

Unit-4.

Ozone Layer Depletion:

Ozone layer - is region in earth's stratosphere that contain 1% conc. of ozone and protect earth from high UV radiations.

- 97-99% Harmful UV radiations are absorbed by ozone layer.
- Ozone hole is discovered in the Antarctica region - which is caused due to CFC's, carbon tetrachloride, methyl bromide and HFC's.

Ozone Layer Depletion: Gradual Thinning of earth's ozone layer in the upper atm caused due to release of chemical compounds containing gaseous Br or Cl from different activities.

Ozone Depleting Substances :

One Cl can destroy 100,000 molecules of O_3

- Some compounds release Cl & Br on exposure to UV radiations - which contribute to ozone depletion - these are known as ODS.

eg:

ODS - Cl



CFC's

Methyl Chloroform

HCFC's

ODS - Br



Halons

Methyl Bromide

Hydrobromofluorocarbons.

↓
Montreal Protocol was Proposed

In 1987 to stop the use of production, Import & export of ODS & minimize their conc. in atm.

Causes of Ozone Layer Depletion:

- ① CFC's: Main cause of OLD:
 - Released by solvents, spray aerosols, Refrigerator, AC etc.
 - Molecules of CFC's in stratosphere are broken down by UV radiations and release Cl atom - these Cl atoms react with O₃ and destroy it.
- ② Nitrogenous compounds - NO₂, NO, N₂O etc are highly responsible for OLD.
- ③ Natural Causes: sun spots
stratospheric winds
volcanic eruptions
- ④ Unregulated Rocket Launches: Result in more depletion than CFC's.
If not controlled may result in Huge loss of O₃ by 2050.
- ⑤ ODS defn- point.

Effects:

- ① On Human Health: Humans get directly exposed to UV radiations.

— might result in serious Health issues
— skin diseases, cancer, sunburns, quick ageing and weak immune system.

② On Animals: skin and Eye Cancer
③ On Environment: Minimal growth, flowers and photosynthesis in plants.

④ Forests also get affected by UV radiation
On Marine Life: Planktons are greatly affected by UV radiations.

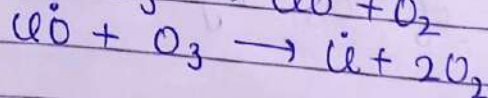
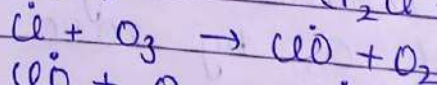
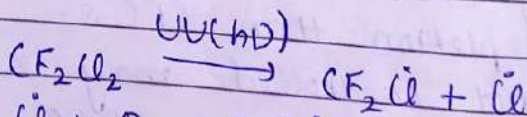
If planktons are affected than this will lead to destroy the complete aquatic food chain.

Mechanism of OLB:

CFC's are common eg. of ODS.

When CFC's escape to the ozone layer they are dissociated by UV radiations to release Chlorine (Cl), this Cl reacts with ozone (O_3)

— an extensive catalytic rxn leading to the net destruction of O_3 and O in the stratosphere.



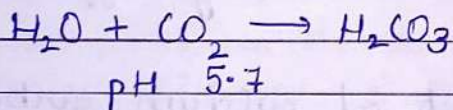
\dot{Cl} free radical is generated in course of rxn — It has been found that one molecule of CFC can destroy more than one thousand O_3 molecules in the stratosphere.

Acid Rain

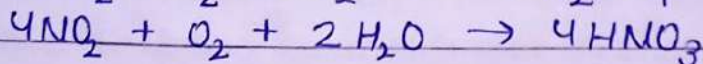
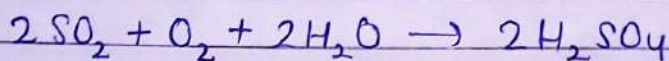
Defⁿ: Precipitation of acid in the form of rain & when atm pollutants like oxides of N_2 and sulphur react with rain water and come down - results in acid rain.

