- TYPES OF SPECIES

Sr No	Name	Meaning
1.	Flagship Species	Species chosen to Represent **environmental cause**
2.	Keystone Species	1. Species whose addition to or loss from ecosystem leads to **major changes** in abundance/occurance of **atleast one other species** 2. Generally TOP PREDATORS as keystone species
3.	Indicator species	1. Species whose presence indicates presence of set of other species and vice versa 2. Any species that **defines traits or characteristics of environment**
4.	Foundation Species	Dominant **PRIMARY producer**
5.	Umbrella species	1. Species selected for making **conservation related decisions** 2. Conservation of Um S= conservn of many other species

BOD and COD

- BOD: amount of dissolved oxygen used by microorganisms in the biological process of metabolizing organic matter
- More **organic matter** in water>>>More BOD>> **less DO** available for organisms like fishes
- Low BOD>> low organic matter **>> greater amt of DO** for fishes

ECOLOGICAL SUCCESSION:

- Allogenic Succession- driven by the **abiotic** components of an ecosystem
- Autogenic Succession- driven by the **biotic** components of the ecosystem

ECOLOGICAL EFFICIENCY

- Amount of energy **transferred from one trophic level to next**
- Generally **10% rule-** 10% energy at level N will be available for consumption at N+1 level

- ECOCLINE

- Gradation of one ecosystem to another when there is **No sharp boundary between two**
- Joint Expression of associated community & complex envi gradients

- ECOZONE

- Large area that contains no. of habitats which are **linked by EVOLUTIONARY history** of animals and plants within them

➢ ECOPHENE

- Aka **ecads**: morphologically-changed forms>> changes in species owing to environmental adaptions **w/o** genetic changes>> thus not permanent

➢ ECOTYPE

- Genetically **fixed** variables associated with ecological conditions
- When Ecophene remains in new envi for **long time**>>> brings permenant changes >>ecotypes

➢ ECO-SPECIES

- When 2 ecotypes belonging to same species separated from each other for very long time, then adaptions becomes permanent and 2 becomes very distinct physically and genetically from each other. These are called Eco-species
- 2 ecospecies from same species can **NOT** produce viable offspring

➢ DISSOLVED OXYGEN (DO)

- DO- Presence of oxygen in water DO<8 mg/Litre = Contaminated DO<4mg/Litre= Heavily polluted
- Factors affecting DO- 1.Surface turbulence 2.Photosynthetic activities 3.O2 consumption 4.Decomposition of organic matter

➢ BIOTIC COMPONENTS

A. Primary producers- AUTOTROPHS

B. Consumers- HETEROTROPHS or PHAGOTROPHS

I. Macro consumers

II. Micro consumers- SAPROTROPHS (decomposers or OSMOTROPHS)

➢ HOMEOSTASIS

- Capacity of ecosystem of self regulation to maintain state of equilibrium

➢ ECOTOPES

- Zone of junction
- Edge effect- larger popu than either zones. terrestrial>>especially for Birds

Also in aquatic

- Biosphere
  - **Absent** at extreme North and South, Highest mts and deepest oceans
  - Enegry comes from Sun
  - Biosphere (not Biome)= **Largest Ecosystem**

- BIOMES

- Aquatic systems- NOT biome
- **Largest** recognizable subdivision of **terrestrial ecosystem** forming regional ecological unit

- Food Chain types:

- Two types:
  1. Parasitic food chain- primary source of energy: Living plants
  2. Detritus food chain- primary source of energy: Dead organic matter
- Saprotrophs/decomposers- **Largest population** in food chain

- Bioaccumulation/ Biomagnification
  - Bioaccumulation: increase in concentration of pollutant in **FIRST** organism in food chain
  - Biomagnification- Long lived, Soluble in facts, Mobile, Biologically active

