

Q: Atmospheric pollution and measures to control it in India.

5/1/2

Ans: Atmospheric pollution is an undesirable change in the physical, chemical or biological characteristic of our atmosphere that may or will harmfully affect living conditions and cultural assets.

- W.H.O. defines the atmospheric pollution as the presence of materials in the air in such concentrations which are harmful to man and his environment.

- Any substance which causes undesirable change in the air is called Air pollutant. It may be gas or particulate matter like dust, mist or aerosol. these air pollutant are of three

types:-

Air Pollutant

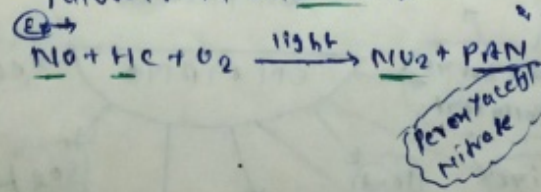
Primary

release directly in the air.

Ex → CO_2 , NO_2 , SO_2 , H_2S , HCl , HF etc.

Secondary

produced as a result of reaction between primary pollutant in the sunlight.

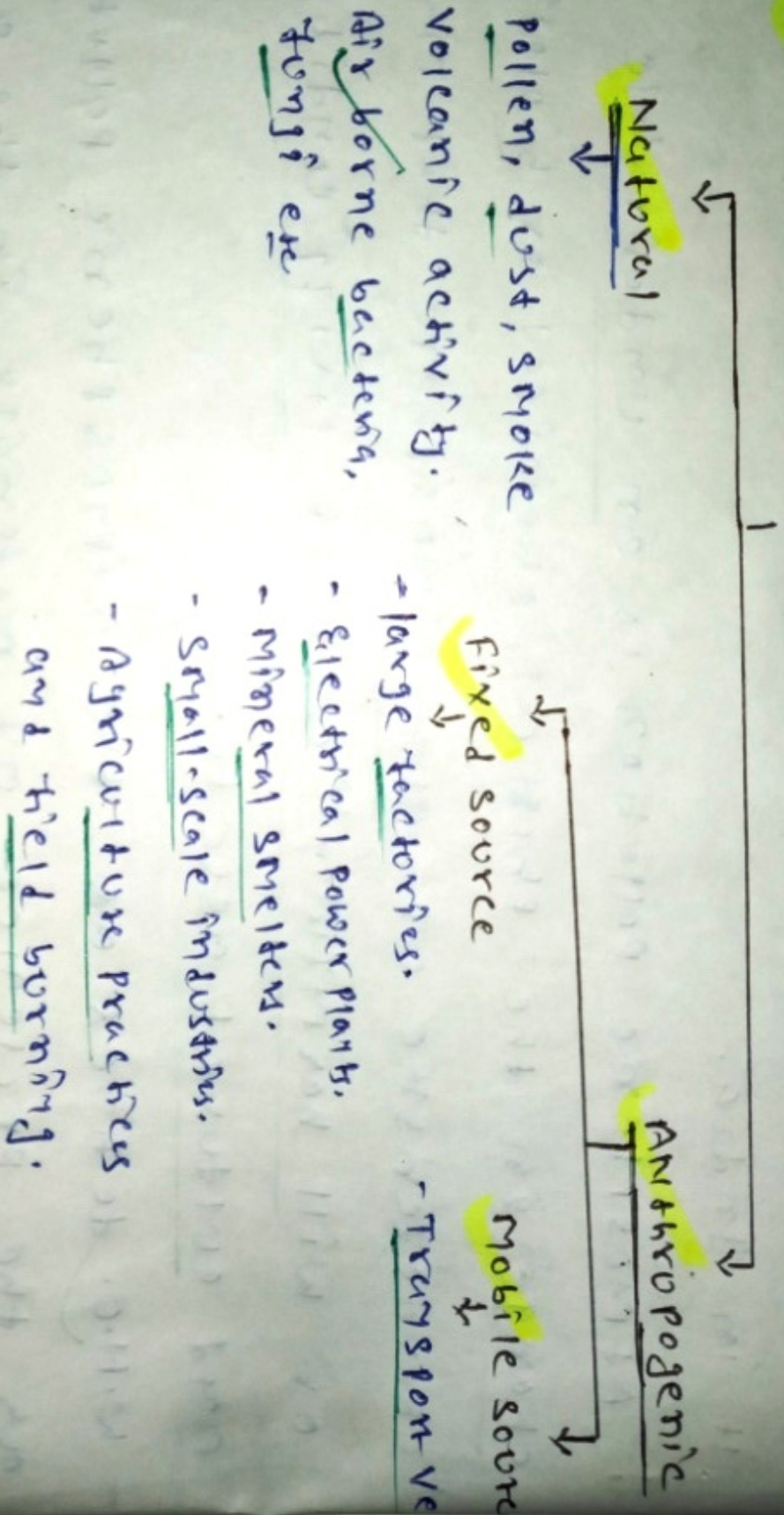


Biological

It involves Air borne pollutants like Bacteria, virus, Fungi, Pollen grains.

These are known as aero-allergens.

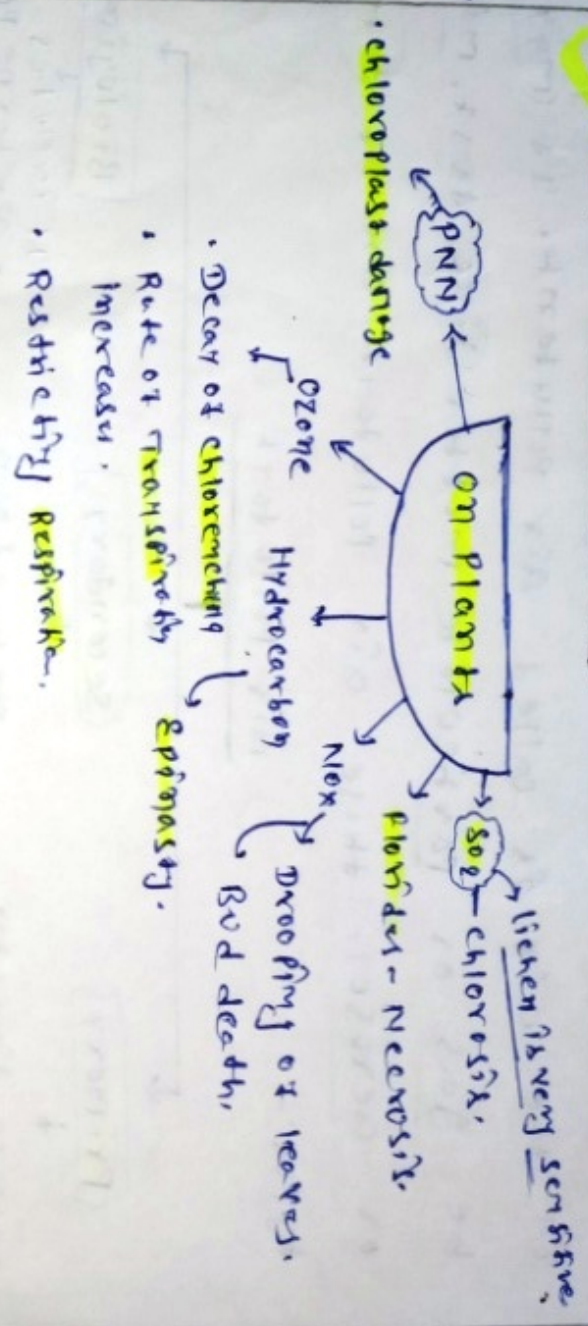
Sources of Air Pollution?



