

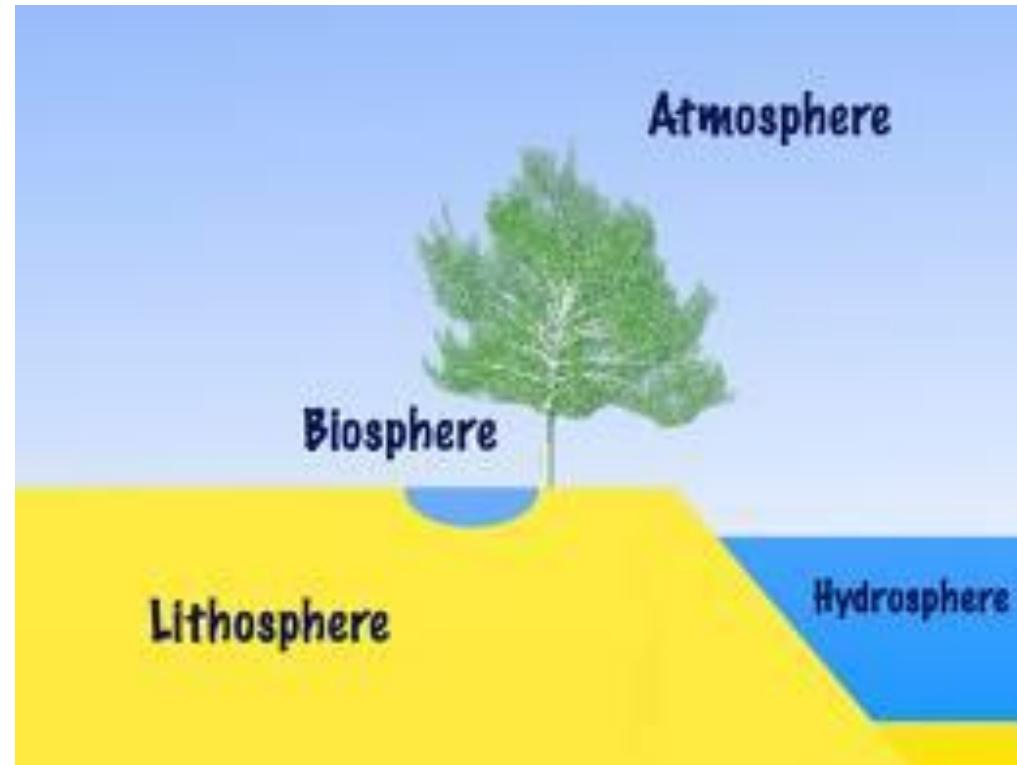
Environmental Pollution



Pollution

- Pollutant
- Types of Pollution

- Environment
 - Components of Environment
 - Air - Atmosphere
 - Water - Hydrosphere
 - Soil - Lithosphere





Soil Pollution



Air Pollution



Noise Pollution



Water Pollution

Type of Pollution

Other Types of Pollution



Implication:

- Soil Pollution
- Air Pollution
- Water Pollution

Pesticide Pollution



Implication:

- Water Pollution
- Soil Pollution



Explain how oil pollution will interface in form of soil pollution with a relevant example.

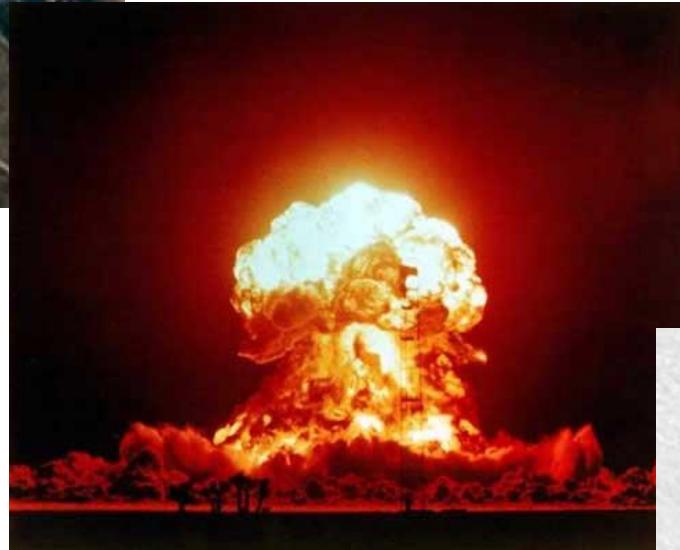
Oil Pollution



Nuclear Fallout

Implication:

- Soil Pollution
- Air Pollution
- Water Pollution

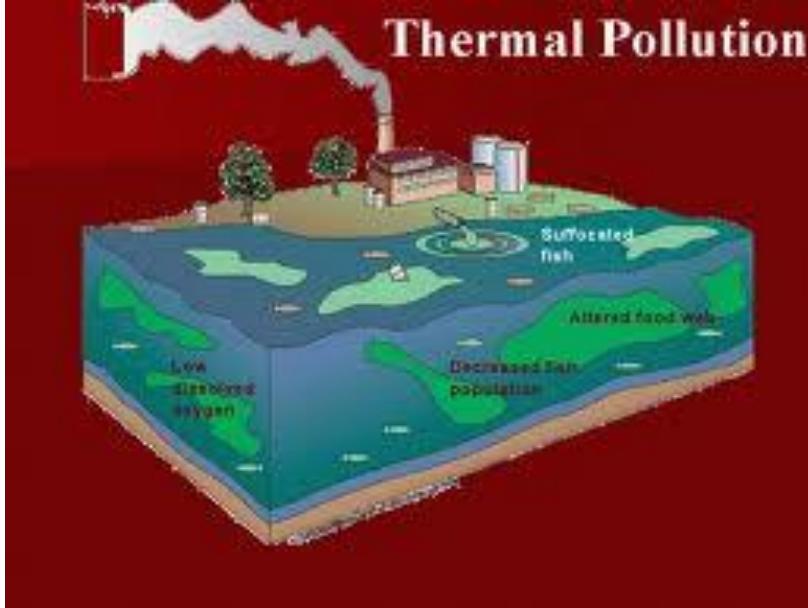


Mining + Rainfall

Explain how Radioactive pollution will interface in form of soil pollution with a relevant example illustrating its dominance

