AIR-1 Notes

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Handwritten notes by

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AIR-1 ESE 2021

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General Studies

Environment & Ecology

⇒ Basic terms related to Ecology, Environment and Energy

1) Species

2) Population

3) Factor

4) Environment and Atmosphere

5) Latitudinal division of earth

6) Community / Biocenosis

7) Ecosystem / Geobiocenosis

8) Ecology / oekologie

9) Autecology v/s synecology

10) Ecotone / principle of edges

11) Technoecosystem

12) Biosphere and Biosphere-2

13) Natural Capital / Ecosystem Services

14) Ecological Foot Print / E.F.P and Earth Overshoot Day

15) Biocapacity

16) C.C.S. / Carbon Capture and Storage
Carbon Sequestration

17) Concept of Carbons

18) Carbon Footprint

19) Carbon Hand print

20) Ecological Equivalent

21) Ecological Guild

22) Ecological Succession

Miscellaneous.

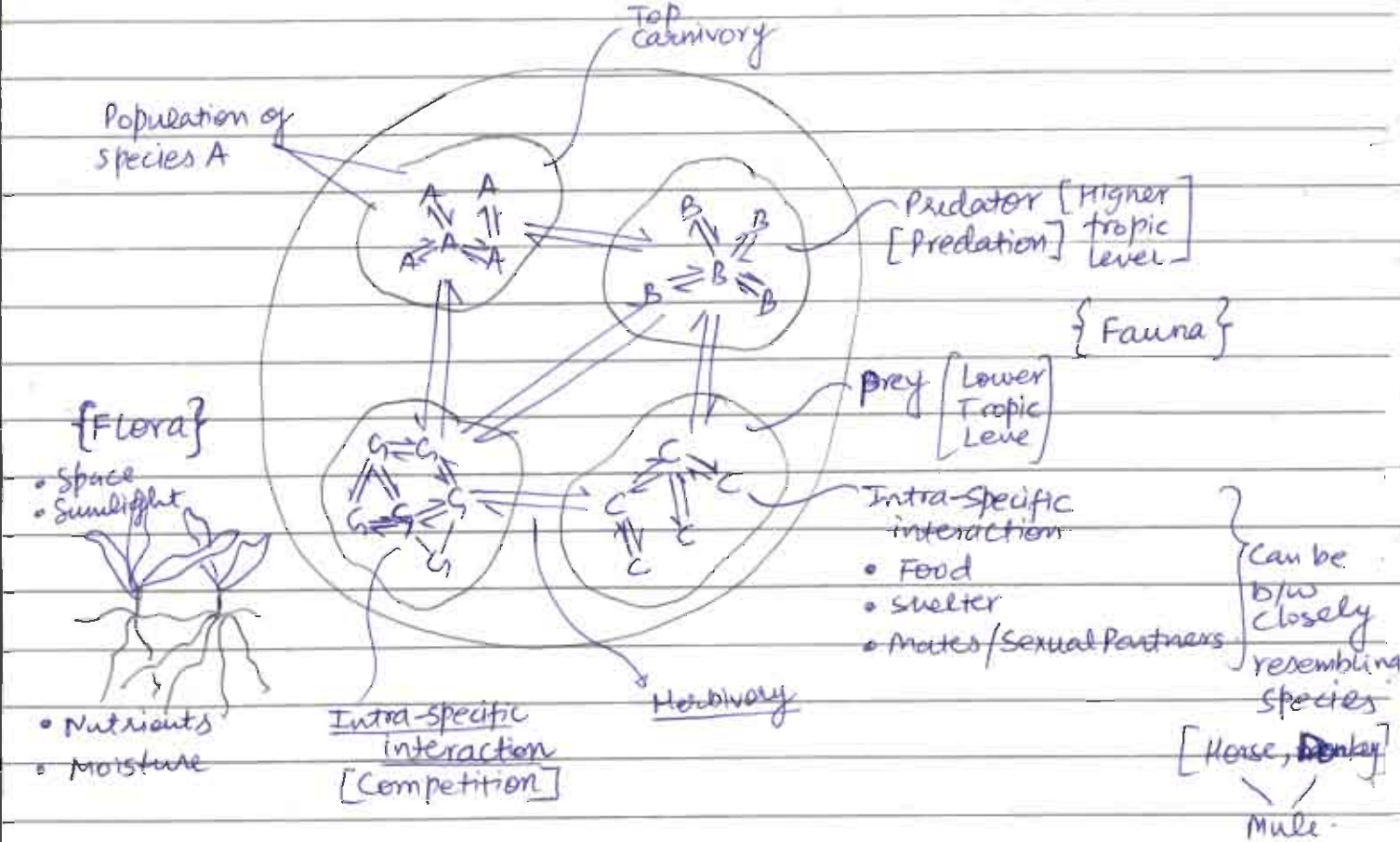
⇒ Species concept

1) There are different concept of species like morphological, genetic and biological.
2) Species is basic unit of Taxonomy that deals with nomenclature and classification.
3) In ecology and environment, biological species concept given by Mayr is widely used.
4) According to Mayr, when individuals can interbreed or reproduce and can form fertile offspring, then they belong to same species.
(ant. sterile)

M ♂ F ♀ Bi ⚥

