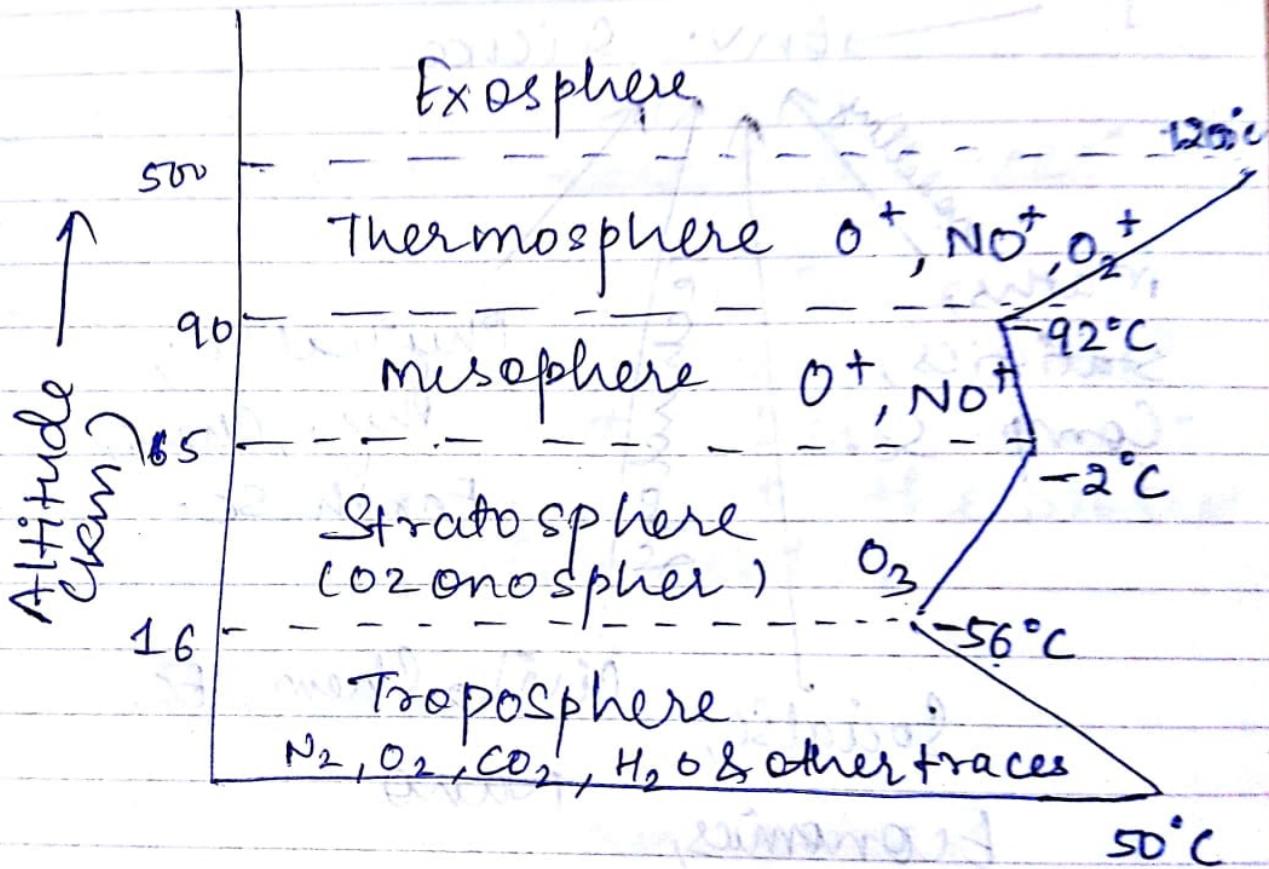


28/01/2018

Notes

Structure of Atmosphere:

