Biodiversity

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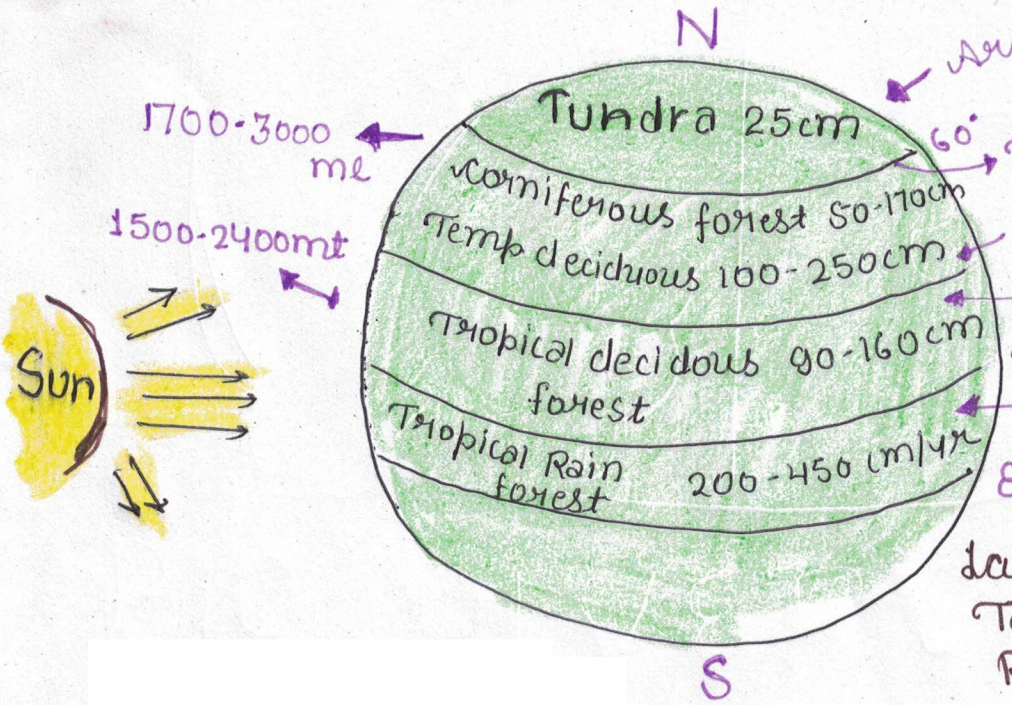
BIODIVERSITY

Biome

large ecosystem

Important role of temperature → Intermining

- **Biotic**
  - Plants
  - Animals
  - Microbes
- **Abiotic**
  - Temperature
  - Rainfall + Snowfall → Precepitation