NOTE: Linnaeus → Father of Taxonomy gave morphological species concept which is on the basis of Age similarity in external morphology (appearance) (Concept was rejected)

Lotsy → gave genetic species concept. According to which members of same species are genetically identical In humans, only identical twins are genetically identical



⇒ Population

It is sum of all individuals that belongs to a given species present in a given area.

⇒ Community / Biocenosis

→ It is sum of all different populations present in a given area.

→ It includes population of all plants [Flora], animals [Fauna] and micro-organisms. ex- bacteria and fungi.

→ Community forms biotic component of the locality.

⇒ Factor

→ Factor is any force or substance or condition that affects individuals in any way

→ For ex- light, temperature, rainfall, chemical fertilizer, wind, competition, herbivory, carnivory.

NOTE: When interaction occurs among members of same species it is called as intra-specific interaction. ex- competition among members of same species.

→ When interaction occurs among members of different species it is called as inter-specific interaction ex- herbivory, carnivory and competition.

→ Bamboo is the longest grass and it is monocarpic as flowering occurs only once

→ when flowering occurs multiple times, it is called as polycarpic ex- mango tree.

⇒ Environment

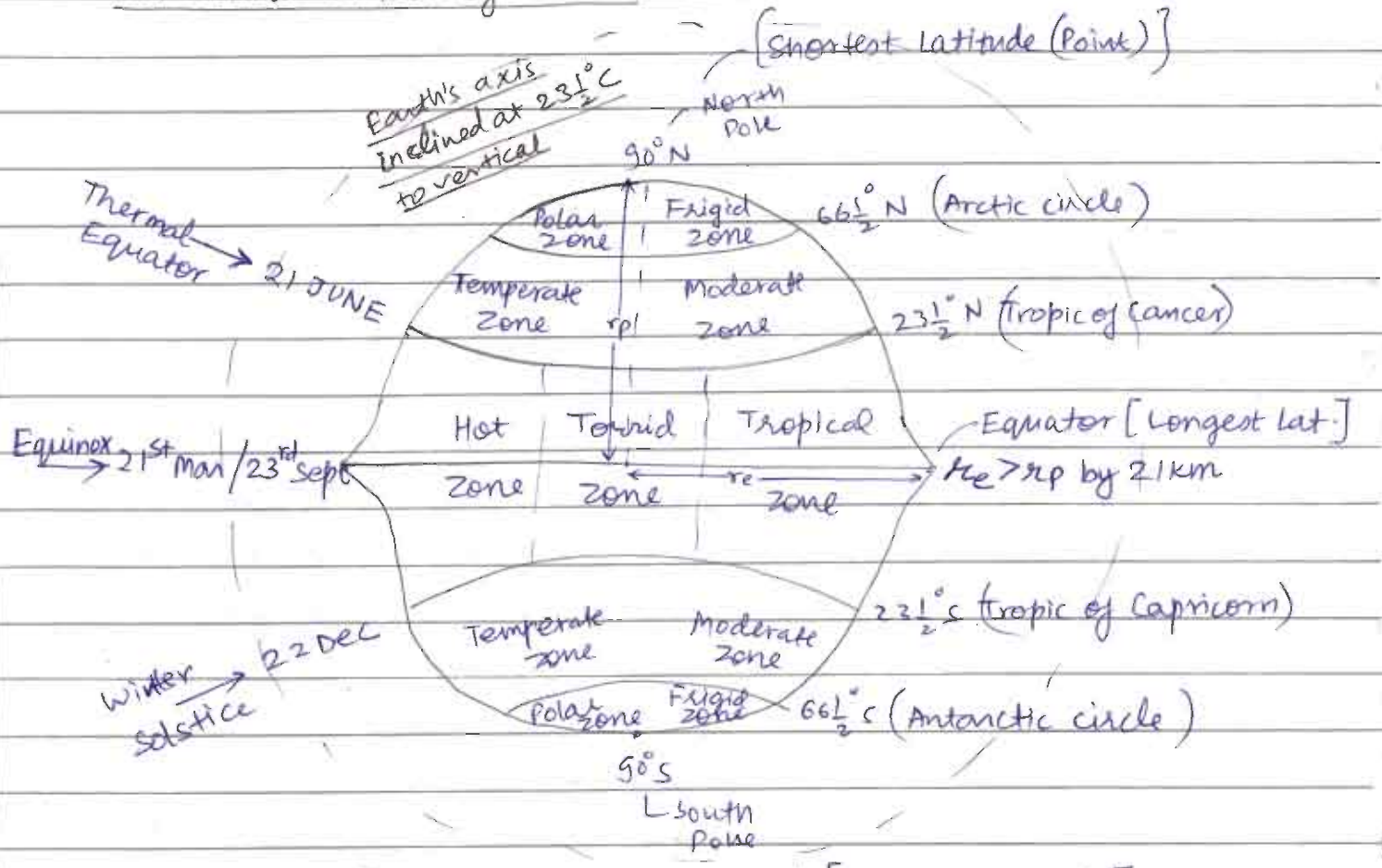
It is sum of all biotic and abiotic factors.