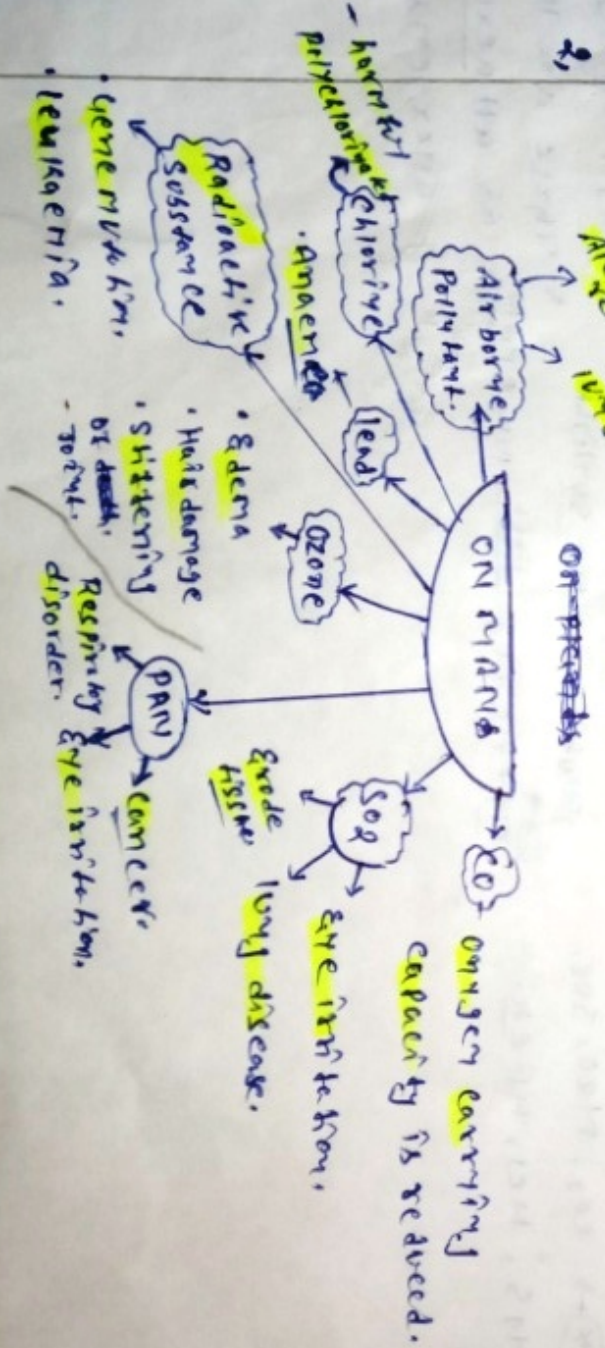
- Other sources like Radioactive substance, ionizing radiation emitted during atomic explosions

Effect of Air Pollution?

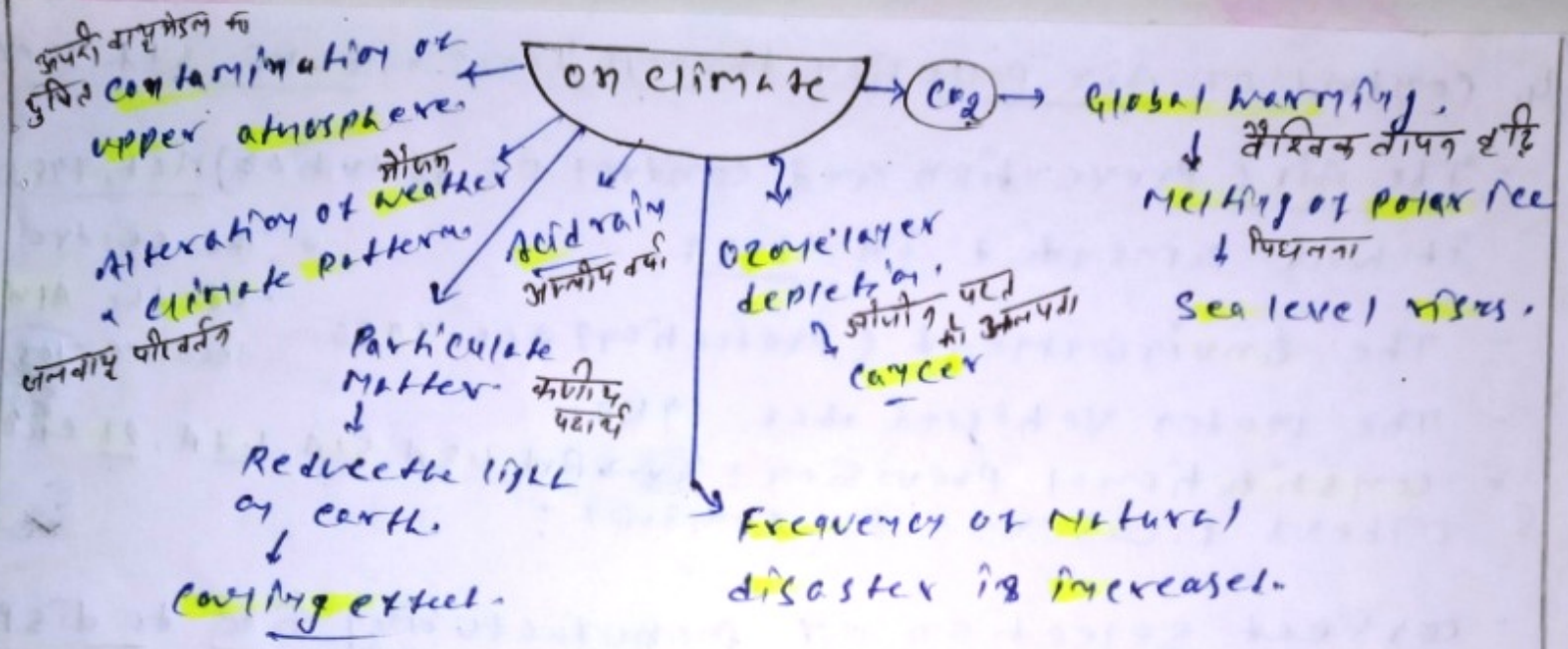
Effect of Air Pollution:



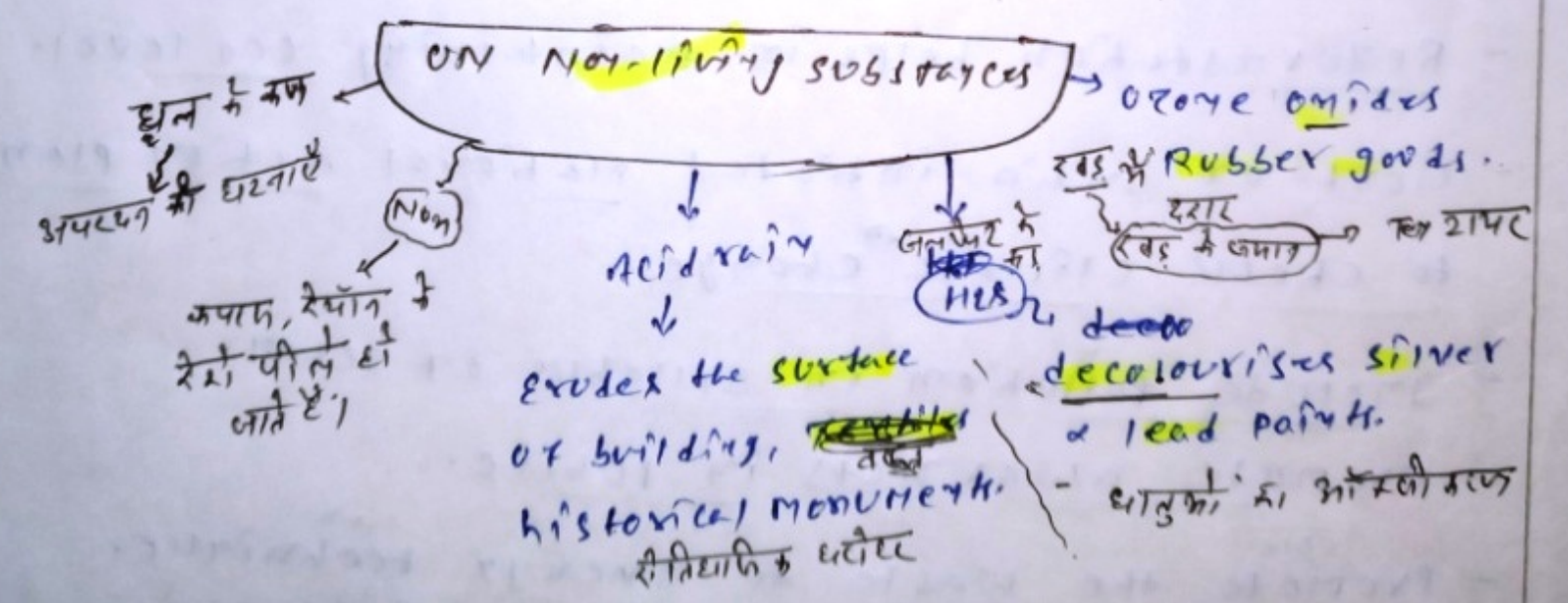
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WATER POLLUTION:

Any change or modification in the physical, chemical, and biological properties of water.