Causes:

- ① Sulphur and N_2 particles which get mixed with the wet components of rain.
S & N_2 particles which get mixed with water are found in 2 ways - as the Emissions from Industries or by natural causes \rightarrow like lightning strike in the atm. releasing NO and volcanic eruptions releasing sulphur oxide.
- ② Regular rain water also contain weak carbonic acid - not extremely harmful



- ③ SO_2 & NO_2 undergo oxidⁿ and then they react with water resulting in the form of H_2SO_4 & HNO_3 (Nitric acid).



Effects:

- ① Acid Rain very harmful to agriculture, plants and animals.
- washes away all important nutrients which are required for growth & survival

of plants.

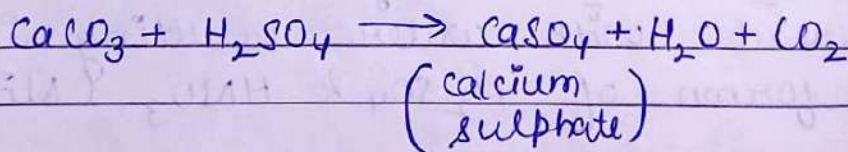
— also alter composition of soil.

- ② Cause Respiratory issues in animals and Humans.
- ③ Damage Buildings, monuments made up of stones and metals.
- ④ Acid Rain — cause corrosion of water pipes — further results in leaching of heavy metals such as Iron, Lead, Copper in drinking water.
- ⑤ When Acid rain falls down & flows into rivers & ponds affect aquatic system. Alter chemical composition of water — which is harmful for aquatic flora & fauna & cause water pollution.

eg. Taj Mahal — largely affected by acid rain.



made up of calcium carbonate
marble



Climate Change and Global Warming:

Defⁿ of climate:

A general prevailing weather conditions of a region i.e.

The Temp^r, air pressure, Humidity, sunshine, winds.

Climate Change Defⁿ:

Gradual change in the weather conditions over a period, short or long time.

Due to change in natural habitat caused by man-made or natural reason.

Eg: Changes in ocean current, melting of ice, loss of biodiversity are included in climate change.

Causes:

① Natural Factors:

- Volcanic eruption: release GHG: CO_2 contributing to warming of atm. But effect is not large.
- Ocean currents: act like conveyer belt, transporting warm water and precipitation from the equator towards the poles and cold water from poles back to tropics.
- Orbital Changes: Earth's orbit around the sun is due to the gravitational attraction b/w earth and sun.
 - ② Currently earth is closet to the sun in the Northern Hemisphere.
- Solar Variations: It has been suggested that

changes in solar output might affect our climate — by directly — changing rate of solar heating of earth & atm.
→ indirectly — by changing the cloud forming process.

② Man-made Factors :

→ Coal Mining: EIA estimated that coal mining was responsible for the 10% of total methane production.

Since CH₄ is major G.H.G. it may lead to G.W.

→ Deforestation: Burning, Cutting, Release G.H.G.

→ Fossil Fuel: are burned, they release CO₂ and other G.H.G., which in turn trap heat in our atm, making them the primary contributors to Global Warming and climate change.

→ Plastics: Sunlight and heat cause the plastics to release powerful G.H.G. — as CC, the planet gets hotter — plastic break down into more methane & ethylene.

→ ↑ rising the rate of CC.

Wasteland Reclamation:

Wasteland - Degraded land which can be brought under vegetative cover with reasonable effort and which is currently under utilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes.