- Antibiosis- Production of secretion by org which is harmful to others

S.No.	Name of Biome	Region	Flora and Fauna
1	Tundra	Northern and Southern most region of world adjoining the ice bound poles	Devoid of trees except stunted shrubs in the southern part of tundra biome, ground flora includes lichen, mosses and sedges. The typical animals are reindeer, arctic fox, polar bear, snowy owl, lemming, arctic hare, ptarmigan. Reptiles and amphibians are almost absent.
2	Taiga	Northern Europe, Asia and North America. Moderate temperature than tundra. Also known as boreal forest.	The dominating vegetation is coniferous evergreen mostly spruce, with some pine and firs. The fauna consists of birds, hawks, fur bearing carnivores, little mink, elks, puma, Siberian tiger, wolverine, wolves etc.
3	Temperate Deciduous Forest	Extends over Central and Southern Europe, Eastern North America, Western China, Japan, New Zealand etc. Moderate average temperature and abundant rainfall.	The flora includes trees like beech, oak, maple and cherry. Most animals are the familiar vertebrates and invertebrates. These are generally the most productive agricultural areas of the earth
4	Tropical rain forest	Tropical areas in the equatorial regions, which is abound with life. Temperature and rainfall high.	Tropical rainforest covers about 7% of the earth's surface & 40% of the world's plant and animal species. Multiple storey of broad-leafed evergreen tree species are in abundance. Most animals and epiphytic plants are concentrated in the canopy or tree top zones.
5	Savannah	Tropical region: Savannah is most extensive in Africa.	Grasses with scattered trees and fire resisting thorny shrubs. The fauna include a great diversity of grazers and browsers such as antelopes, buffaloes, zebras, elephants and rhinoceros; the carnivores include lion, cheetah, hyena; and mongoose, and many rodents.
6	Grassland	North America, Ukraine, etc. Temperate conditions with low rainfall.	Grasses dominate the vegetation. The fauna include large herbivores like bison, antelope, cattle, rodents, prairie dog, wolves, and a rich and diverse array of ground nesting bird.
7	Desert	Continental interiors with very low and sporadic rainfall with low humidity. The days are very hot but nights are cold.	The flora is drought resistance such as cactus, euphorbias, sagebrush. Fauna: Reptiles, Small Mammals and birds.

NUTRIENT CYCLE

- Perfect nutrient cycle aka short term cycle - nutrients replaced **as fast as possible**- Gaseous nutrient cycle
- Imperfect nutrient cycle aka Long term cycle- No immediate recycling as nutrients gets lock up – sedimentary nutrient cycle

➢ Gaseous Cycles:

1.Water cycle 2.Carbon cycle (short + long term) 3.Nitrogen cycle

- **Diazotroph**- these are **bactria** and **archea** that **fix atmospheric nitrogen** gas into more suitable forms
    - Thus diazotrophs grow **without** external sources of fixed Nitrogen
    - **All** diazotrophs are **prokaryotic**
    - Examples:
        - **Anarobes**- can **not** tolerate **oxygen at all** (e.g.- Clostridium, Methanococcus)
        - Faculative anaerobes- can take oxygen, but fix nitrogen **only anaerobically**
        - Aerobes- **requires Oxygen**, but N_2 fixation dominates (e.g.- **Azotobacter)**
        - Symbiotic Diazotrophs- **Rhizobia, Cynobacteria** (Azolla-Anabena)
- Azolla- Can fix N2 **Directly from Atmosphere**>. Thus No need of soil
  - Have symbiotic relation with Anabena (Prokaryotic Blue green Algae)

➢ Sedimentary cycle: does not circulate thr atms, but thr **erosion, sedimentation, mt building, volcanic activity, biological transport**
1.Phosphorous cycle(central role in aquatic ecosystem)- from minerals in phosphate rocks>>>causes excessive root growth + freefloating microscopic plants
2.Sulphur cycle

GRASSLAND ECOSYSTEM IN INDIA

(Page 26- grassland types + page 13 of forunias test 10)

INDIAN STATE OF FOREST REPORT

- By Forest Survey of India, MoEFCC
- BIENNAL report
- Based on interpretation of LISS III sensor data of Resourcesat-II satellite
- 2019 report:
    1. **For First time-** assement of **qualitative nature of forest**, Created **National Forest Inventory, Rapid Assesment of Biodiversity** in states
    2. Forest Cover (**Areawise**(MACOM)-
    MP>>>Aruna>>>Chattisgarh>>>Orissa>>.Maharashtra
    3. Forest Cover (**perentage**-wise): Mizoram>>>Aruna>>>Meghalaya
    4. **Total Forest Cover- 21.67%**
    5. **Top 5 increase** in forest cover: **KR**>>Andhra>>Kerala>>J&K>>Himachal
    6. **Decline in North East-** 0.45% (Except for Assam and Tripura)
    7. **Mangroves-** increase by 1.1%
    8. **Wetlands within Reserved Forest Area- GJ>>**WB
    9. **Dependence of fuelwood** on forest – highest in **MH**,