SOURCES:

WATER POLLUTANTS:

① NON-DEGRADABLE

- can't be easily broken into simpler components.
- eg - Mercuric salts, plastics, pesticides.

BIO-DEGRADABLE

- May be broken down easily by micro-organisms.
- eg - kitchen waste.
- Residue of plants
- Excreta of animals

SOURCES:

① Natural

- eg - soil minerals, humus, surface run-off, excretory products of animals etc.

② POINT SOURCE

- eg - Industries, power plants, underground coal mines, offshore oil wells.
- Specific sites near waterbody which directly discharge effluents into them.
- ① निम्नलिखित प्रकार के हैं।

ANTHROPOGENIC

DOMESTIC

sewage discharge

- eg - food residue, animal excreta.

Industrial effluents

- eg - Toxic chemicals, radioactive substance.

Non-Point source

- eg - scattered source which collectively pollute water.
- eg - Atmospheric deposition.
- surface runoff from agricultural field.
- movable source like ships etc.

EFFECT:

(i) ON AQUATIC LIFE:

① Decrease in dissolved oxygen (DO):

(ii) ON HUMAN BEINGS:

CONTROL:

1. Sewage must be treated properly before discharge! -
2. Industrial effluents should be treated chemically before release.
3. Utilisation of wastes in preparing biogas.
4. Legislative measure to control water pollution.
 - section 277 of Indian Penal Code
 - section 12 of Factory Act, 1948.
 - The Water (Prevention and Control of Pollution) Act, 1974.
5. Planting trees prevent soil erosion → reduce pollution by sediment.
6. Prevent agricultural runoff.

Ecological effects on aquatic life:

1. Decrease in oxygen content: organic and inorganic waste depletes the level of oxygen content of water i.e. increase the Biological oxygen demand and the chemical oxygen demand both. This makes the survival of aquatic organisms impossible.
2. Destruction of biota: Silt pollution decreases the depth of light penetration. It also forms a covering over the habitat food. Thus, it reduces the food supply to aquatic life.
 - Silt may interrupt the reproduction of fish by smothering eggs laid on the bottom.
3. Calcification: - early hatching of eggs
 - failure of trout eggs to hatch.
 - change in diurnal and seasonal behavior.
 - affect migratory migration.
 - significant shift towards more heat tolerant forms.
4. Destruction of spawning ground:
5. The marine pollution affects the growth of phytoplankton which is the main producer of the oxygen ($1/4^{th}$) in atmosphere.

6. Plankton Blooms: ~~are~~ Eutrophication in waterbodies stimulate the plankton growth.

(i) Blue green algae produce obnoxious odors & tastes in water.

(ii) Dinoflagellates blooms or the red tide produce toxic metabolic products.

(iii) excessive weed growth or weeds can impede fishing, fish spawning, shell fish production etc.

Ecological effects on man:

1. Spread of diseases: contaminated water spreads epidemic diseases like Cholera, Typhoid, dysentery, diarrhoea, Jawadice, viral diseases & many other water borne diseases.

2. compounds of heavy metals like Hg, Arseenic, Cd, Pd etc are poisonous. through food chain enter into human body & causes detrition.

(Ex) $\text{Hg} \rightarrow$ Mimata disease

$\text{Cd} \rightarrow$ Itai-Itai "

3. Nitrate contaminated ~~water~~ drinking water by faecal bacteria convert these nitrate into Nitrite.

Nitrate contaminated drinking water $\xrightarrow[\text{bacteria.}]{\text{intestinal}}$ Nitrite

these Nitrite, has more affinity with Hb than oxygen, decreases oxygen carrying capacity known as Methemoglobinemia.

4. persistent pesticides like, DDT reached to man through bio magnification, causes fatal disease like cancer, leukemia.