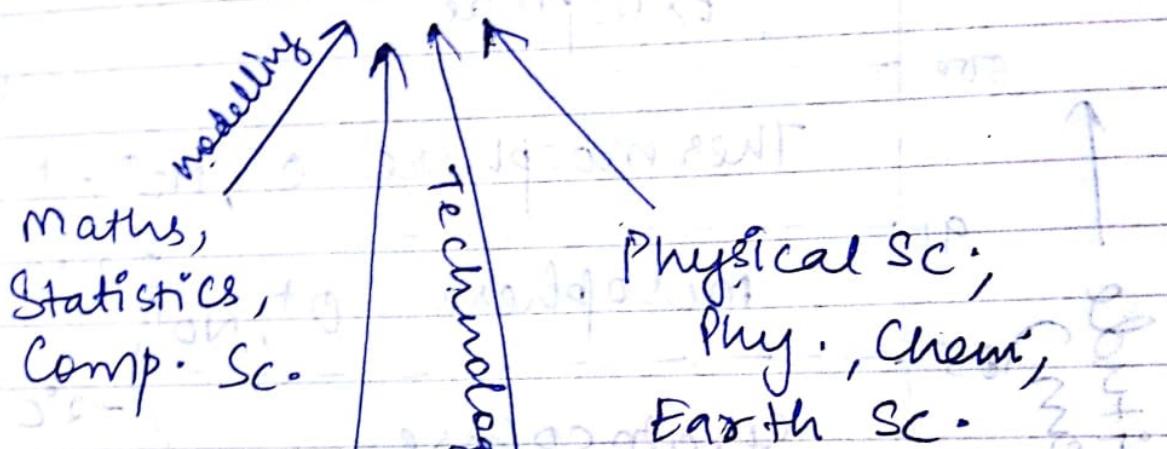


Gaia Hypothesis:

Nothing is isolated. Everything is integrated.

~~Environmental Sciences~~ is a multi-disciplinary subject

Life Sciences → Env. Science



Social Sc., Economics, Sociology, Law, Mass Comm

Civil, Chem, EC, Nano

MULTIDISCIPLINARY APPROACH

Public Information, Public Communication, Public awareness, Public protection ← Environmental protection

Importance of studying Environment ~~issue~~ Sciences.

- ① International issue
- ② Problems associated with development (Development should be w.r.t the protection of Environment).
- ③ Pollution
- ④ Need for an alternative solution.
- ⑤ Possibility of species extinction.
- ⑥ Wise planning
- ⑦ Various scientific reports