NOTE: 5th June is declared as World Environment Day due to Stockholm Conference or Stockholm Declaration (5th June 1972).

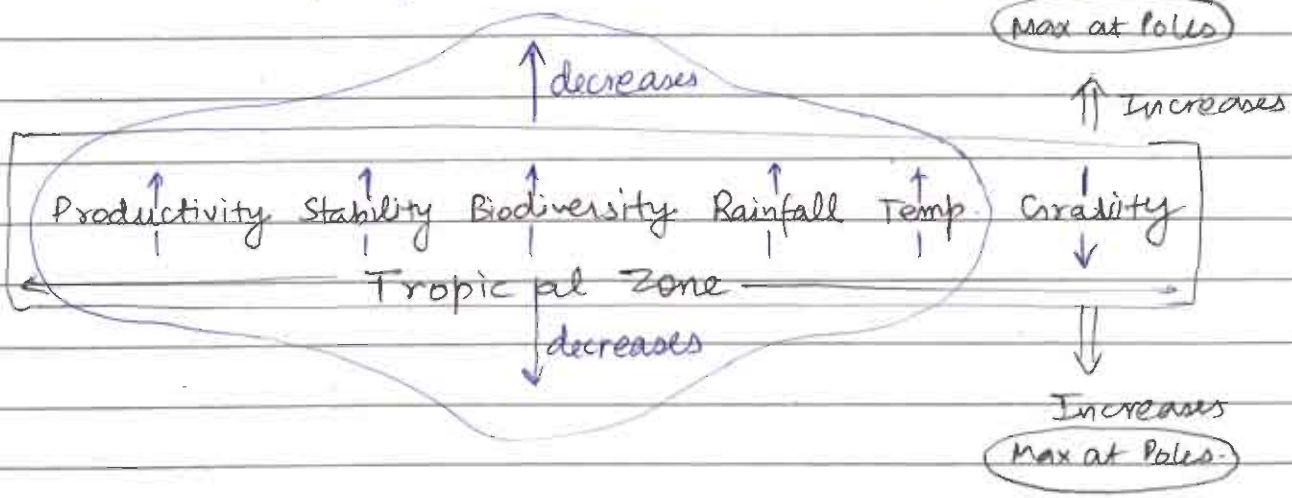
→ For 5th June, 2018, India was host country and theme was beat plastic pollution.

→ For 5th June, 2019 china was the host country and theme was air pollution.

⇒ Latitudinal Division of Earth



Shape of earth ⇒ Geoid [Oblate spheroid]



⇒ Atmosphere

→ It is gaseous envelope surrounding earth surface which is endogenous in origin i.e. gases are released from interior of earth.

→ Atmosphere is responsible for maintenance of low diurnal range of temperature i.e. habitable temperature

→ Atmosphere is held by means of force of gravity which is maximum at the surface of earth.

