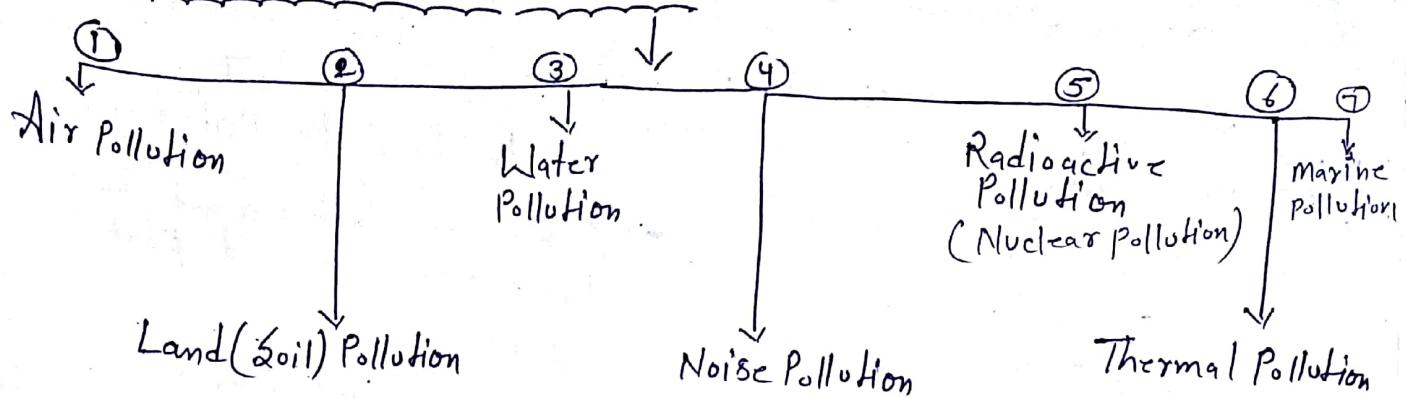
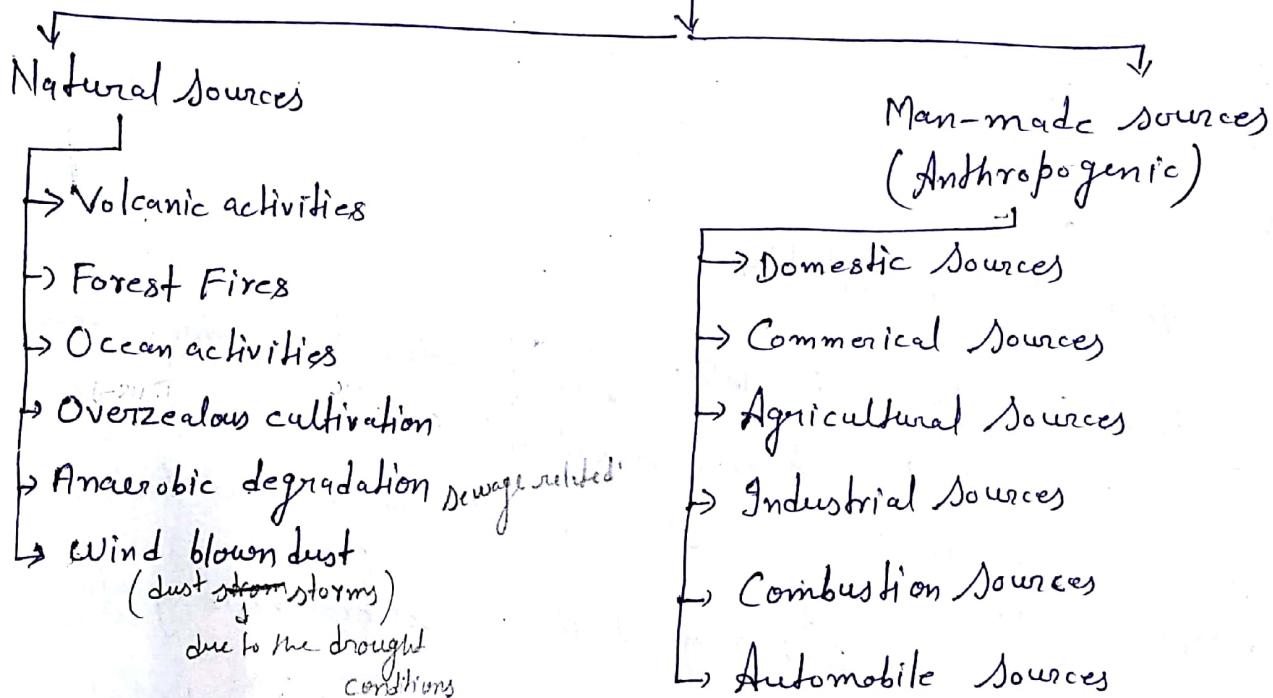