to protect the environment

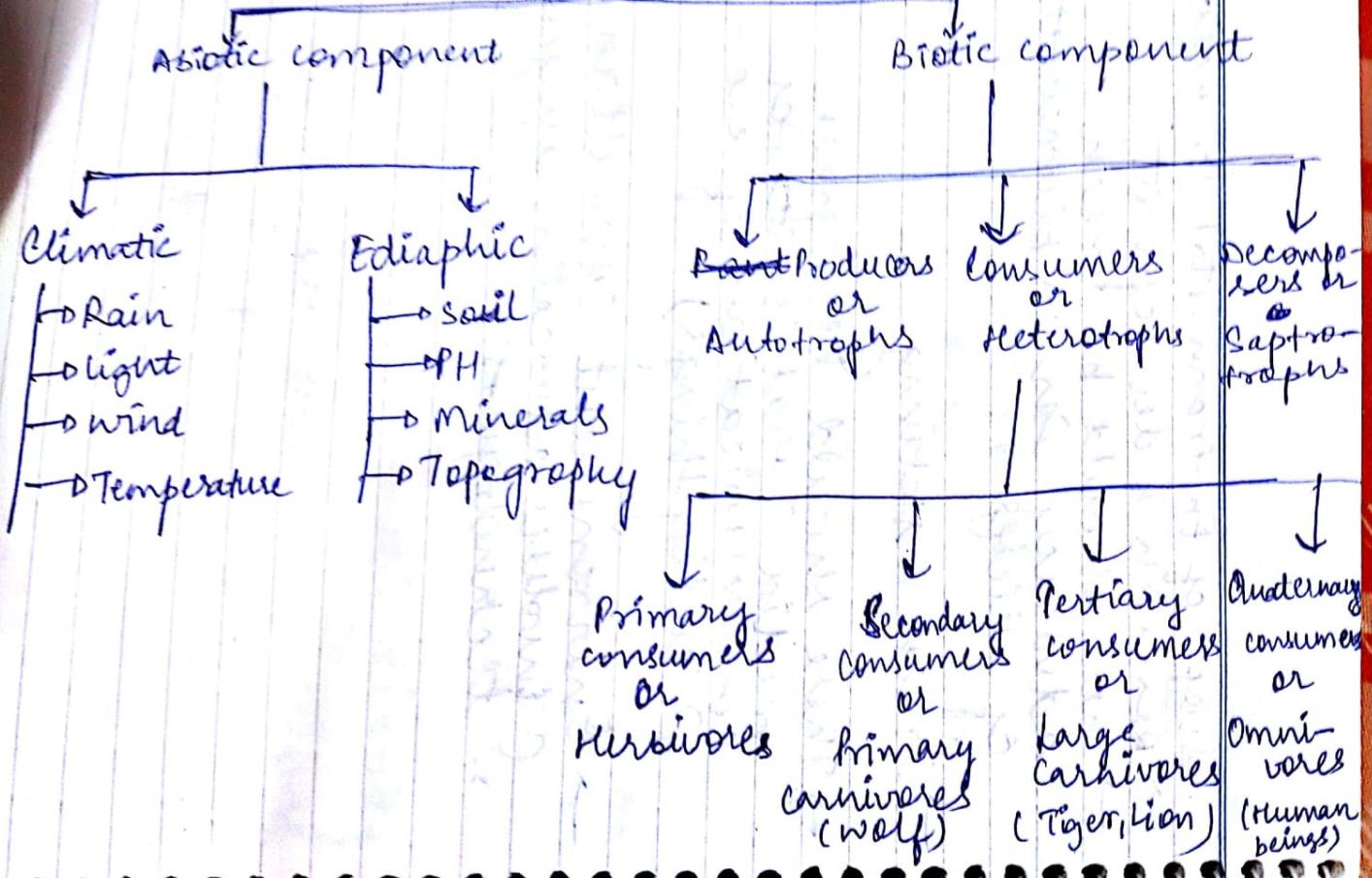
Need for public awareness

- growing population
- Poverty
- Agriculture growth
- Safe ground water / need to protect ground water
- Development & forest
- Degradation of land
 - ↳ leads to degradation of soil
 - ↳ leads to degradation of fertility
- Reorientation of Institute
- Reduction of genetic diversity
- Urbanisation (There should be proper planning)
- Pollution

Slope of Environmental Sciences:

- Research & development
- There should be green advocacy for implementation of policies.
- Green marketing
- There should be a green media (that is, ~~not~~ for communication of eco-friendly things)
- Environment consultancy.
(Involves advocates, lawyers, technologists)

Foodsystem Structure



Ecosystem:

Ecosystem is the interaction of plants, animals, microbes with each other & with environment

It is the functional unit of ecology.

Food Chain:

For 2 things

- Flow of nutrients
- Flow of energy

All food chains are interconnected.

Food Web:

Consists of many food chains

Interconnection of food chains
food web.

Autotrophs: Manufacture their food on their own

Heterotrophs: Dependent on autotrophs

<u>Organisms</u>	<u>Source of C</u>	<u>Source of Energy</u>
Autotrophs	Inorganic ($\text{CO}_2, \text{HCO}_3$)	Sun
Heterotrophs	Organic matter	Organic matter
Chemotrophs (manufacture their food using some chemicals)	Inorganic or organic matter or Both	Oxidation of simple inorganic compounds like FeS , M_2S , etc.

- Tansley (Scientist) coined the term 'Ecosystem'.
- Stability of ecosystem depends on food energy.