Arctic

60° → Tree lime/Timber line

Temperature

Subtropical

20°

Tropical

Equator 0°

Latitude ↑
Temp. ↑
Rainfall ↓
Light ↓
Diversity ↓
Productivity ↓

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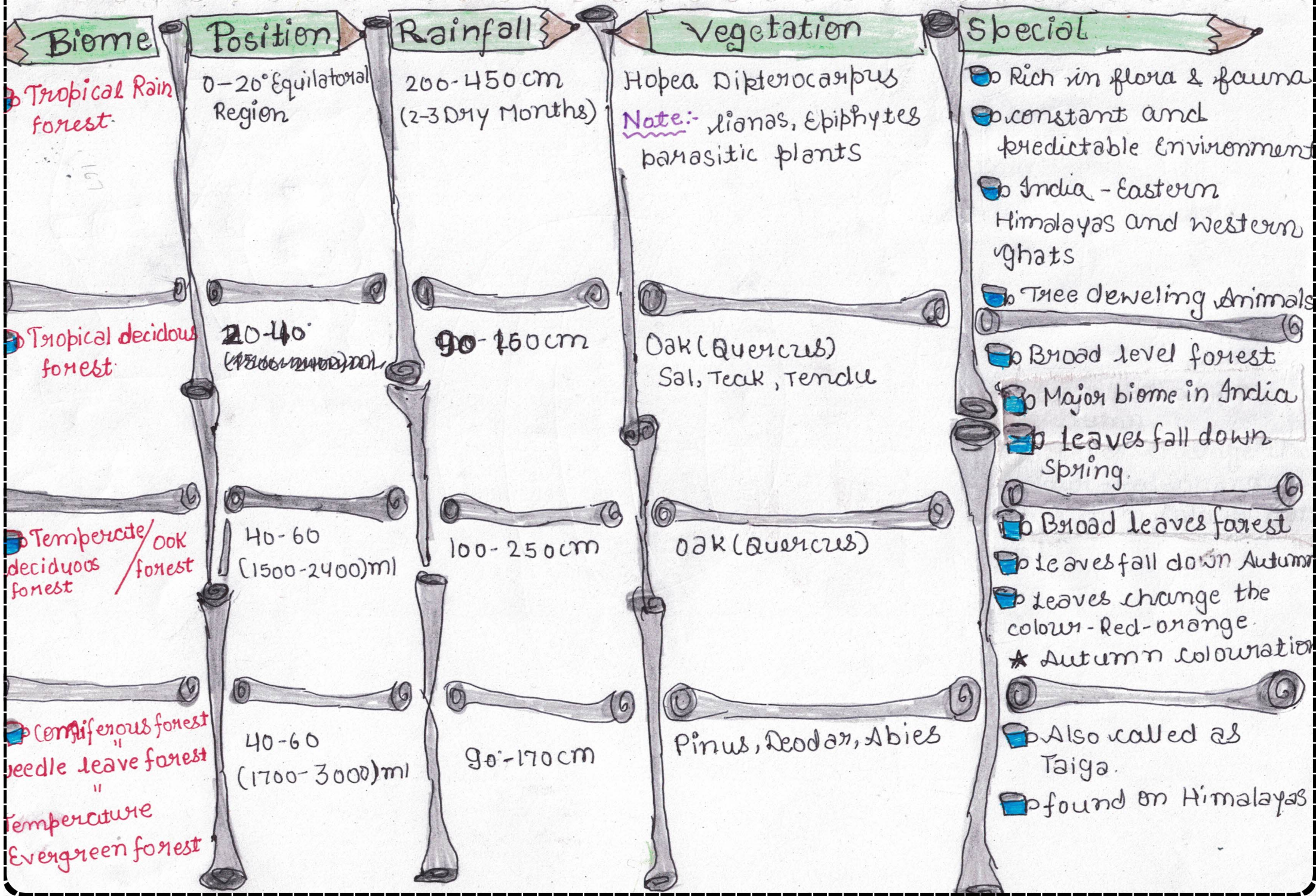

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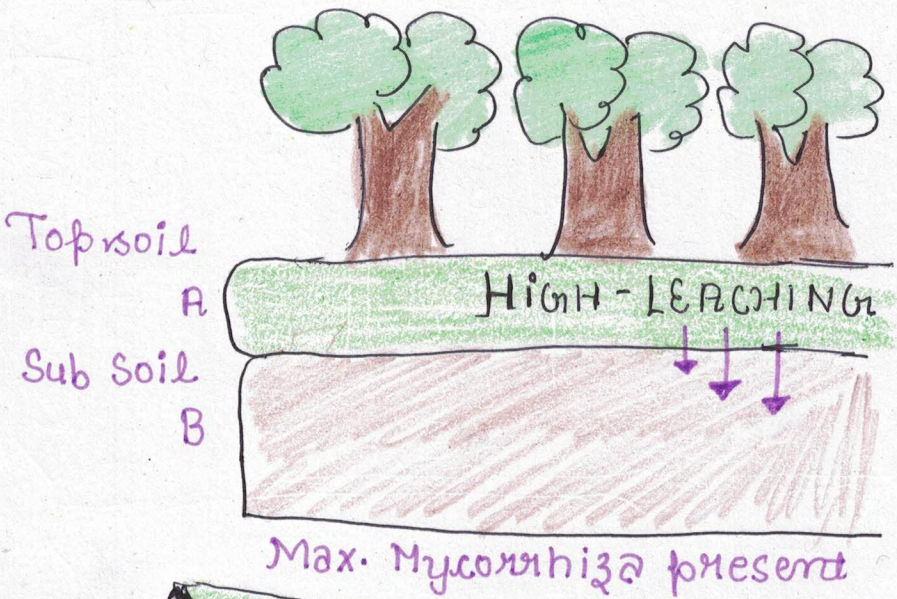
Tropical Rain forest

Rainfall ≥ 200-450 cm

- Specification is a function of time
- Long Evolutionary time.
- high Niche specialisation.
- Direct Sunlight More over light