5. ingestion of toxic contaminated water for a long period causes a disease known as fluorosis. (5)

6. Excessive growth of weeds can impair in Navigation.

7. ~~Oil spill~~ oil spills on the coasts of the sea side resorts, drive away holiday makers, affecting the economy of that place.

8. oil spreads on the water surface, it clogs the feathers of diving birds making their flight impossible.

9.

- Water pollution is also posing a real time threat to the health condition of the Indian people who consume contaminated water. TO curb water pollution all the laws and regulations implemented by the government will be a futile practice without active participation of the local people. It is thus, responsibility of every citizen to contribute in conserving water bodies and keep them pollution free.

THERMAL POLLUTION:

"degradation of water quality due to changes in water temperature"

"Addition of excess of undesirable heat to water body that make it harmful to living beings"

Sources:

1. Nuclear power plants: including -
 - Nuclear experiments
 - " explosion.
 - Research institute.
2. Coal field power plants: the condenser coils are cooled with water.
3. Industrial effluents: like Textiles, Paper, sugar releases cooling water into nearby water body.
4. Hydro-electric power:
5. Removal of stream side vegetation.

Effects:

1. Reduction in dissolved oxygen.
2. Toxicity increase.
3. Mortality:
4. Primary producers are affected \rightarrow Global warming, algal blooms, microbial growth increase.
5. Metabolic activity changes.
6. Risk migration.

COMBUSTOR MEASURES

1. cutting Towers: Transfer heat from hot water to the atmosphere.

2. cutting Pond:



3. Spray Pond



4. Air-Kelvin Cell:

NUCLEAR HAZARDS:

Radioactive pollution: presence of undesirable ^{radioactive} substance on surface or within solids, liquids and gases.

Source:

(A) Natural

(1) Anthropogenic

Cosmic: from outer space.

Terrestrial: in soil, water, & living beings like Thorium-232, U-235, Radium-226, comes from earth's crust.

Internal: Naturally occurring within body. like K-40, C-14, Pb-210.

Natural disaster: eg → Fukushima Nuclear disaster

(B) - Mining of Radioactive materials.

- Atomic reactors.

- Nuclear fuels.

- X-ray & radiation therapy.

- Nuclear fuel

- Radioactive isotope used in research.

EFFECT

(i) GENETIC: occurs at genetic level. It's

very dangerous.

eg → - mutations in chromosome.

- Gene mutation.

(ii) Somatic: eg - leukaemia, cancer, Abnormalities in foetus, Radiation sickness etc.

(Ex) → ^{131}I → Thyroid gland,

• Strontium-90 → Bone → instead of calcium.

• Leukemia → cancer of bone marrow.

CONTROL :

- Nuclear power plants → should be carefully installed.
- Leaks must be monitored regularly.
- Radioactive waste → disposed off safely.
- Safe storage & transport.
- International conferences like -
 - Comprehensive Test Ban Treaty (CTBT),
 - Non-Proliferation Treaty (NPT).

SOLID WASTE

↳ waste other than liquid or gaseous.

India: class 2 cities → 2 million tons.

Delhi: 5,922 tons per day.

It can be classified: Municipal, Industrial, Agricultural, Medical, Mining waste & Sewage sludge.

↳ Urban, Industrial, E-waste, Hazardous waste

↳ Recycling

↳ SOLID WASTE MANAGEMENT:

- "The collection, treatment, recycle and disposal of solid waste to minimise the harmful effects of solid waste".

1. Waste collection: Door to door waste collection.

- It's the first and most ~~imp~~ critical step.

2. W. Segregation:

- Recyclable & Non-Recyclable

- Biodegradable & Non-Biodegradable.

- Hazardous and Non-Hazardous.

3. W. Transportation: Must be done in covered vehicle to avoid outdoor pollution.

4. Processing of waste: Must be processed before disposal.

5. DISPOSAL:

① INCINERATION: burning of waste at high temperature

Note Remove plastic: Dioxins and polychlorinated biphenyls (PCBs).