Types of Environmental Pollution :-



(1) Air Pollution :- It can be defined as "any atmospheric condition in which certain substances are present in such concentration that they can produce harmful effects on man and his environment."

Classification of Air Pollution Sources

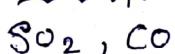


→ Pollutants of Air Pollution

Gaseous Pollutants

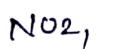
→ usually gaseous in nature & exist at normal Temp. & Pressure.

→ example:-



NO_2 , Phytochemical oxidants (smog)

→ It can be divided in Primary and Secondary pollutants



Effects of Air Pollution

→ Effects on Human Health → Air pollution have many acute and chronic effects on human health.

→ Gaseous pollutants like SO_2 → it irritates the mucous membrane of respiratory tracts.
↓
its high concentration causes bronchitis & affect lung.

→ When $\text{CO} + \text{haemoglobin} \rightarrow$ Carboxyhaemoglobin → It stops transportation of O_2 in body parts & may even lead to death.

→ NO_2 also irritates lungs & its high concentration may even cause acute bronchitis.

→ Benzene, toxic metals, formaldehydes etc. causes reproductive problems & even cancer.

Particulate Pollutants

→ Substances which are not gases but may be in solid particles form.

→ It can be classified on the basis of size, source or physical state.

→ examples → Lead, cadmium, Nickel, Mercury (Pb)

→ other substances such as

Lead :- cause coma & even death.

Cadmium :- cause kidney & liver damage.

Mercury :- cause nerve, brain & kidney damage.

(2) Effects on Plants :- Air pollutants also affect the plants.

like SO_2 :- It bleaches the leaf surface & causes chlorosis

(disappearance of chlorophyll & yellowing of leaf)) Plasmolysis,

metabolic inhibition & even death.

→ PAN (Peroxyacetyl nitrate) & ozone → are both known to damage plants.

means in terms of
premature fall & curling
of sepals.

→ NO_2 → suppresses the growth of plants.

→ Excess use of fertilizers, pesticides also affects the growth,
metabolism of plants & disrupt photosynthesis.

(3) Effects on Animals :- When the animals feed up on the

particulate coated plants especially with Pb, arsenic, results
in bronchitis & lack of appetite in animals.

(4) Effect on climate / Environment :-

Deforestation →
Burning of fossil fuels →
Increases in human population →

are responsible for
↑ in CO_2 concentration
in the atmosphere.

It's ↑ concentration
causes green house
effect.



↓ It reduce dissolved oxygen in water ↓

(4)

- Burning of fossil fuel → increase the % of oxides of N & S (like coal) in atmosphere They interact with rain H_2O & converted into strong acidic comp. such as H_2SO_4 & Nitric acid & come down as acid rain.
- Chemical like CFCs (chlorofluorocarbons) → released from jet planes It deplete the ozone layer by which UV rays do reach earth.
- Control of Air Pollution:
- By using / adopted Anti-pollution measures by all industries.
- By removing the oxides of N & S.
- By using less polluting fuels. (e.g. - H gas)
- By controlling the vehicle pollution by in the modification of engine technology.
- By planting more trees.
- Industries should be located after proper EIA studies.
- By using Renewable sources of energy.