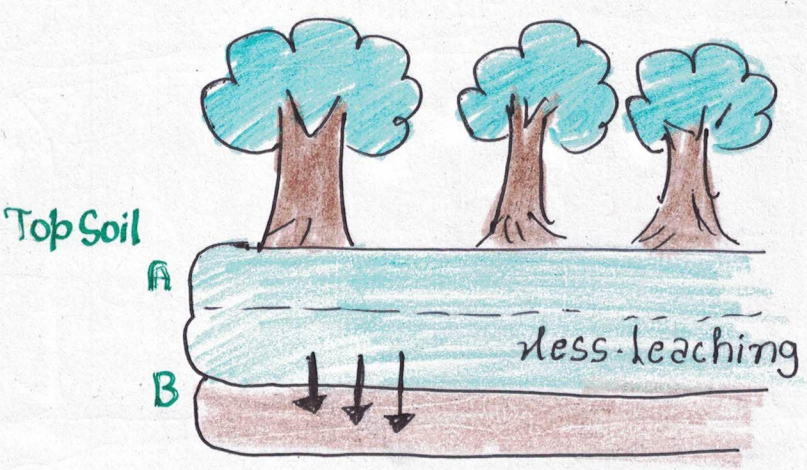


Oligotrophic
↑
Top soil
Nutrient Poor

Max. Mycorrhiza present

Temperature Deciduours

Rainfall = 100-250cm.



Eutrophic Soil
↑
Top soil Nutrient Rich

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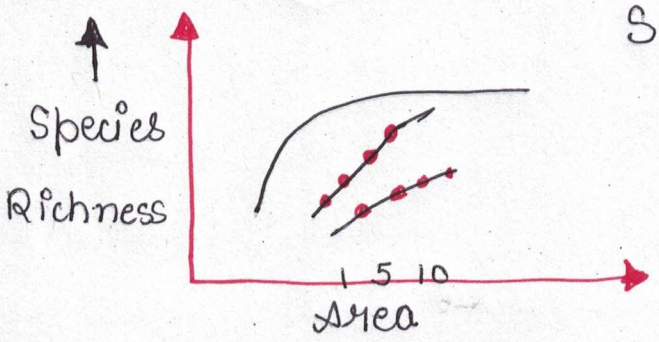
Species Area Relationship



$S = CA^Z$

$\log S = \log C + Z \log A$

Small Area = Z = 0·1 - 0·2

Large area = Z = 0·6 - 1·2

Tropical Rain forest = Z = 1·5
(fruit Eating birds + Mammals)

Loss of Biodiversity

SSS

Tropical pacific Islands :- Human colonies → 2000 Native Birds species → Extinct

SSS

IUCN (2004) :- Last 500 years → 784 species → 334 Vertebrates, 339 Invertebrates, 87 Plants

Recent Extinction

- Dodo
- Quagga
- Thylacine
- Sterllars Sea cow
- Bali, Javan, Caspian
- (Sub. Species of Tiger)

Presently

- 12% Birds
- 23% Mammals
- 31% Gymno
- 32% Amphibians

} Threat of Extension

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Threatened Species

- Critically Endangered → Immediate future → Danger
  - Sibarian Crane
  - Great Indian bustard
- Endangered → Near future → Danger
  - Bentinckia nicobaria
  - Rawscoolfia Subantiana
  - Red panda
  - India Aconite
  - Hornbill
- Vulnerable → Number ↑ → OverExploitation
- Rare → Least no. in Nature

Species
50000
20,000 V | 2000 E | 200 C·E

Red Data book → Plant + Animal
Green Data book → Plant (Conserved)

Causes of Biodiversity Loss

Evil Quarter

(i) Habitat loss and fragmentation
(ii) OverExploitation.
(iii) Alien Species Invasion.
(iv) Co-Extinction

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BIODIVERSITY CONSERVATION

- In-situ
  - On-Site
- Ex-Situ
  - Off-Site

(i) Biodiversity Hot Spots :- 25+9 = 34

< 2% Area (1.4%)

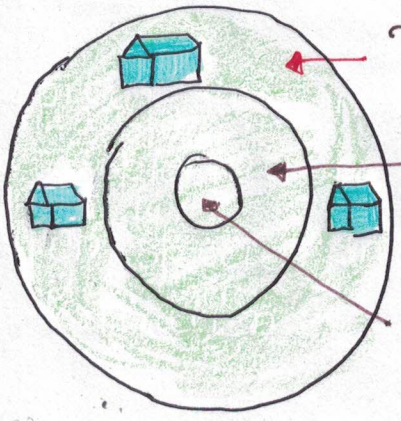
- High level of Species richness
- High degree of threat ∝ Habitat
- High level of Endemism.

