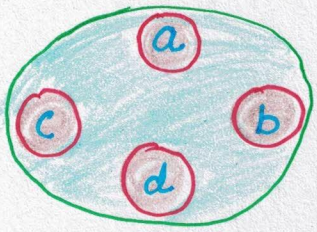
Absolute

formula $\frac{a+b+c+d}{4} = PD$

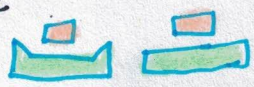
Relative

Fishes in Pond

$\frac{a+b+c+d}{4} = PD$



Bacterial culture → Biomass



NOTE

Indirect Census

↓

Tiger

↙ ↘

Pug Marks Fecal Matter

BIRTH RATE - (Natality)

$$BR = \frac{\text{Total No. of birth in a year}}{\text{Population}}$$

Question :→ 20 lotus plants $\xrightarrow{12}$ 28 lotus plants.

⇒ $BR = \frac{8}{20} = 0.4 / \text{Lotus} / \text{yr}.$

CRUDE BIRTH RATE (CBR)

CBR = Total no. of Birth / yr / 1000

India CBR = 24 / yr. / 1000

DEATH RATE MORTALITY

$$DR = \frac{\text{Total no. of death in a year}}{\text{Population}}.$$

Question :- 40 insect $\xrightarrow{1\text{month}}$ 36 Insects.

→ $DR = \frac{4}{40} = 0.1$

CRUDE DEATH RATE (CDR)

CDR = Total no. of death/yr./1000

India CDR = 8/yr/1000

AGR = CBR - CDR

India AGR = 24 - 8 = 16/yr/1000

% AGR = 1.6 %

(Immigration)

↓

Natality → Population Growth (PG) ← Mortality.

↓

Exit → Emigration.

PG = (N+I) - (M+E) or (B+I) - (D+E)

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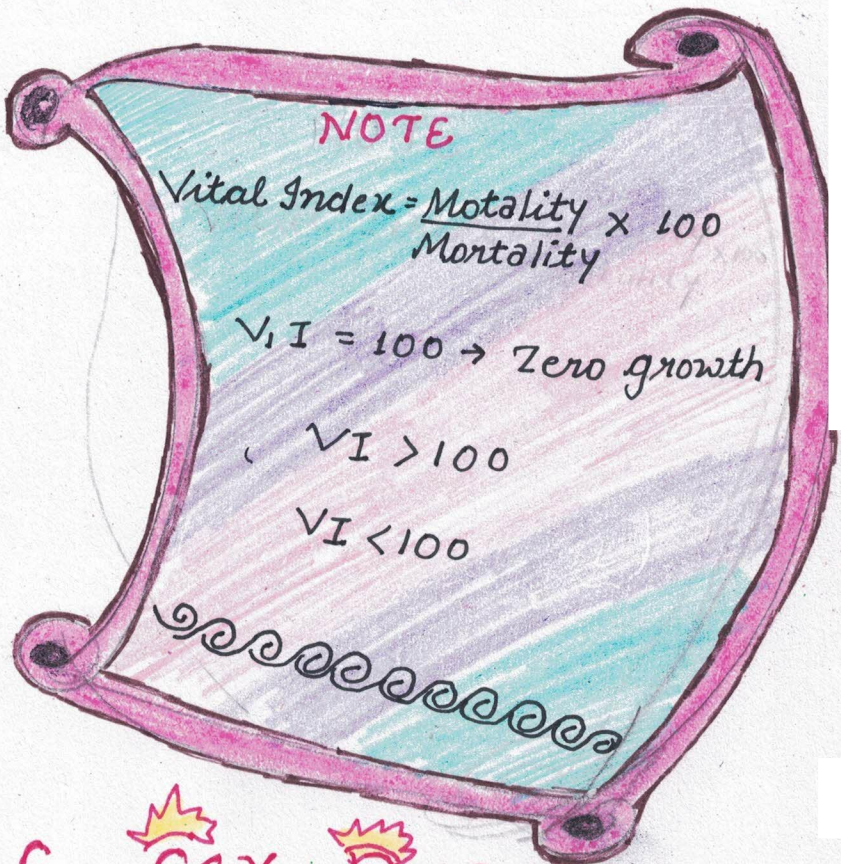
- $(B+I) = (D+E) \Rightarrow$ Zero growth
- $(B+I) > (D+E) \Rightarrow$ +ve growth
- $(B+I) < (D+E) \Rightarrow$ -ve growth

$$N_{t+1} = N_t + [(B+I) - (D+E)]$$

$N_t = 100$

1 year $\begin{bmatrix} B=20 & I=10 \\ D=10 & E=5 \end{bmatrix}$



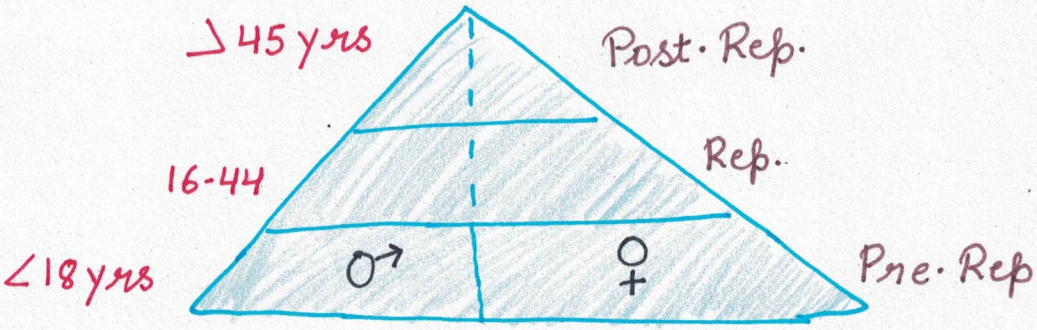
AGE - SEX PYRAMIDS :-

Age Groups -

< 15 yr = Pre - Reproductive.