NOTE: The difference in temperature between day and night is called as diurnal range of temperature.
→ moon is devoid of atmosphere like that of mercury (1/6th gravity) (Solar impact)

⇒ Ecosystem

→ British plant ecologist A.G. Tansley gave the term ecosystem.
→ According to Tansley, it is a system formed by Interaction b/w interacting biotic component with that of interacting abiotic component
→ Spatial dimension of ecosystem is highly variable. For ex - small drop of water having few bacteria upto the whole earth. When whole earth is taken as ecological model, it is the largest ecosystem called as ecosphere.
→ For natural ecosystems, sun is the main source of energy

⇒ Ecology

→ German scientist, Haeckal gave the term ecology. ~~it is the study of~~
→ Ecology is the study of structure and function of ecosystem.
→ While performing ecological studies, when focus is on single individual species, it is called as Autecology.
→ In Autecology focus is on single species about it's geographical location, taxonomic position (species) and functional role in ecosystem (producer, consumer) it is called as Autecology.
→ While performing ecological studies, when the focus is on entire community or biotic component it is called as Synecology.

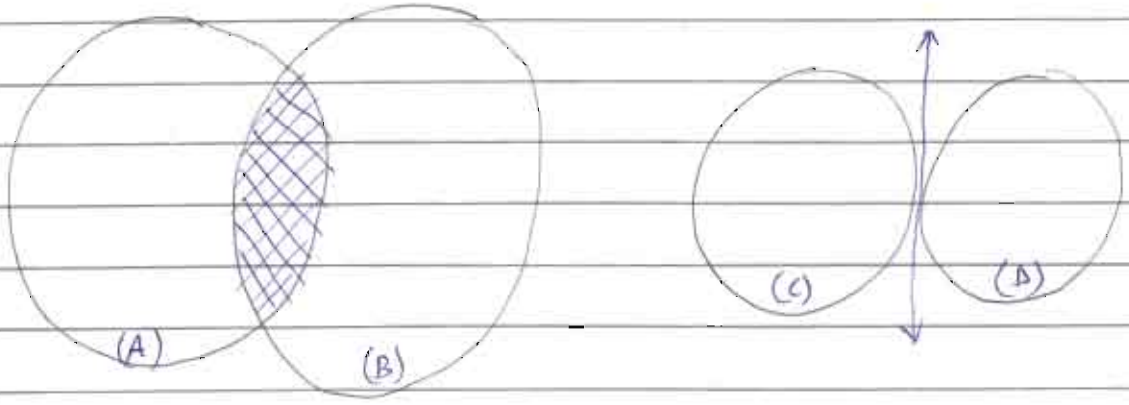
Homo sapiens.
Genus Species.

→ Synecology gives true picture of ecosystem

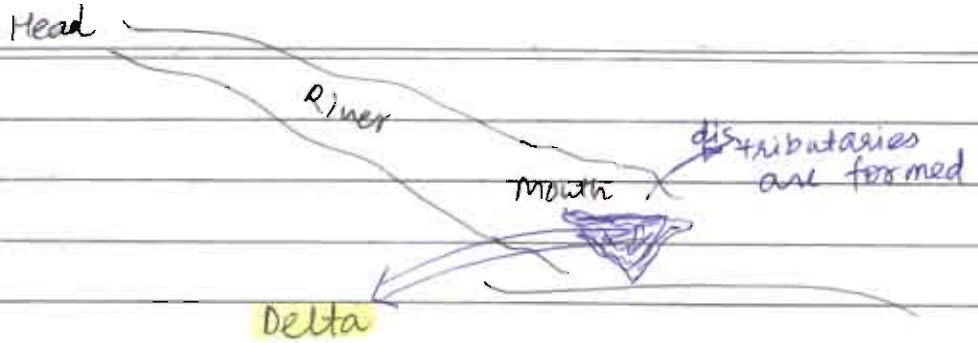
⇒ Ecotone / Principle of edges / Edge effect

Q- Which of the following is not example of ecotone.