India - 3 Hots Spots

- Western ghats - Sri Lanka
- Indo - Burma
- Eastern - Himalaya

(ii) Biosphere Reserves (Biotic + Abiotic)

1986 → MAB Man and Biosphere



Transition Zone (people visits Normally)

Buffer Zone (only when permitted)
(No one Allowed Even VIP's)

Core Zone (NEET- VG (17))
(14) → (18)

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(iii). National Parks (Biotic) (90-120)

(iv). Wild life Sanctuaries (Animal) (448-500)

(v). Sacred Groves :-

- Khasi and Jaintia Hills in Meghalaya.
- Aravalli hills of Rajasthan.
- Western ghats region of Karnataka and Maharashtra.
- The Sarguja, Chanda and Baster Areas of Madhya Pradesh

Ex - Situ

- Botanical Garden
- Zoological Parks
- Wild life Safari parks
- Cryopreservation (-196°C) liquid N_2
- Seed Bank
- Tissue culture.

20th century → Starting → 30% land area forest cover

↓

End → 19.4% forest cover

↓

12% forest Dense forest

1988 → National forest policy

Hills → 67%. plains = 33%

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forestry

Protection

Conservation forestry

Biosphere Reserves

National Park.

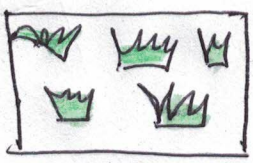
Production

Commercial forestry

Social forestry

Agroforestry -

Taungya Sysh



- 1980s → JFM → Joint forest Management.
- 1972 → Wild life protection Act.
- 2002 → Biodiversity Act.
- 1974 → chipko Movement
- Sailent Valley → National Reserve forest.

Steps Internationally taken :-

1992 → Earth Summit

↓

UNCED → United Nation conference on Environment and development

↓

2002 → World Summit

↓

sustainable Development

↓

2010 → Biodiversity Year

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IUCN :- Government

WWF :- World Wild Life fund (NGO)

BIODIVERSITY (EDWARD WILSON)

Gene Diversity :- Single species

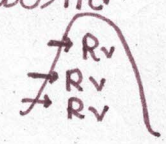
↓

Different Genes (Alleles)

Example :- Rauwolfia Vomitoria

↓

Reserpine



Rice Strains > 50,000

Mango 1000 Varieties.

Species Diversity :- Single Community

↓

Different Species.

Example :- Western Ghats > Eastern Ghats

Ecosystem / Ecological Diversity :- Single Landscape

↓

Different Ecosystem.

Example :- India / Norway

Total discovered species

↓

> 1.5 Million ← 22%

Total Species = 7-Million

Robert May

Animals

> 70%.

↓

Max. Insect (70%.)

plants

22%.

↓

Max Angio > fungi

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Overall max. = Insect

INDIA

↓

2.4% land Area

↓

8.1% Diversity

8.1% > 450000 = plants
> 90,000 = Animals } Discovered

> 135000
> 560000 } 22%

Pollution

Any undesirable, change in physical, chemical and biological composition of Air, water and Soil.

Types of Pollutant

① Biodegradable

Quantity ↑↑

↓

Pollutant

Example

Sewage

dive stock Garbage

Non-Biodegradable

Eg:- DDT,
(Dichloro diphenyl trichloro Ethane)

BHC (Benzene Hexa chloride)

- Glass, plastic, Aluminium
- Mercury.

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(2) PRIMARY POLLUTANTS

In the form of unburnal hydrocarbon

Car Smoke → CO_2, CO_2, HC → 3,4 Benzopirine, Benzene, Nox, Sox, Pb

DDT

SECONDARY POLLUTANTS

Sox, Nox + H_2O $\xrightarrow{O_2}$ H_2SO_4, MNO_3

↑↑↑ ↓↓↓

Car Smoke — Acid Rain (Sec.)

$HC + NO + O_2 \rightarrow PAN + NO_2 + O_3$

↓

Peroxyacetyle Nitrate

Fog + Smoke → Smog (Sec.)