Pollutants

Invisible

Nature

Normal T

example

 SO_2 , C NO_2 , Ph

→ It can

Prima

pollute

 CO , CO_2 SO_2

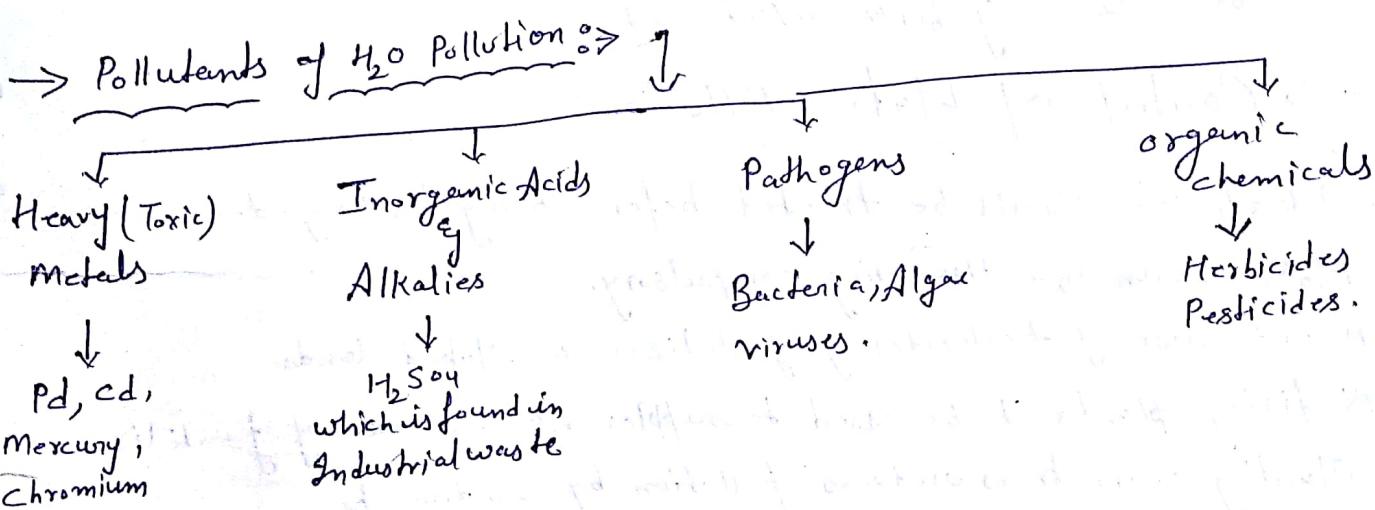
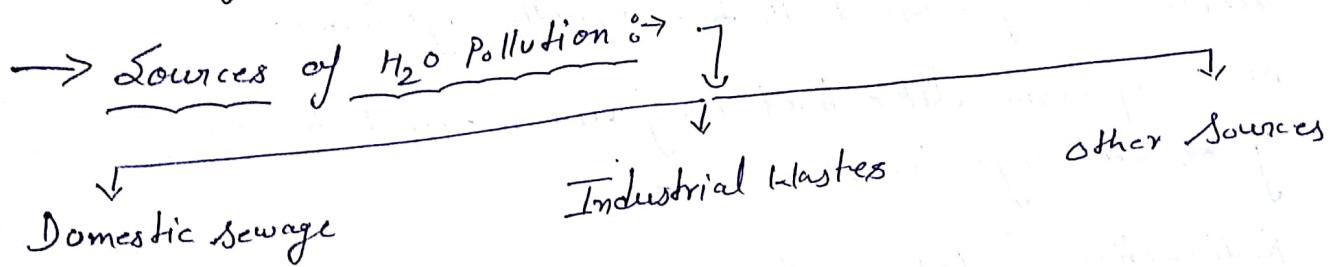
NO

→

(1)

→

(2) Water Pollution \rightarrow It may be defined as "the presence of some impurities in H_2O in quantities that may cause a health hazard by making it unfit for use".