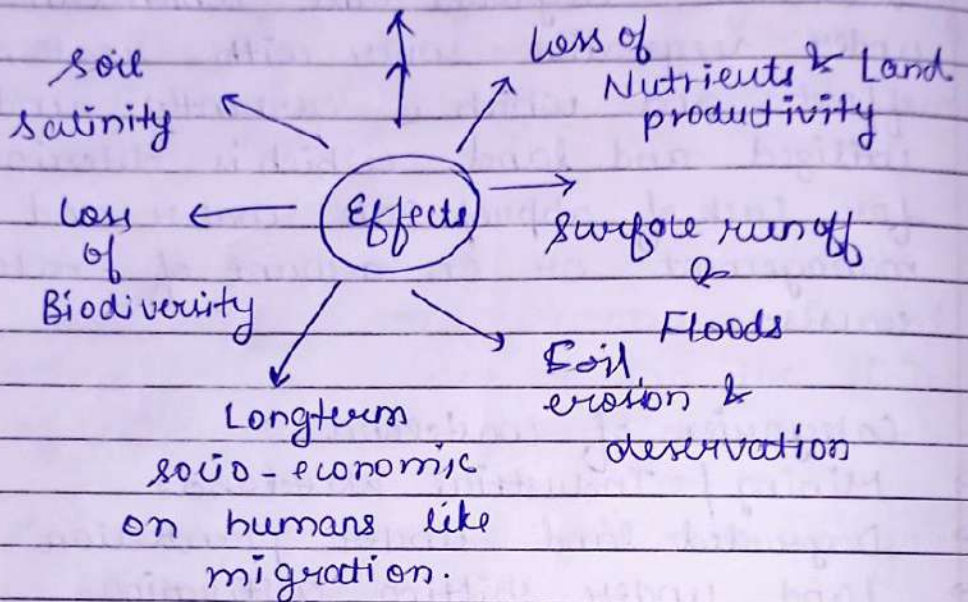
Categories of wasteland:

- Mining / Industrial wastelands.
- Degraded land under plantation crop
- Land under shifting cultivation
- snow covered and glacial area.
- Waterlogged and marshy land.
- steep sloping area etc.

Causes:

- Over Cultivation
- Degradation
- Use as fuel wood.
- Shifting cultivation
- Commercial timber exploitation
- Clearing forests permanently for non-forest activities.
- Overgrazing
- Improper irrigation practices.

Soil Acidification:



Classification:

① Easily Reclaimable:

- Used for agricultural purposes.
- By reducing the salt content which can be done by leaching.
- Gypsum, urea, potash & compost are added before planting crop in such areas.

② Reclaimable with some difficulty:

- Utilized for Agroforestry.

↓
Main Purpose putting land to multiple uses.

↓
Have trees and crops inter- and / or under planted to form an integrated system of biological prodⁿ within a certain area.

③ Reclaimed with extreme difficulty:

→ Can be used for forestry or to recreate natural ecosystem.

→ Field experiments have shown that species like eucalyptus, Prosopis and Acacia cannot be grown in highly alkaline soil.

Studies have shown that if tree seedlings are planted with a mixture of soil, gypsum & manure — better growth can be achieved.

Methods of Wasteland Reclamation:

① Afforestation — Growing forest over cultivable wasteland.

② Reforestation — Growing the forest again over the land where they were existing & was destroyed due to fires, overgrazing & excessive cutting.

③ Providing Surface Cover: Protect the land surface from soil erosion is of leave crop residue on land after harvesting.

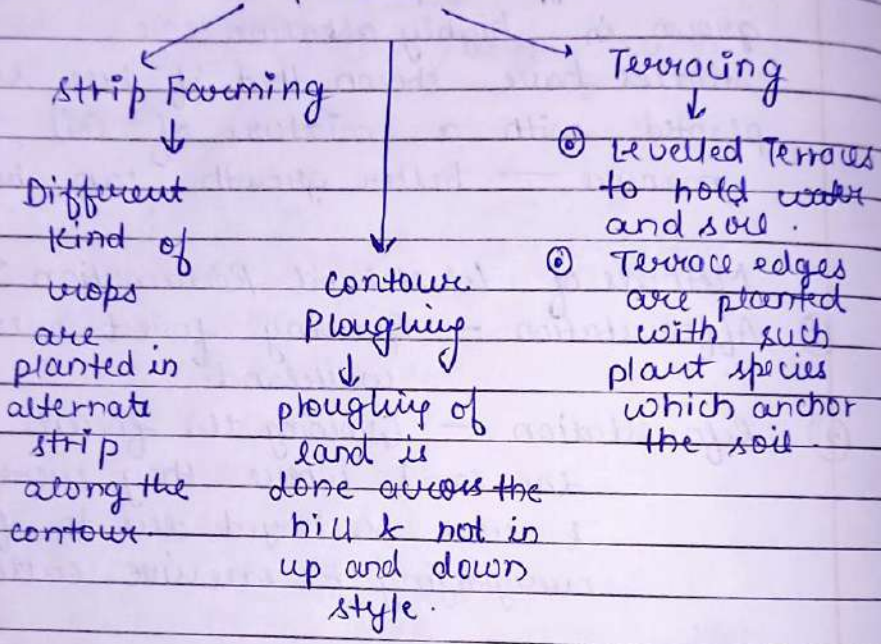
④ Mulching: Mulch is a layer of material applied to surface on an area of soil.