(3) Quantitative

Part of Nature

↓

Quantity ↑

Eg:- CO_2, Nox, SOx

Qualitative

Not a part of nature

↓

Small Quantity

↓

Pollutant

Eg:- CO, CN, DDT

(4) Natural

CH_4

Methonogen ↑↑↑

Marshy Area

||

Paddy field

SOx

volcanic lava

forest fire - CO_2

Anthropogenic (Man-Made)

Vehicular pollution

Industrial pollution

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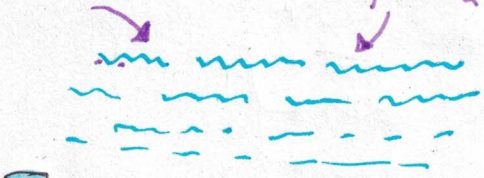
Types of pollution

(1)

POSITIVE POLLUTION

Undesirable overfertilizing

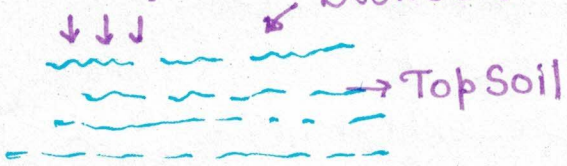


Soil

- land filling

NEGATIVE POLLUTIONS

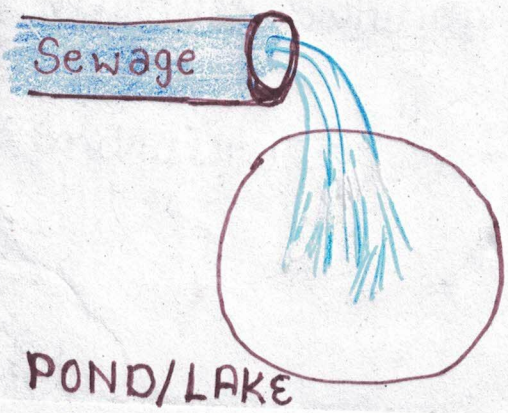
Rainfall ↓↓↓ Desirable



- overgrazing
- Deforestation

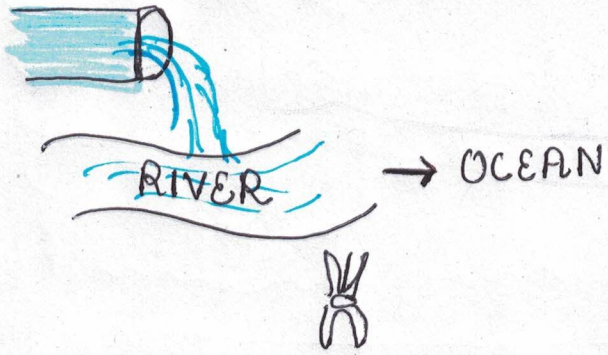
POINT SOURCE POLLUTION

(2)



NON-POINT SOURCE POLLUTION

large area



OUTDOOR POLLUTION

(3)

- Vehicular pollution
- Industrial pollution

INDOOR POLLUTION

- Mosquito killer → Insecticide
- News paper → Ink - (Pb)

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Air Pollution

Gaseous → CO, CO_2, NOx, SOx etc

Particulate
- Settleable → Size 10 μm ↑
- Suspended → Size 10 μm ↓

CPCB :- Suspended particular Method → Size 2.5 μm ↓

Suspended Particular Matter

- Solid
  - Example
    - Dust particle
    - Soot, Small C-particles in smoke
    - Pollen grain
- Liquid-fog/Mist
  - Aerosols

PRIMARY AIR POLLUTANTS

(i) NOx →
source ↓
- vehicular Smoke
- fertiliser Industry
- Agriculture field.

Urea + H_2O ⟶ NO_2 ↑ NO_3 ↑

Harm → lung cancer

(ii) SOx →
source ↓
- vehicular Smoke
- Thermal power plants (coal Burning)
- Oil Refineries
- Ore Smetters