- \rightarrow Effects of H_2O Pollution \rightarrow
- Organic & other toxic comp. from industrial waste e.g. cleaning agents
 - Organic & other toxic comp. from industrial waste e.g. harms aquatic life.
 - Inorganic nutrients like nitrogen, phosphorus from animal wastes, plant & fertilizers cause eutrophication of lakes & affect infants & unborn babies.

Eutrophication \rightarrow it is the enrichment of H_2O by nutrients like P & N. \rightarrow by which excessive plant growth is their. This enhanced plant growth often called an "algal bloom" \rightarrow It reduce dissolve oxygen in the H_2O & can cause other organism to die.

Effects of Water Pollution :-

- Nitrate when present in excess in drinking water causes blue baby syndrome or methaemoglobinemia. The disease develops when a part of Hb is converted into non-functional oxidized form.
- Nitrate in stomach partly gets changed into Nitrites which can produce cancer-causing products in the stomach.
- Excess of fluoride in drinking water causes defects in teeth & bones, a disease called fluorosis.

Teacher's Signature :

- Inorganic chemicals like acids, salts by heavy metals make the H_2O unfit for drinking or irrigation & cause health problems for humans & aquatic life.
- Organic waste like animal & plant parts, sewage etc. decrease O_2 & cause death to aquatic organisms.
- Micro-organism like bacteria & viruses affect humans & aquatic organisms.
- Radioactive substances from nuclear power stations cause cancer & birth defects etc.

Control of Water Pollution :-

- Inatile H_2O should be treated before being discharged.
- Make rain H_2O Harvesting compulsory.
- Avoid use of pesticides & fertilizers on sloped lands.
- N-fixing plants to be used to supplement the use of fertilizers.
- Planting more trees reduces pollution by sediments.
- Separate drainage system should be used for sewage & rain H_2O .
- Before discharging the waste H_2O , it should be disinfected to kill the disease-causing bacteria.
- A ratio should be fixed for total fresh H_2O withdrawal for each industry.
- The treated H_2O should be reuse.
- Improving process technology to reduce water demand.

(3) Soil Pollution → Any physical or chemical changes in soil conditions that may adversely affect the growth of plants by other organisms living in the soil is known as "soil pollution".

→ Sources of Soil pollution →

By using increased quantities of fertilizers & Pesticides etc.

By Industrial discharge of urban solid waste

By waste H₂O of faulty sanitation.

→ Pollutants of Soil Pollution →

Chemicals from Industrial waste like:- Zn, Cd, Al, Co, mercury

Organic insecticides like:- DDT, benzene

Improper & continuous use of fertilizers & pesticides.

→ Effect of Soil Pollution →

- chemicals from industrial discharges change the physical, chemical & biological properties of the soil.
- Salts tend to accumulate in the soil causing salinization which leads to death of plants.
- Plants also absorb the pollutants & store them in their stems by leaves which affects the humans.
- Radio-isotopes in the soil enter the food chain, replace essential elements in the body & cause abnormalities.

Inorg
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Control of Soil Pollution

- Industrial waste should be properly treated before discharging them into the soil.
- Methods like dilution, vapor extraction or bio-remediation improve the quality of soil by decreasing the pollutants.
- Biodegradable organic wastes should be used for generation of Biogas.
- Chemical fertilizers should be replaced by biofertilizers.
- Mining techniques should be improved to reduce the spread of mine dust.
- Pneumatic pipes, special carts should be used for collecting & disposing wastes.
- The waste materials like paper, glass & plastics should be recycled.
- Biological pest control methods should be used to reduce the level of pesticides.

(4) Noise Pollution → It may be defined as "release of unwanted sound in atmosphere".