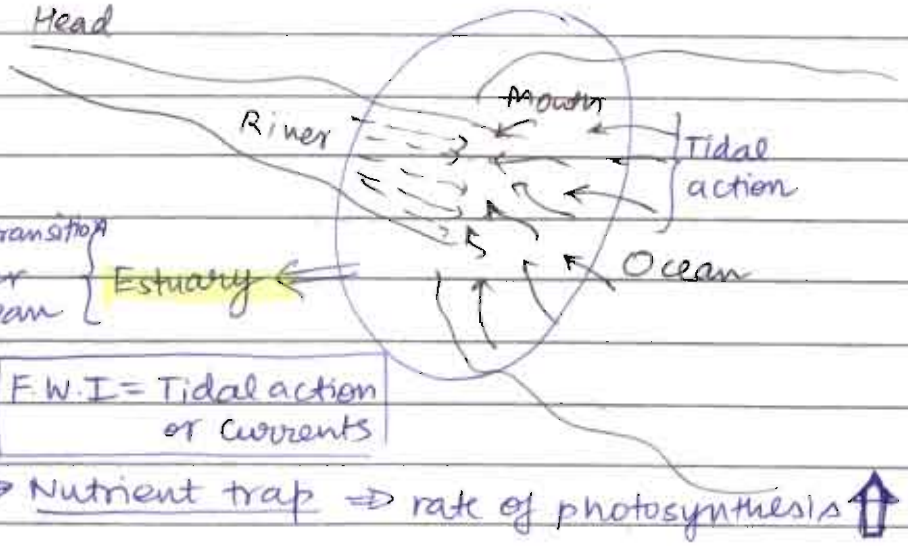
(A) swamps ✓
(B) Marshes ✓
(C) Bogs ✓
(D) Wetlands ✓
(E) Estuary ✓
(F) Savanna ✓
(G) None.



→ Ecotone is zone of transition b/w 2 adjacent ecosystems.
→ As it is zone of transition, it has high value of species richness or variety commponent which is responsible for high value of biodiversity.
→ As the value of biodiversity is maximum at the edge or margin of adjacent ecosystem, it is called as edge effect or principle of edges.