Ecosystem Types

Broadly, ecosystems are of 2 types:

(A) Terrestrial Ecosystem

(B) Aquatic Ecosystem

Terrestrial Ecosystem:

→ Forest ecosystem

→ Desert ecosystem

→ Grassland ecosystem

→ Mountain ecosystem

Aquatic Ecosystem:

→ Fresh water (^{13%} Rivers, ponds, glaciers, wells)

→ Marine Ecosystem (^{87%} oceans)

→ Lentic (slow moving or stationary)

→ Lotic (fast moving, e.g.: rivers) (e.g.: ponds)

→ Wetlands

Marine ecosystem

Forest Ecosystems:

- Tropic Rain forest ecosystem
- Tropic Evergreen forest ecosystem
- Tropical deciduous forest ecosystem
- Temperate evergreen forest ecosystem
- Temperate deciduous forest ecosystem
- ~~Fauna~~ Taiga.

Desert Ecosystems:

have species which are tolerant to high temp.

- Leaves modified to spines to reduce water loss through transpiration

Functions of Ecosystem

- ① Regulatory Functions
 - nutrient reg.
 - gas regulation
 - climate "
 - disturbance "
 - water "
 - soil retention
 - waste treatment & assimilation
- ② Supporting Functions
 - pollination
 - Biological control
 - Vegetation
- ③ Provisioning Functions
- ④ Cultural Functions
- ⑤ Aesthetic important functions

06/02/18

life → different

Biodiversity (different life forms)

Biodiversity Hot Spot

→ are the areas / ecosystems which are under threat (like human activities & natural causes)

* Concept of biodiversity was 1st time explained by Norman Myers (1988)

To qualify as a hot spot, the region should follow the following criteria or less

→ Should have 1.5% or 150 species

of the species in the world.

→ 70% of the species are lost from that region / ecosystem

There are 2 hotspots in India:

(1) western ghats

(2) eastern

Himalayas

Western Ghats: Region Maharashtra, Goa, Tamil Nadu, Karnataka

At present, 1600 km sq.

More than 6000 plant species
Over 2500 genera

Fauna: 77% amphibians endangered

62% reptiles endangered.

Eastern Himalayas: Starts from Nepal to north-eastern states.

10,000 species

1/3rd of them are endemic.

Fauna: Nearly 163 species that include one-horned rhinoceros

45 mammal species

56 bird species

17 reptile species

12 amphibian

Vertebrates

Habitat : Residence of a species

Reasons for loss of biodiversity:

- (1) Habitat Destruction (due to human intervention or natural causes like floods, earthquake)
- (2) Resource Mismanagement: Imbalance & unsustainable resource management. Continuous misuse of resources.
- (3) Poaching / Illegal hunting
- (4) Global warming

* Lichen is an indicator of air pollution. Not found in Delhi 40 yrs back, they were found in Delhi.

- (5) Forest Fragmentation (Forests cut into smaller & smaller pieces)

(6) Introduction of exotic species

e.g.: Eutrophication

↳ species

belonging to

another region

(7) Overgrazing

(8) Natural calamities

(e.g. endemic & specific diseases).

International Union for Conservation of Natural Resources (IUCN)

→ Estimation of no. & types
of species on Earth

Red list of species: Includes
those species which are
extinct.

Type of Biodiversity

- (1) Genetic biodiversity
- (2) Species biodiversity
- (3) Ecosystem biodiversity
- (4) Biosphere biodiversity / Information biodiversity

Genetic biodiversity: Difference in genes

made up of
DNA, RNA

Species biodiversity: Adaptation
to environment

Ecosystem biodiversity: Ecosystems
are different from each other

Conservation of Biodiversity:

- ① In-situ
- ② Ex-situ

In-situ: Conservation of a particular species / biodiversity in its natural habitat

Eg: Conservation of Tiger in forest

Ex-situ: Conservation of tiger in zoo, national parks, etc or in other place.

12/02/2018

Classification / Representation of Biodiversity :

- ① Point Biodiversity (•) (Spatially)
- ② α - Biodiversity (Small areas)
- ③ β - Biodiversity (Large areas)
- ④ γ - Biodiversity (Very large areas)

UNIT - 2

Natural Resources

Any substance which can derived from nature or environment & people ^{species} can use them as they exist in nature by their own.
People cannot generate natural resources.

Eg: land, soil, coal, air, water.