15 - 44 yrs = Reproductive.

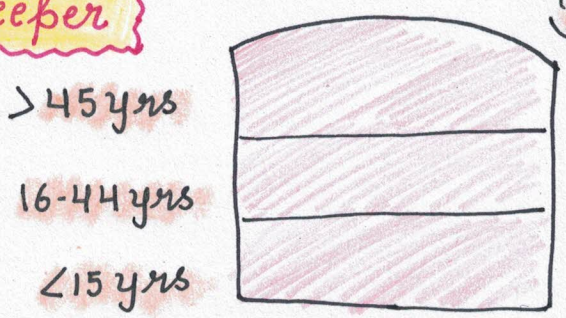
> 45 yrs = Past Reproductive



Expanding (Developing)

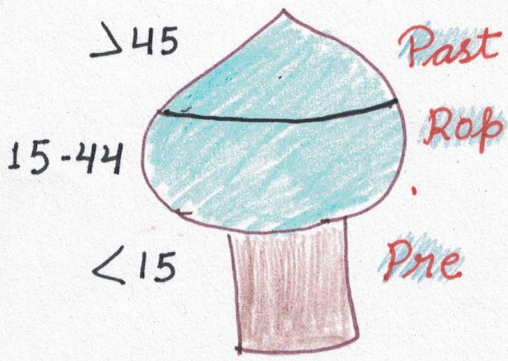
Less Steeper

Bell Shape



Stable (Developed)

More Steeper



Urn Shape
↓
कलश।

Declining (china)

Population Growth Curve

Resources Unlimited
↓
J-shape
↓
Geometric
↓
Exponential

Resources limited.
↓
S-shape
↓
Sigmoid.
↓
logistic

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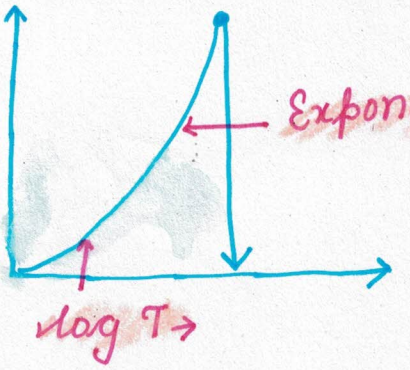
J-Shape

Biotic Potential (b-d)

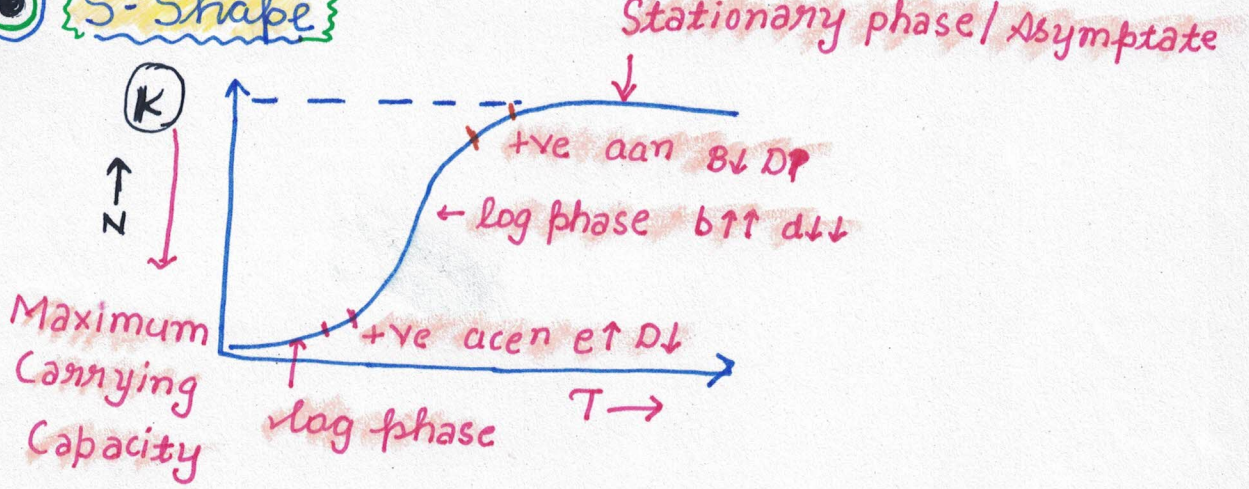


$\frac{dN}{dt} = rN$ ↑

$Nt = No\,e^{rt}$

- Rainy Insect.
- Seasonal fungi.
- Algae bloom.

S-Shape



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

$r = 0$ when $K = N$

Environmental Resistance

Question If present population $= x$

After 3yrs $= 2x$

$Nt = No\,e^{rt}$

$2x = ne^{3r}$

$\log 2 = 3r \log_e e$

$\ln 2 = 3\gamma$

$0.69 = 3\gamma$

$\frac{0.09}{3} = \gamma$

$0.23 = \gamma$

- flebby (flexible) Bone → Swin Bladder Absent
- Lactate Dehydrogenase → Enzyme.