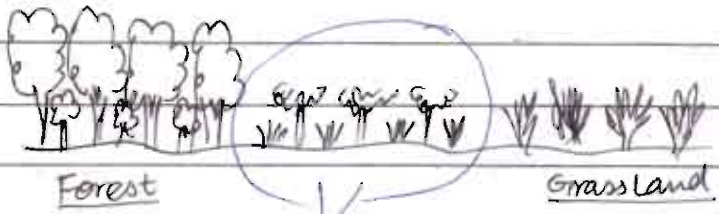
Ocean



Zone of transition b/w river and ocean } Estuary

When F.W.I = Tidal action or currents

→ Nutrient trap ⇒ rate of photosynthesis ↑

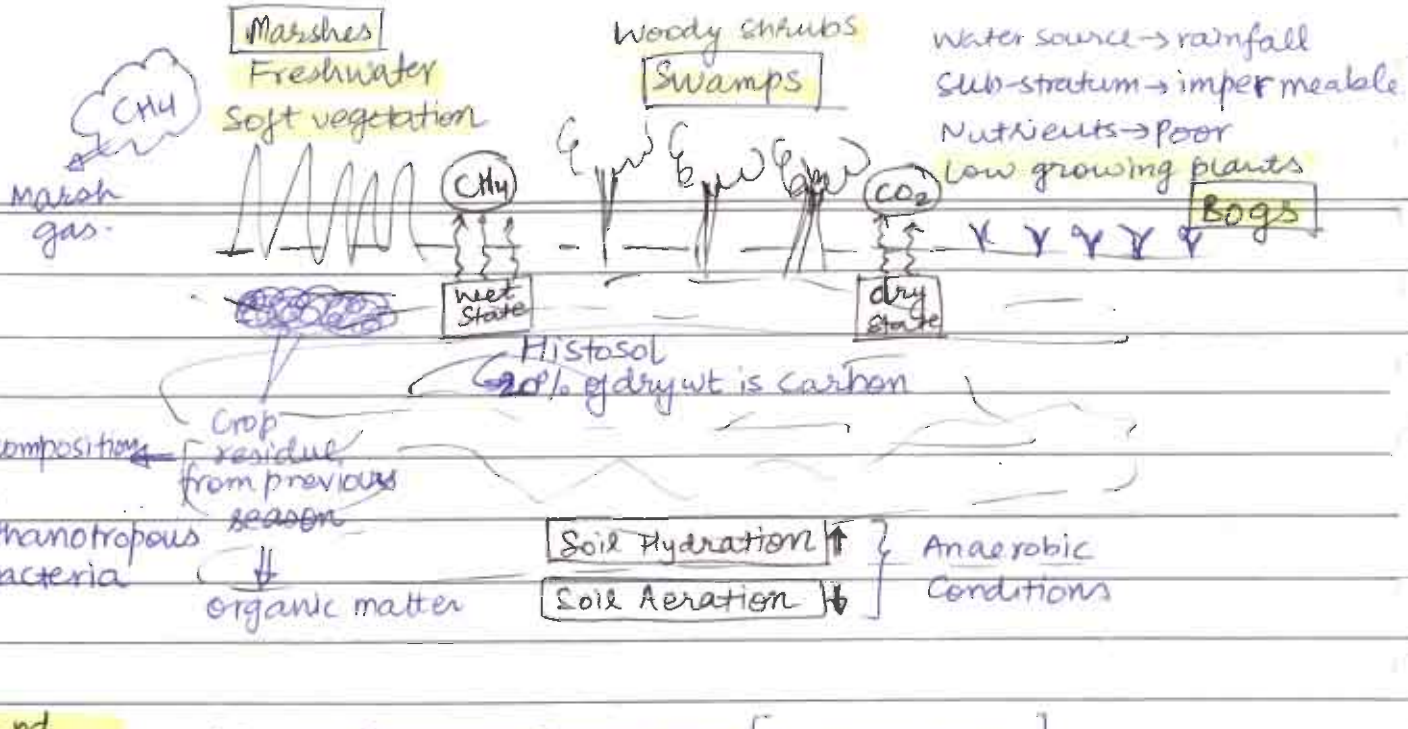


Savanna
Zone of transition

Grass ↑ → Herb Savanna

Shrubs ↑ → Shrub Savanna

Trees ↑ → Tree Savanna



2nd Feb, 1971 ⇒ Ramsar Convention [Ramsar, Iran]

⇓ World Wetland Day

42 ⇑ Ramsar sites in India

Montreaux Record ⇒ ecological threat

- Chilika Lake → has been removed now as restored.
- Loktak → Keibul Lamjao NP (Only Floating park)
- Keoladeo NP (Rajasthan)

NOTE:

1) Wetlands are zone of transition b/w land and marine ecosystem.
2) When wetlands are dominated by soft vegetation ⇒ Marshes
   eg - Paddy crop
3) When wetlands are dominated by woody shrubs ⇒ Swamps
   eg - Mangroves
4) When substratum is hard / rocky / impervious, rain fall is main water source, nutrients are poor and low growing plants are found ⇒ Bogs eg - Spaghnum

Q- List out whether the given statement is True / False

1) Montreax Record is register of wetlands which are under ecological Threat i.e. either ecological character has changed or changes are likely to occur (True)
2) Forest, grassland, savanna are example of carbon sink. (True)
3) In India, maximum wetland is under paddy cultivation around 70% (True)
4) Ramsar Convention is regarding wetlands and it was signed on 2nd Feb, 1971 at Ramsar, Iran (True)

5) India is signatory to Ramsar Convention. (True)

6) wetlands are kidney of nature involve in water purification ground water recharging, flood mitigation and nutrient recycling. (True)

7) In India, total 27 Ramsar sites are present in which recently identified is Sunderban. (True)

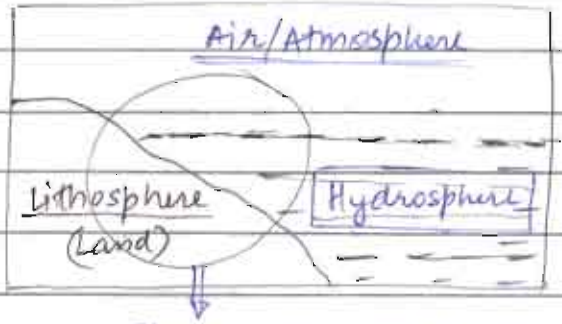
8) In India, 3 wetlands are mentioned under Montreax record (False)

9) Ramsar Convention is legally binding treaty and is part of UN Conventions like UN convention on Biodiversity. (False)

Biosphere and Biosphere-2

→ Biosphere is zone of transition b/w Lithosphere, hydrosphere, atmosphere having biotic component

→ when in Biosphere, human is dominating biotic component it is called as Biosphere 2.



⇒ Ecological Equivalent

→ Individuals that occupy different geographical location, diff. taxonomic position, but they have same tropic level or ecological role or food habit or ecological function they are said to be ecological equivalent to each other.

→ eg - Buffalo of Haryana and Mithun of Arunachal Pradesh

eg - Cow of India and Kangaroo of Australia

eg - Doob grass of Delhi and Elephant grass of African Savanna

⇒ Ecological Guild

Ecological Guild is formed by group of individuals that belongs to different species but exploits same class of resources almost in similar manner. Thus membership in guild is on the basis of competition for same class of resources almost in similar manner.

Q- Which of the following forms ecological guild

(A) All nectar feeding insects of sunderbans

(B) All flowers in which anemophily occurs.

(C) Group of insects performing entomophily.

(D) Detrivores present at the floor of forest ecosystem.