Protective cover of organic matter & plants like stalks, cotton stalks, tobacco stalks

↓
Which reduce evaporation.
Reduce soil erosion.
Help in retaining soil moisture.

⑤ Changing Ground Topography on Downhills: Running water erodes the hill soil and carries the soil along with it.

Minimized by fall alternation:



⑥ Leaching: In salt affected land, salinity can be minimized by leaching them with more water.

⑦ Changing Agricultural Practices: Like mixed cropping, crop rotation & cropping of plants are adopted to improve soil fertility.

⑧ Ecological Succession: Natural development or redevelopment of an ecosystem which help in reclaiming the minerally deficient soil of wasteland.

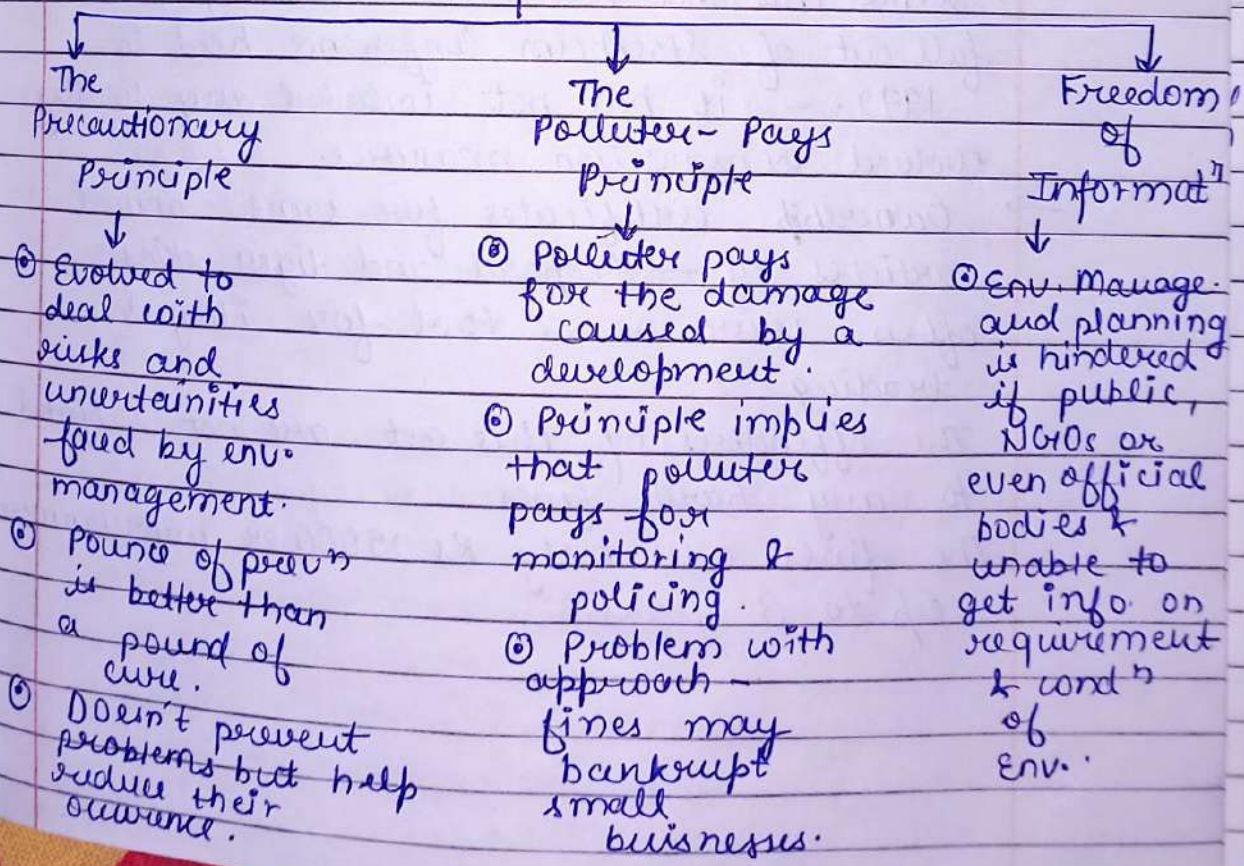
Issues involved in enforcement of env. legislation:

Env. legislation: Collection of laws and regulations pertaining to air quality, water quality, the wilderness endangered wildlife and other env. factors.

→ The umbrella of environmental leg. covers many laws and regulations, yet they work together towards a common goal

↓
which regulates the interaction b/w man and natural world to reduce threat to env. & the public health.

Three Important Issues of E.L.



① Without proper knowledge about current situation & status of our natural resources, we are unable to formulate policies that will enhance their plight.

② No. of laws have been enforced for safeguarding the env. quality.

Problems Involved with the Enforcement of Env. legislation :

- ① Drawbacks of WPA, 1972
- ② Drawbacks of FA, 1980
- ③ Drawbacks of Pollution related Acts.

① Drawbacks of WPA, 1972.

→ Since this act has been enacted just as a fall out of Stockholm Conference held in 1972. - it has not included any locally evolved conservation measures.

→ Ownership certificates for some animal articles eg - Leopard and tiger skins often serve as a tool for illegal trading.

→ The offenders of this act are not subjected to any harsh fines.

The fines are only Rs 25000 or imprisonment up to 3 years.

② Drawbacks of EA act, 1980.

- Only transfers power from the state to the centre to decide the conservation of reserve forests to non forest areas.
- Law is concentrated on protecting trees, birds and animals but not on protecting poor people who are dependent on forest resources for their livelihood.
- Tribal people living in forests are totally dependent on forest resources. If they are stopped from exploiting forests for their livelihood they resort to ~~criminal~~ criminal activity like smuggling & killing.

③ Drawbacks of Pollution related act:

- The penalties imposed by this act are very small when compared to damage caused by big industries due to pollution.
- Person cannot directly file a petition in the court.
- For small industries, it is very expensive to install a custom made effluent treatment plant.

Despite the various shortcomings of the environmental laws in India - govt. has taken various steps to conserve our biodiversity.

- ① Public Private Partnership
- ② Use of Technology
- ③ Active international collaboration.
- ④ Timely Amendment of Rules.

Consumerism and Waste Products :



Related to constant purchasing of new goods, with little attention to their need, durability, product origin or environmental consequences of their manufacture and disposal.

Waste product,



Any product or material that is unused and rejected as worthless or unwanted.

② In consumer society, people replace their goods with newer ones. They purchase goods, use them and throw them away.

Reason: Imbalance in demand and supply of commodities leading to hoarding; black marketing.

: Low literacy levels & lack of awareness of rights.

: Backwardness

: Ignorance

: Lack of education & information

: Emotional stability - media trying to influence people.

Effects of consumerism:

① Craving for goods is high

② Excessive consumption

③ Ecological imbalances

④ High depletion of natural resources.

③ Ecological Imbalances



Destruction of Natural Habitat

Deforestation

Industrialization

Geological disturbance : Endangered species .

Psychological Health

Now this excess consumption than required leads to huge amount of waste products -

Chemical wastes

Plastic material

E-waste

Nuclear Waste



↓
Harmful effects to environment

How to control this consumerism and redundant waste products??

→ Waste Minimisation - Redesign, prevent creation of waste, minimize resource.

Measures to control:

- Resource optimization
- Reuse of scrap material
- Waste exchanges
- Durability