10. **Dependence for Fodder**- highest in **MP**
11. **Forest Fires-** 21% of total forest cover is highly to extremely threatened by forest fires
    - **Mizoram-** highest

- Note- **Forest Area**= Area **notified** and recorded as Forest irrespective of presence of trees (based on records of **Revenue Dept)**
  Actual Forest Cover= Actual forest area with **canopy (**Canopy density >**10%** and Area > **1 hectare**)
- Lakshadweep: **zero** forest Area

TIGER CENSUS 2018

- Every 4 year by NTCA
- 2018 census facts:
  1. Landscape wise tiger population

Landscape	2006 Census	2010 Census	2014 Census	2018 Census
Shivalik Gangetic	297	353	485	646
Central India and the Eastern Ghats	601	601	688	1,033
Western Ghats	402	534	776	981
North East Hills & Bramhaputra Plains	100	148	201	219
Sunderbans	NA	70	76	88
Total Tiger Population in India	1,411	1,706	2,226	2,967

  2. **40%** of tiger popu lives **outside** core areas of tiger habitat
  3. **Top Performers: Madhya Pradesh**>> Karnataka>> Uttarakhand
  4. 4 states: **MP>>KR>>UK>> MH (**each have more than 300 tigers)
  5. **No** tigers found in **Mizoram**
  6. **No** tigers in Buxa (WB), Dampa (Mizo) and Palamau (JH)
  7. **Sathyamangalam TR -** registered **maximum improvement** since 2014
  8. **States** with **max popu growth** (since 2006)- **Kerala**>> TN>> Bihar
  9. **States** with **max popu decrease** (since 2006)- **Mizo>>** Odisha>> CH
  10. **Top rated TR- Pench** (MP)>> **periyar** (Kerala)

AQUATIC ORGANISMS

Neuston	@air-water interface
Periphyton	Attached to stems and leaves of rooted plants or substance above bottom mud
Plankton	Microscopic plants-Phytoplankton & zooplankton (stationary)
Nekton	Swimmers
Benthos	Living @ bottom of watermass

Eutrophication- Mainly due to Phophates and nitrates

Harmful Algal Bloom (HAB)- Due to : 1.Nutrient enrichment 2.Warm water

WETLANDS- Criterias:

1. Waterlogged for atleast **7 days** during growing season
2. Adopted plant life (Hydrophytes)
3. Hydric soils (Not enough CO2)
4. Stabilization of local climate
5. Genetic reservoir for various plant species
6. Support specific diversity

NATIONAL WETLAND CONSERVATION PROGRAMME

- 1985-86
- 115 wetlands -requiring urgent conservation and management

ESTUARY

- Semi enclosed coastal body with one or more river flowing in
- Very **little wave action**>>> thus CALM-REFUSE from open sea
- Most productive region as receives high nutrients from sea and river
- Most heavily polluted
- Formation: 1.Sea level rise 2.Movm of sand and sandbars 3.glacial process 4.Tectonic process

MANGROVES

- Littoral Plant formations of tropical and subtropical sheltered coastlines
- Require high solar radiation
- Acts as sink for heavy metals
- Largely distributed in **High energy tidal coasts** of two extreme conditions: 1.Humid and wet in Sunderbans 2.Arid and dry in Gujrat
- Sunderbans: Largest mangrove forest in **world**
- **Pichavaram (TN)**- 2nd largest mangrove forest in world>> famous for its '**Rhizophera'** - pichavaram aka **'true Mangroves'**

Coastal Ocean Monitoring and Prediction System (COMAPS)

- Implement: **Earth System Science Organisation**- Integrated Coastal Marine Area Mana (ESSO- ICMAM)
- 25 parameters (like DO, BOD, pH, planktons) are monitored @20 locations

FUTURE EARTH COASTS

- Originally named as Land-Ocean Interaction in Coastal Zone (LOICZ)
- Launched by IGBP(Int Geosphere-Biosphere Programme) + IHDP (Int Human Dimension Programme)

INTEGRATED COASTAL AND MARINE AREA MANAGEMENT (ICMAM)

- Attached office to MoEarth Science

SOCIETY OF INTEGRATED COASTAL MANAGEMENT (SICOM)

- Implementing World Bank assisted ICZM project
- Under MoEFCC

NATIONAL COASTAL ZONE MANAGEMENT AUTHORITY (NCZMA) and SCZMA

- Enforcement and monitoring of CRZ rules