Select the correct code:

1) A and B 2) B and C 3) A, B, C 4) A, B, C and D.

Agent	→	Classification of Pollination
Wind		Anemophily
Water		Hydrophily
Insect		Entomophily
Ant		Myrmecology
Human/Elephant		Zoophily
Snails		Malacophily

⇒ Natural Capital / Ecosystem Services

→ All those services and benefits provided by natural or natural ecosystem or unmanaged ecosystem, free of cost is called as ecosystem services or natural capital.

→ As energy is currency of ecology, it is expressed in unit of energy.

Q- which of the following is not an example of natural capital or ecosystem services

1) Pollination of crops by wind, water and insects.
2) Purification of air through rainfall
3) Olericulture, cultivation of vegetables
4) Artificial rainfall / Project / Cloud seeding.

Select the correct code:

(A) 1 and 2 (B) 2 and 3 (C) 3 and 4 (D) 1, 2, 3 and 4

Technoecosystem → Naveh gave the concept of technoecosystem
→ which is technologically advanced ecosystem that behaves as energetic island as consumption of fossil fuels like coal and petroleum is very high that causes high level of environmental degradation
→ As in this system, there is high level of green house gas emmission emission of ODS (Ozone Destroying substances) and various other pollutants, it behaves like parasite on natural surrounding.

Ecological Foot Print (E.F.P.)
→ Concept was given by Rees and Wackernagel
→ The used the phrase "small is beautiful"
→ EFP is defined as area present outside any given technoecosystem i.e. required to support life activities by fulfilling the demand i.e. demand of fresh water, food, air and also to absorb, recycle and regenrate resources.
→ The value of EFP depends upon:
(a) Demand of Technoecosystem (EFP $\propto$ Demand)
(b) Biocapacity of surrounding area (EFP $\propto \frac{1}{\text{Biocapacity}}$)

NOTE:

1) Resource regenerating capacity of a given area or ecosystem is called as it's Biocapacity.
2) Biocapacity also takes into account capacity of ecosystem to absorb waste, regenerate resources and thus different assets of ecosystem that maintains it's biocapacity are forests, lakes rivers and wetlands

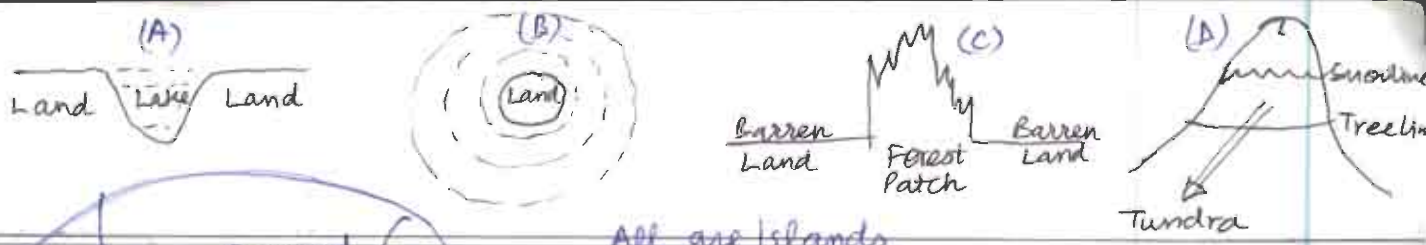
Q Fill in the blanks, with the help of given table:

Techno ecosystem	Ecological Foot Print per capita
A	0.75 ha/ per person
B	1-50 "
C	2.99 "
D	4.75 "
E	5.50 "

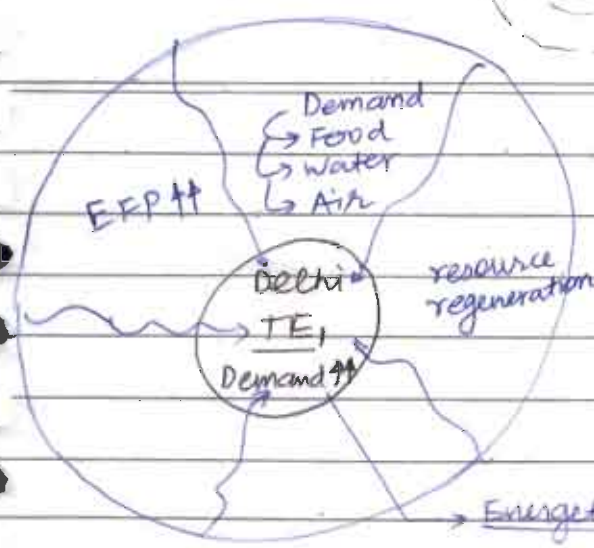
1) A is most stable. A
2) In E environmental degradation is very high. E
3) A is least parasitic on natural surrounding. A
4) E is least sustainable. E
5) E is stronger or intense energetic island. E
6) Impact of pollution is maximum in E E
7) A has maximum biocapacity. A