Man-made Resources: Product of natural resources.

Classification of natural Resources

① On the basis of their origin

coal, petroleum

→ Biotic (origin from life) ↑

Abiotic (air, water, soil,

minerals)

don't have life.

② On the basis of their stage of development

Maybe in future

→ Potential Resource

(They are not available for utilisation today)

Eg: Peat (stage of coal)

→ Actual Resource

(They are available presently for utilisation. coal, petroleum, etc.)

(3) On the basis of their renewability

- Renewable (sunlight, tidal energy, geothermal energy)
- Non-Renewable (coal, Petrol)

(4) On the basis of Availability

- Exhaustible (coal, Petroleum)
- Inexhaustible (Solar energy)

Energy Resources

(1) Can be renewable or non-renewable. (1st classification)

(2) Primary / Secondary → LPG, CNG,
derived from environment directly like sunlight, hydro energy, nuclear fuels
made from Primary.

③ Newer / older ad nos (8)

→ conventional (Traditionally used, older ones, cause more pollution. Coal, wood.

→ Non-conventional (newer)
(reduce pollution,
eco-friendly)
Tidal energy, Wind
energy

WIND ENERGY

Advantages

- (1) Pollution relatively very less.
- (2) India has many areas near Oceans which can be utilised for wind energy.

(3) Can be stored in battery
& can be utilised anywhere

Constraints:

(1) Cannot be installed at every place.

(2) Harmful for some species.

HYDRO ELECTRIC ENERGY

- Advantages:

(1) Environmental friendly, less pollution

(2) Creates lot of employment.

(3) Multipurpose (can be utilised in tourism, etc).

Constraints :

- (1) We need to create larger dams. Sometimes, this can lead up to floods.
- (2) If dams are very large, they can disturb the plates on earth's crust which can cause earthquake.
- (3) Fire in forest due to wiring.

SOLAR ENERGY :

Advantages :

- (1) Environmentally friendly
- (2) Pollution free
- (3) Can be stored & used at night.

Solar cookers, street lights, solar panel.

Disadvantages / constraints:

(1) Not available for 1-2 months when it is cloudy.

(2) Installation cost is high.

BIO MASS / BIO ENERGY /

AGRICULTURAL ENERGY

Advantages

Production of energy from ~~material~~ substances which have biological ~~experience~~ origin.

Eg: Gobar Gas Plant.

Mining

Constraints:

- Leakages can lead to emission of carbon monoxide, CO₂, etc.

Environmental Protection Act (1986)

Rule: Not enforceable in any court. Only challengeable

Act: is a law if it is implemented or declared to be implemented in any court of law.

GEO THERMAL ENERGY

Advantages:

- (1) Renewable, pollution free
- (2) Tremendous geothermal energy is available under earth's crust

TIDAL ENERGY

→ ~~maximum of tidal energy available~~

→ ~~constraints in making it~~

① Timing. (~~To be~~ can be used at proper time)

(ASPE) → ~~not much of datum time~~ only

Advantages:

→ Renewable

→ Non-polluting. (It is fossil fuel)

COAL-BASED RESOURCES

60% energy comes from here.

Advantages:

we have lot of coal available

Disadvantages:

Pollution

20/02/18

fission
fusion

NUCLEAR ENERGY :

Has lot of potential in our country as we have lot of uranium & other nuclear fuels.

We can also export electricity generated using nuclear energy to nearby countries.

Disadvantages:

- Accident (like leakage) can cause be very destructive.
- can lead to change in DNA which will affect the upcoming generations.

HYDROGEN ENERGY :

Hydrogen is the lightest gas on earth

Advantages:

Production & utilisation of H₂ gas has no pollution.

Disadvantages:

Production of H₂ gas is not economical in today's time.
Thus not sustainable & viable.

Production of H₂ gas:

- (1) Photolysis of water
- (2) Breaking down of hydrocarbons
- H₂ energy is used in rockets launching bcz by-product is pure water which is used by astronomers.

It is a future fuel bcz emission of air polluting gases is zero.
∴ It has lot of scope.