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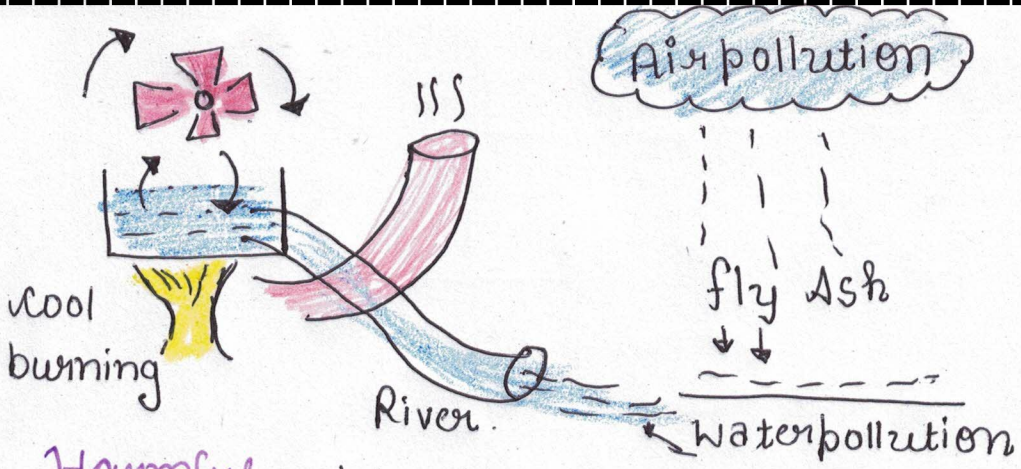


Harmful :- Chlorophyll destruction

Note :- Lichen → SO_2 sensitive → pollution Indicator

(3) Hydrocarbons

Carcinogenic
- 3,4 Benzopyrine] umbun H.C
- Benzene
- HCHO] - Dry cleaners
- CH_4] - Marshy Area

↓

VOCs

↓

Volatile Organic Compounds

Harm → Lung Cancer

(4) CO -

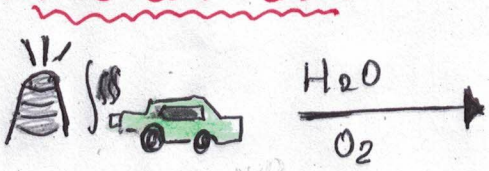
Source - Vehicular Smoke

Harm - Asfyscia.

Secondary Air Pollutants

Normal Rain Water pH = 5-6
Acid Rain pH < 5-6

(i) Acid Rain



H_2O
O_2

H_2SO_4 : HNO_3
70 : 80

H_2SO_4 70
HNO_3 28
Other Acid 2

H_2SO_4 ↑↑
HNO_3 ↓

Acid + Rain = Water ← Wet Acid Rain ← Acid Rain

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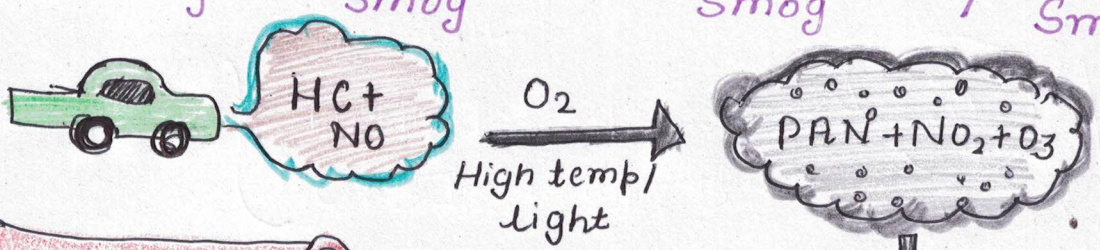
Harm

- Air, water and soil → Acidic
- Historical Monuments
  ↓
  Taj Mahal
  ↓
  Stone-yellow → (Stone leprosy)

2. fog + Smoke → Smog :-

(i) Los Angles Smog / Photochemical Smog / Light induced Smog / Oxidising Smg



NOTE:

Brown coloured Air
↓
Photochemical Smog

Low temp. → Incomplete Photochemical Smog → Grey coloured Air

Harm of PAN

- Eyes, Skin → Irritation
- Plants - P.S II e^- flow → Blocked.

Ozone

- Emphysema
- Respiratory Tract → Mucous membrane → Rigid

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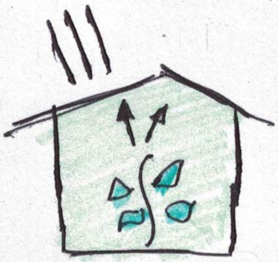
(ii). London Smog / cool Induced Smog / Industrial Smog / Classical Smog / Reducing Smog / 5·days Smog