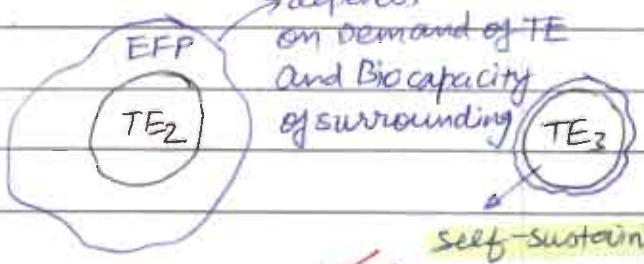
NOTE:

1st August 2019 is observed as Earth overshoot day as resources allocated for their 2019 got consumed by 1st Aug. Thus remaining months are parasitic on ecosphere and conditions are ecologically not stable.



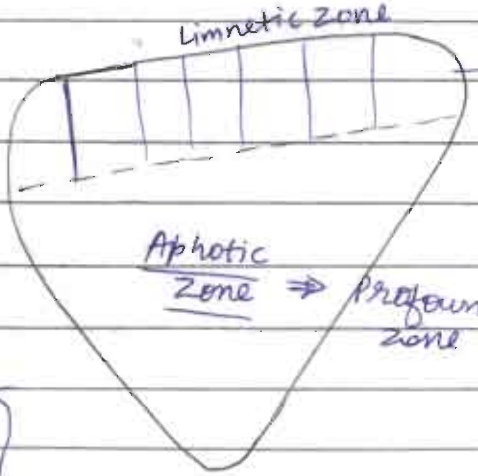
All are Islands





self-sustaining Technoecosystem.

⇒ Ecological Niche → Grinnel



1) Habitat / Spatial Niche [Microhabitat]

2) Trophic niche / Functional Zone
Autotrophs v/s consumers (producers)

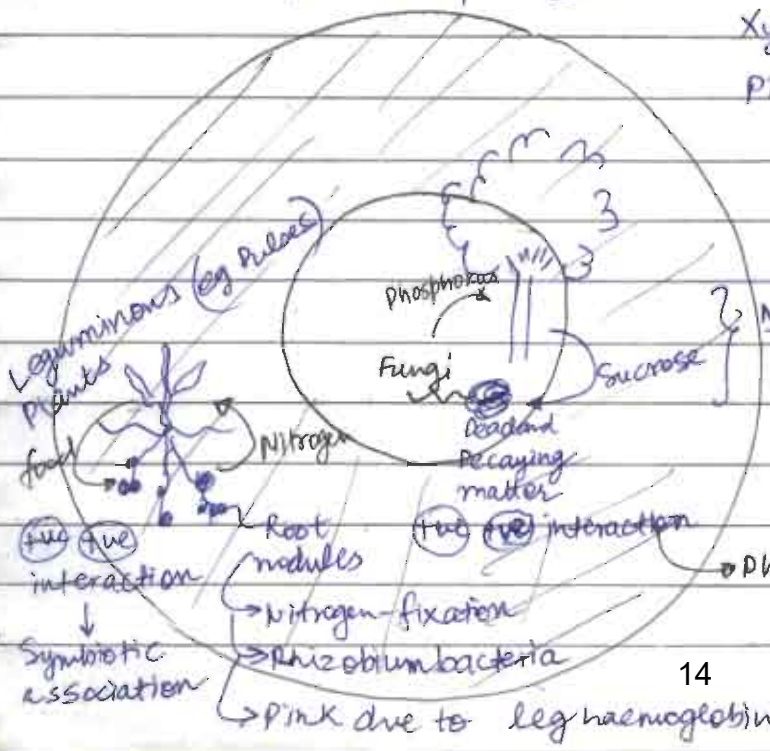
3) Multifactor Niche [Fundamental Niche] → Hutchinson

Pond → Profoundal ~~Niche~~ Zone → Poorly Developed

Realised Niche > Fundamental Niche

Xylem = Water + Nutrients → Ascent of Sap

Phloem = Translocation ≡ Sucrose of food



Mycorrhiza → Symbiotic association

→ Phosphate

In humans
DNA, RNA
ATP
→ all contain phosphate.