Difficult to store & transport bcz it requires thick chambers to store it.

MINERAL RESOURCES:

India has lot of minerals. Some are exported also.

Mining Problems:

- (1) Pollution
- (2) Destruction of vegetation
(Especially when vegetation is in initial stage)
- (3) Subsidence of land
- (4) Lowering / declining water table
- (5) Respiratory & other health impacts.

Mining should be done in a sustainable & environment friendly manner.

LAND RESOURCES / SOIL RESOURCES

Degradation of land resources:

- (1) Urbanisation
- (2) Poor agricultural productivity due to less irrigation
→ due to declining water table

Causes of land degradation :-

- (1) Deforestation
- (2) Agricultural mismanagement
(intensive use of insecticides & pesticides, unplanned agriculture)
- (3) Urbanization
- (4) Soil erosion
- (5) Pollution
- (6) Disturbance in natural cycles
(like water cycle & mineral cycle)

Problems associated with land resource degradation:-

- (1) Water logging.
- (2) Soil Salinity
- (3) Desertification

Egypt : 90-95% land is affected by water logging.

Pakistan : 68% land is saline

India : 25% land is saline

FOREST RESOURCES:-

Forest types in India:

There are 14 forest types in our country:

- (1) Tropical dry deciduous forest
- (2) Tropical moist deciduous forest
- (3) Tropical evergreen forest
- (4) Tropical semi-evergreen forest
- (5) Tropical rain forest.
- (6) Sub-tropical forest
- (7) Temperate broad leaved forest
- (8) Temperate conifer forest
- (9) Sub alpine forest
- (10) Alpine forest
- (11) Desert thorny forest
- (12) Coastal sand dune forest
- (13) Estuarine evergreen forest
- (14) Grasslands

Policy of Govt: Atleast 33% of the state area should be under forest cover.

21% forest of total area

In India:

65% of forest area is controlled
administered by govt.

27% is under private control.

Reasons for degradation

BENEFITS

- (A) Direct Benefits:
 - (1) Fuel
 - (2) Timber & furniture
 - (3) Food
 - (4) Shelter
 - (5) pulp & paper
 - (6) Forest products

(B) Indirect Benefits

- (i) Conservation of soil.
- (2) Soil improvement in terms of fertility
- (3) Reduction of air pollution
- (4) Control of water flow & water cycle.

Causes of deforestation / forest degradation:

- (1) Growing population
- (2) Forest fires due to A.O's
- (3) Grazing of animals
- (4) Pest attacks
- (5) Natural causes like snow, storm, flood, lightning.

large scale deforestation leads to habitat destruction.

- (1) Increase in pollution
- (2) Loss of biodiversity
- (3) Decrease in forest products availability
- (4) Declining water table
- (5) Other ecological problems.

WATER RESOURCES:

of the world, only 2.45% surface water area is in India.

4% of water resources of the world are available in our country.

Total water from precipitation is 4000 cubic km.

60% of water is usable (India).

States like Orissa & Chhattisgarh have good ground water in terms of quality & availability.

92% of ground water fulfills agricultural needs requirements.

5% of ground water → Industrial

3% of ground water → Domestic use.

Reasons for depletion in ground water:

(1) Uneven rainfall

(2) Season difference in rainfall

(3) High temp.

Parameters causing ground water pollution

(1) Growing population

(2) Industrial wastes

(3) Herbal waste

Methods of conservation of water

(1) Adoption & implementation
of provisions & laws
effectively.

(2) Use water efficiently in development of technologies

(3) Prevention of water pollution

(4) Water shade development

(5) Rain water harvesting

(6) Water Recycling & Reuse

Main

Causes for water scarcity in India:

(1) Lower rainfall

(2) Uneven distribution of water resources

(3) Increasing demand of water

① Large scale urbanisation:

4 multipurpose projects in India

1. Noida 2. Gurgaon
3. Chandigarh 4. Jhansi

examples of multipurpose urban all (S)
Bhopal is also (S)

examples of multipurpose urban (S)

Chandigarh is an example of India.