→ Noise is measured in dB (decibels) → unit of sound.

→ Hearing loss begins if a person is exposed to noise levels.

of 8-90 dB (for more than 8 hours a day.)

→ A noise level of 180dB could kill a person.

⇒ Sources of Noise Pollution

Road traffic
aircraft

Industrial operations
construction activities

Celebrations,
elections,
functions,
public meeting
religious festivals

Entertainment
sources like
T.V., radio,
cloud speakers

⇒ Effect of Noise Pollution ⇒

Physical effects

- Affects hearing ability
- Impairment of vision
- Heart problems

Physiological Effects

- Headache
- Increase in heartbeats
- Impairment of night vision
- Lowering concentration
effect on memory
- Muscular strain
- Nervous breakdown
- Anxiety
- Narrowing arteries

Psychological Effects

- Depression
and
fatigue
- Stress
- Emotional disturbances
- Frustration
- Irritability
- Insomnia

→ Control of Noise Pollution

- By Producing less noise.
- Machineries should be redesigned to reduce noise.
- Earphones, earplugs, earmuffs & other noise absorbing materials should be provided.
- Heavy vehicles & old vehicles should not be allowed in the populated areas.
- In old machinery proper oiling can reduce noise.
- Silencers can reduce noise pollution.
- Sound proof chambers should be installed.
- Noise producing airports, railway stations, industries etc. should be located away from human settlements.
- There should be silence zones around residential areas, hospitals & educational institutions.
- The rules should be fixed for the noise levels for fire crackers & industrial activities.
- The ^{Acting} legislation should ensure that production of noise in diff. functions is within limit. Permission should be granted for use of the system in open after 10 pm & before 6 am.

(v) Radiactive Pollution :- (Nuclear Pollution)

→ Radioactive substances which are present in nature emit high energy radiations which pollute the environment & causes harmful effects.

→ Sources of Radioactive pollution :-

Natural Sources

→ radioactive elements present in rocks, soil
e.g. H_2O eg: U-235,
U-238, R₉-224,
Th-232, C-14 etc. → nuclear weapons,
nuclear fuels,
atomic reactors,
radioactive isotopes,
X-rays.

Man-made sources

→ Cosmic rays are high-energy radiation, mainly originating outside the Solar system.

→ Effect of Radioactive Pollution :-

→ Atomic explosions → release large number of radiations to the environment → Radioactive particles fall on earth through rain drops

↓
They cause soil pollution

ultimately harm

human beings ← Then enter from soil it is transferred into food chain ← into water sources

Teacher's Signature

- In medical treatments use of X-rays for detecting skeletal disorders, cancer therapy etc. also causes problems.
- Radioactive irradiations can affect even genes of chromosomes & the resulting mutations are transmitted to generations. It may lead to burns, miscarriages, cancer of thyroid, lungs, skin etc.
- The damage caused to the human body by irradiations depends upon the dose, dose rate & the part of the body exposed.
- In γ doses radiation can cause instant death whereas in lower doses it can impede the functioning of the body organs.
- In human hands & feet can tolerate a much larger dose of radiation as compared to other parts of the human body.
- Some cells like embryo, reproductive cells, bone marrow cells etc. are readily affected by radiation whereas the muscles, bones & nervous tissues are less injury by radiations.
- Radiations from Strontium - 90 gets deposited in bones as Ca & causes bone cancer.
- T-131 damages bone marrow, lymphnodes, spleen & WBC & causes tumors, skin cancer, defective eye sight.
- Radiations affect even plants & animals for e.g. fish accumulate ^{55}Fe & other marine animal tend to accumulate ^{90}Sr .