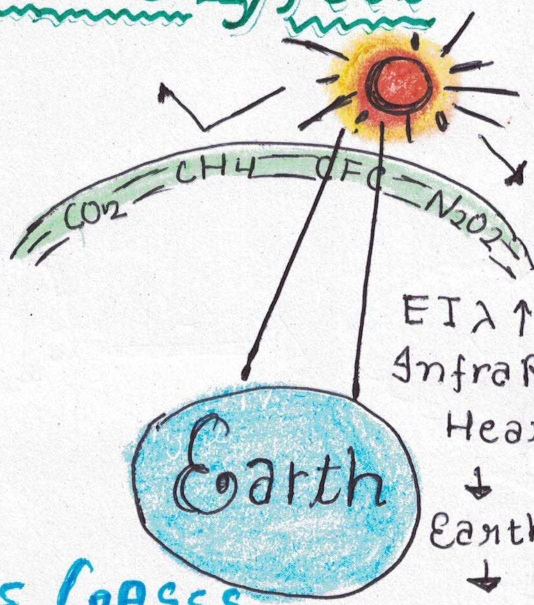
1952
5 Dec
↓ 5 days
9 Dec

80x Coal Burning → $H_2O + O_2$ (low temp) → H_2SO_4
↓
Yellow coloured Air
↓
London Smog

GREEN HOUSE Effect



Phytotrons



ET λ ↑
Infra Red
Heat ↑
↓
Earth surface
↓
Warm

GREEN HOUSE GASES

CO_2 = 60%

CH_4 = 20%

CFC = 14%

N_2O = 6%

Note :- NO_2, SO_2, O_3 and water Vapour

Global Warming ← Earth Surface ← CO_2 Concⁿ
↓
Extra Warm

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CO_2 Conc^n = 1956 — 280 ppm | 2001 — 368 ppm | Present — 394-400 ppm