② COMPOSTING: Aerobic and Anaerobic.

released: CO_2

marsh gas (CH_4)

- H_2S ; Ammonia

③ DUMPING: controlled vs uncontrolled,

④ By products of solid waste recovery:

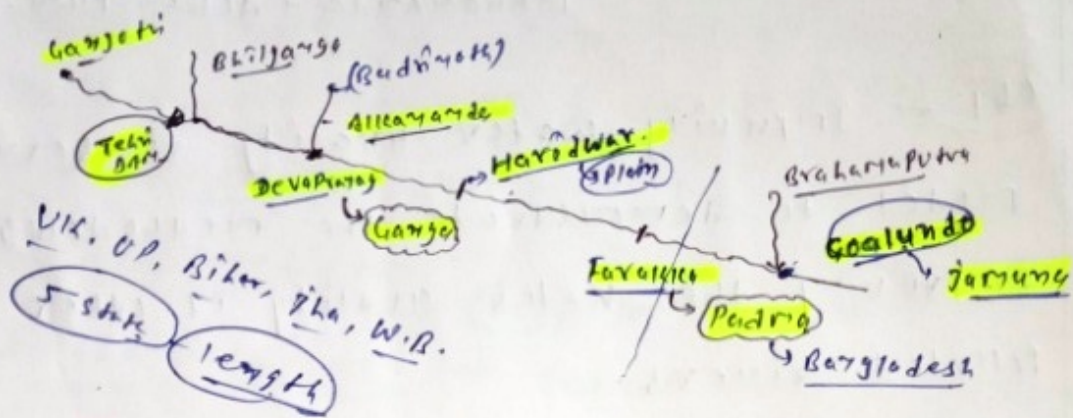
- Eco bricks, compost, RDF, landfill gas and waste to energy.

Imp. 3Rs: Reduce, Recycle and Re-use:

It is a self check exercise by the waste generator to see where waste can be reduced, recycled and re-used.

GANGA ACTION PLAN

Origin - Gangothri Glacier → Name - Bhagirathi
(Gaumukh).



GAP-I

Launched → June, 1985.

TOWY → 25 class I → in state → UP (6), Bi (4), W.B. (15).

Scheme → sanctioned → 261
completed → 259 (2 in Bi).

COST → Rs 962 crore.

Obj: Improve the water quality of Ganga to acceptable standards by preventing the pollution load reaching the river.

1987 → Recast the Obj: To the "Bathing class standard".

BOD → 3 mg/lit. Maximum.

DO → 5 mg/lit. Min.

Total coliform → 10,000 per 100 ml.

Faecal coliform → 2500 per 100 ml.

GAP-II: Approved → April 1993.

It also include → Gomti, Yamuna, Gomti and Mahanada → action plan.

Obj. → Improving water quality to serve as model to demonstrate the methodology for improving the water quality of other polluted rivers.

1995 → National River Conservation Directorate (NRCD)

Obj. → To check pollution in rivers through implementation of pollution abatement schemes to bring the river to bathing quality.

Present Status:

→ Rivers → 34
State → 20
Town → 160
Cost → <u>9736 crores</u>

05-12-1996: GAP-II merged with NRCD.

closed on: 31-3-2000.

Reasons for failure: - Inappropriate environmental planning.

- lack of local technical expert.
- lack of mass awareness.
- least political dedication.
- V.P. and Bihar → lack of electricity.

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BHOPAL GAS TRAGEDY!

American Businessman

Warren Anderson

- Union Carbide India Limited (UCIL) was set up in 1969 at Bhopal (M.P.) to produce carbamate (carbamate) pesticide (name - sebin) using MIC (Methyl Iso Cyanide) as intermediate.

- Accidents:
 - ① (1976) → complaint of poisoning by employee
 - ② (1979) → set up plant to produce MIC
 - ③ (1982) → engineer - 30% sick. (1983-84) → several leakages

④ ⑤ Night of 2nd to morning of 3rd Dec, 1984

- Water enters into the tank of MIC



Tank overhated & emptied



- 40 tons of MIC leaked (40 kg. phosgene as impurities).

- Fog like clouds over 40 km² area.

- 500 people died (5,00,000 being exposed).

caused!

- 10:30 PM → worker complaint.

supervisor → thought that cheer it after few times

- ALARM → not working.

- STILL TODAY: exact causative cause has not been established.