Teacher's Signature

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| STORY | 1 |
| PAGE NO. | 1 |

change
pollution

c.

design

→ Control of Radioactive pollution :-

- The total exposure should be kept below the maximum dose.
- Avoid routine X-rays.
- Using air filters by exhaust systems, wearing protective clothing etc. minimizes the radiation contamination.
- Leakage of radioactive elements from nuclear reactors need to be checked from time to time.
- Areas which cause exposure to radiation should be marked as radiation zone and entry should be restricted in those areas.
- Radioactive resistant walls should be constructed for screening workers from radioactive materials.
- The radioactive wastes should be stored in the deeper layers of lithosphere where their gradual harmless decay can take place.
- Radioactive waste disposal in deep mines, deep wells, oceans require careful evaluation before being permitted.

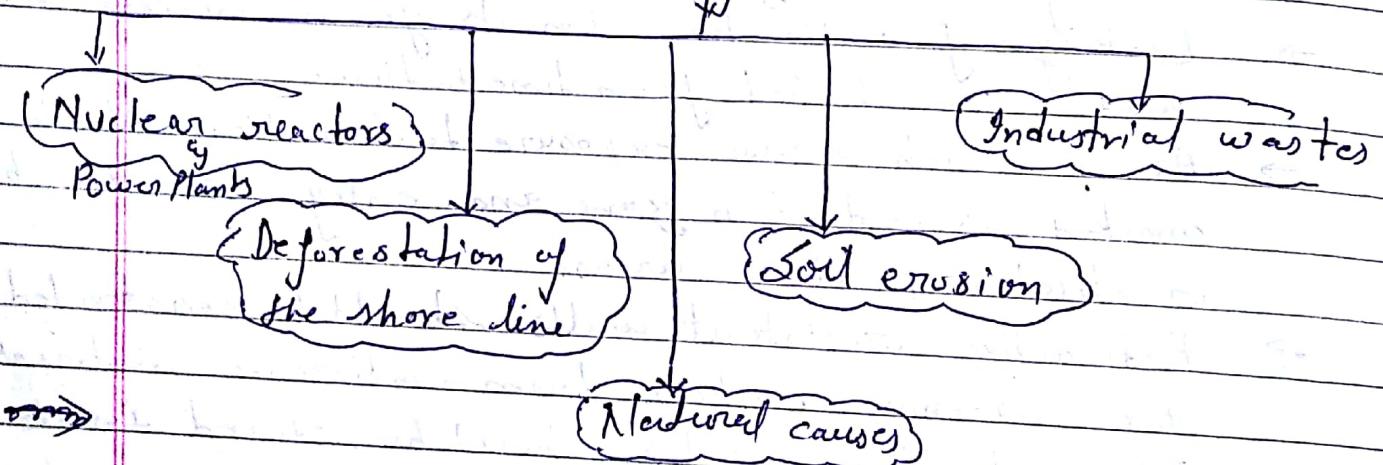
Teacher's Signature

(vii) Thermal Pollution

→ Thermal Pollution is defined as the undesirable changes in the natural environment due to the presence of waste heat in the water/Air.



Sources of Thermal Pollution



Effect of Thermal Pollution :-

- It reduces the O.O content of H₂O.
- It changes the characteristic properties of H₂O.
- It influences reproductive cycle, digestion rate, respiration rate & many enzymatic activities of living organisms.
- It favours the growth of certain bacteria & pathogens.

Control of Thermal Pollution:-

- It can be controlled by cooling ponds, cooling towers & cogeneration.
- Using of wasting less electricity.

Marine Pollution ⇒

→ "Marine pollution is defined as the direct or indirect discharge of matter or energy by humans into marine water bodies that is harmful to living organisms, hazardous to human health; adversely affects sea-water quality & reduces its amenities."

Oceans are ultimate sink for most of the waste we produce. This is because any waste material which is released into the river system will exit into the ocean. Marine pollution is also known as ocean pollution.

Sources of Marine Pollution

Land Sources of Marine Pollution

- Radioactive substances
- Toxic chemicals
- Solid waste
- Thermal pollution
- Sewage
- Nutrients
- Pathogens etc.

Offshore sources of Marine Pollution

Teacher's Signature