CO_2-fertilizing Effect

C_3-plants (Dicots) → CO_2 conc^n ↑ → Photosynthesis ↑

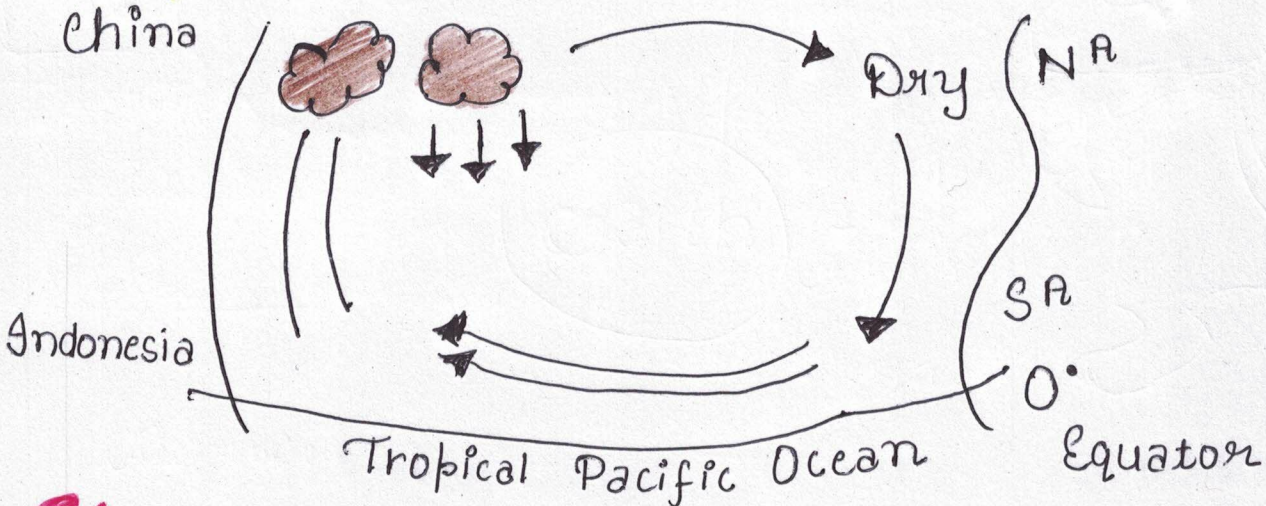
↓

Partial closing of stomata → Transpiration

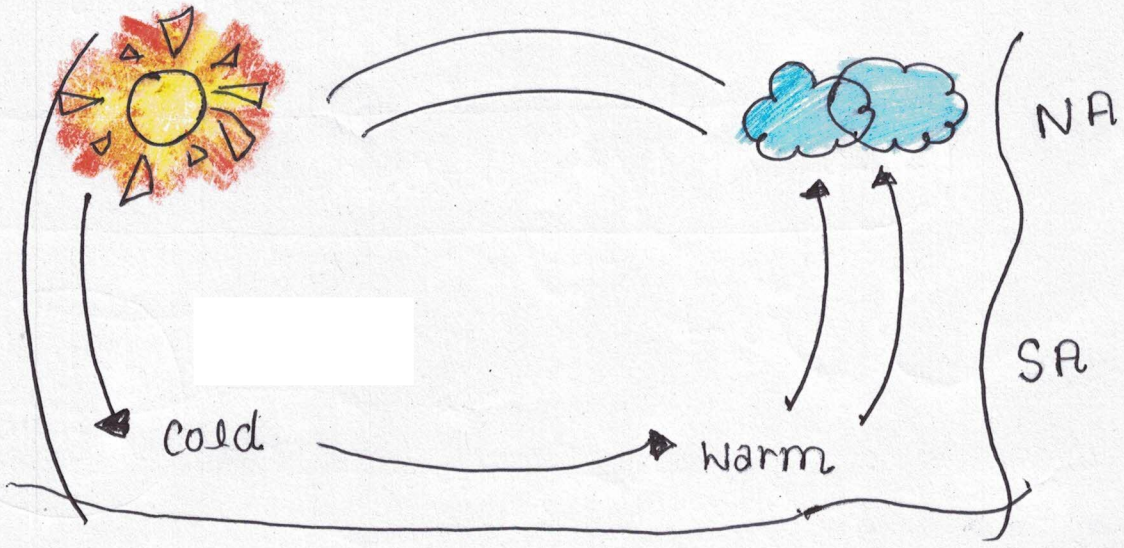
↓

Stomatal Density ↑

La-Nina



El-nino



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1992 → Earth Summit

↓

UNCED → United Nation Conference on Environment and development

1995 - COP-1 → Berline Germany → fail

↓

Conference of parties

1996 → COP-2 → Geneva, Switzerland → fail

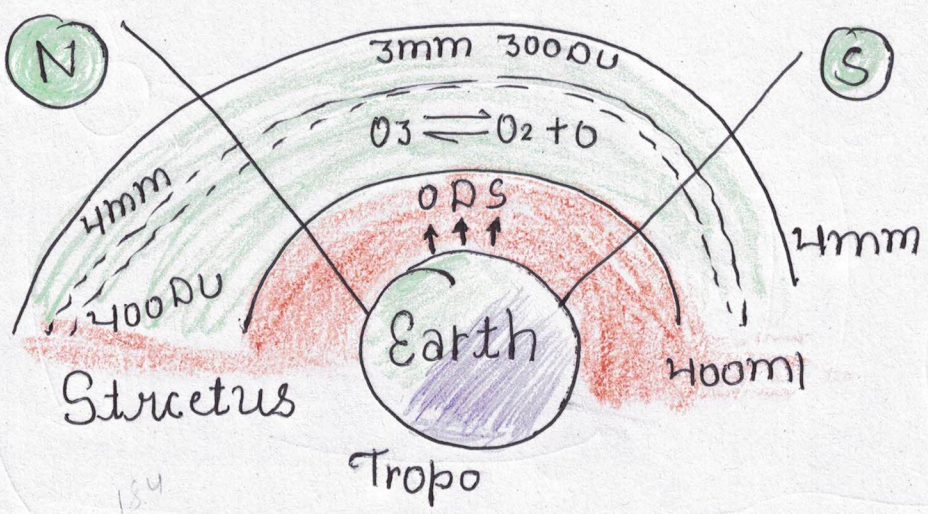
1997 - COP-3 → Kyota, Japan → Kyota protocol

↓

Agreement

2011 → COP-17 → Durban, South Africa
2012 → COP-18 → Doha, Qater → 2020
2013 → COP-19 → Warsow, Polland
2014 → COP-20 → Lima, Peru
2015 → COP-21 → Paris, france
2016 → COP-22 → Manakesh, Morocco
2017 → COP-23 → Bonn, Germany.

Ozone Depletion



Ozone thick ness

↓

Dobson Unit

↓ DU = 0·01mm

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ODS → Ozone Depleting Substances

$$CF_2Cl_2 \xrightarrow{h\nu} CF_2Cl + Cl^{\cdot}$$

$$Cl + O_3 \longrightarrow ClO + O_2$$

$$ClO + [O] \longrightarrow Cl^{\cdot} + O_2$$

Max. Accumulation of CFC = Low temp. (Polar Area)

Ozone total thickness ↓ → Ozone hole (100 DU)

first Ozone hole → 1985 → Antarctica.

↓

(last Aug - Early Oct.)

1987 → Montreal Protocol → Montreal City Canada

↓

1989

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