Radioactive Pollution

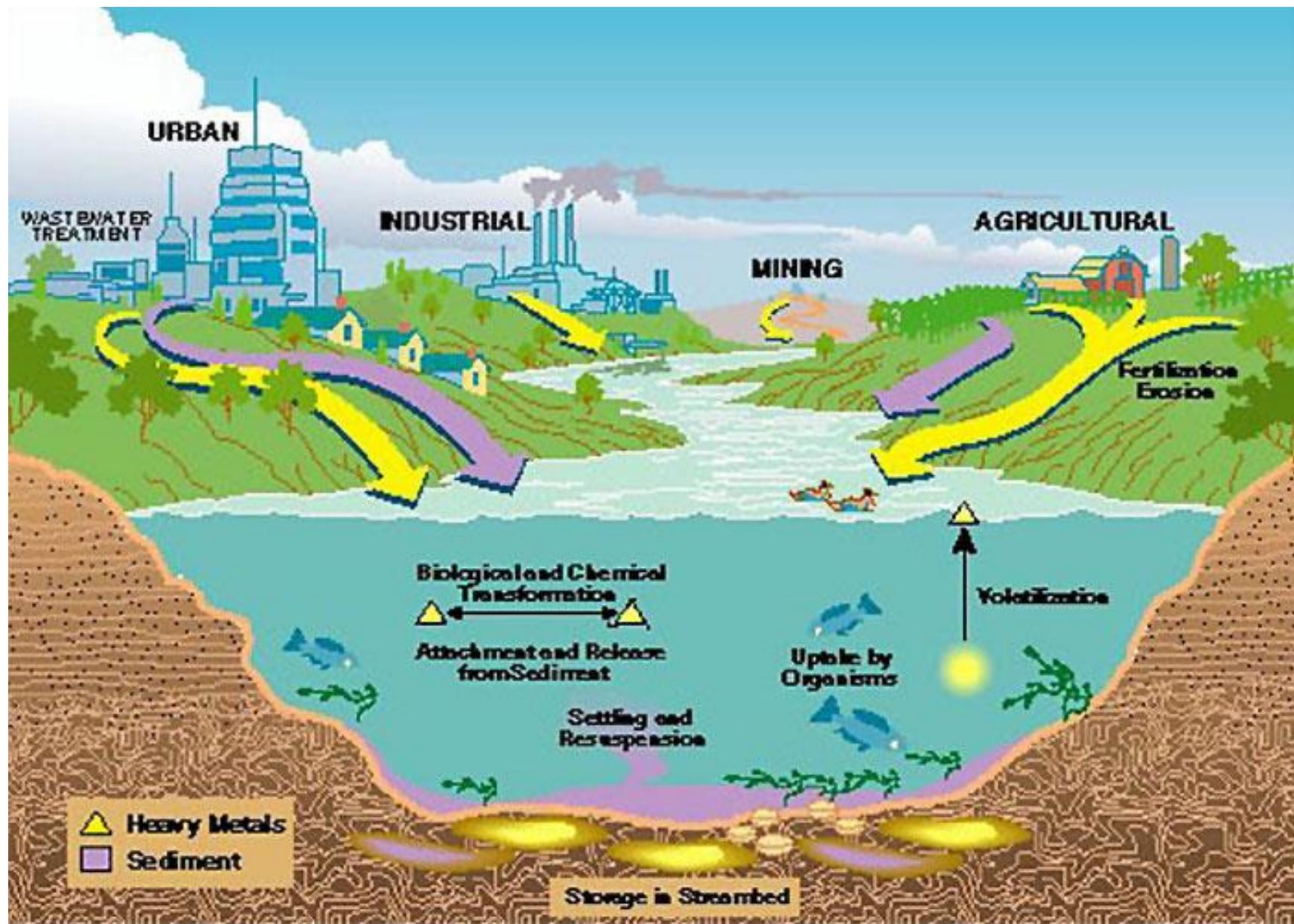




Implication:

- Water Pollution

Thermal Pollution



Heavy Metal Pollution

Air Pollution

Earth's Atmosphere

- Envelope of Gases above the Earth's Surface is termed as Earths Atmosphere

Earth's Atmosphere

Troposphere : 0-11km

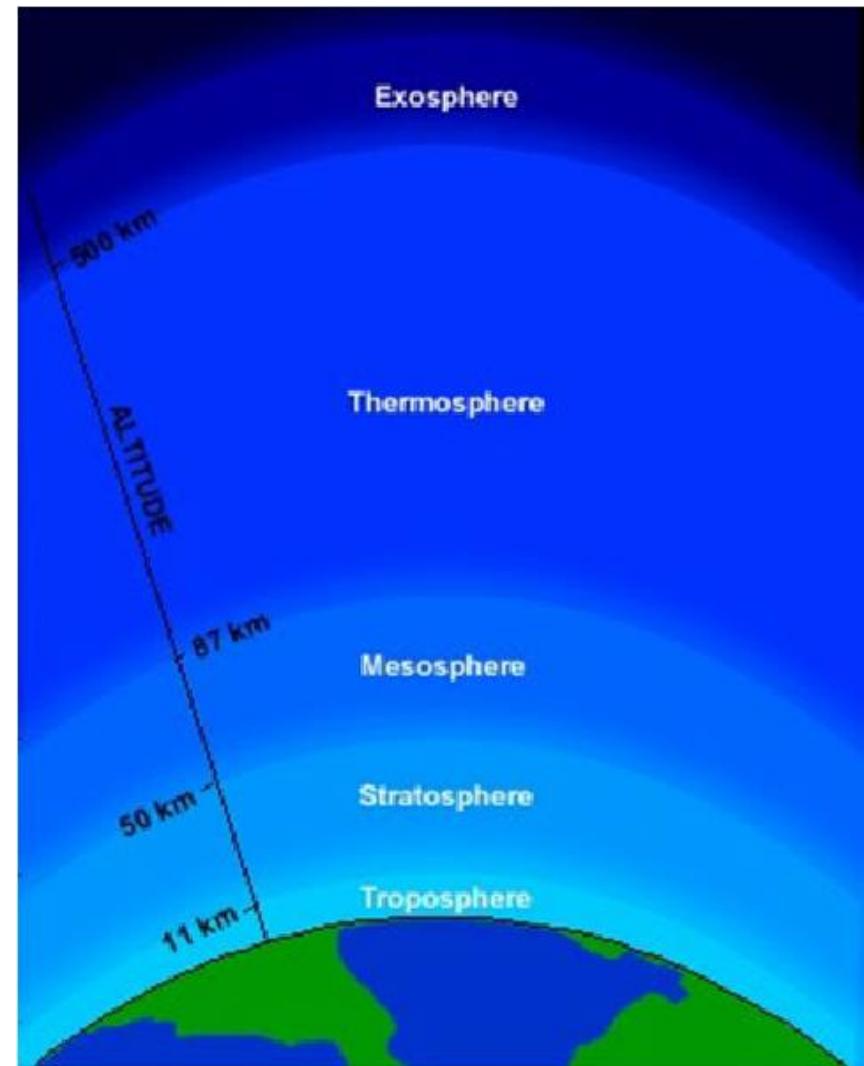
Stratosphere: 11-50km

Mesosphere: 50-87km

Thermosphere: 87-500km

Exosphere: 500-1000km

Air Pollution mainly
occurs in Troposphere and
Stratosphere



Role of Earth's Atmosphere

1. Protects Earth's Biosphere from Electromagnetic Radiations
2. Absorbs Infra Red Radiations and maintain Temperature on earth's surface (GHE)
3. Maintains balance in the bio-chemical cycles (Oxygen, Nitrogen, Carbon, Hydrological)

Composition of Clean Air

Gases	Avg. Conc. (ppm)	Gases	Avg. Conc. (ppm)
Nitrogen	780900	Krypton	1.0
Oxygen	209400	Hydrogen	0.5
Argon	9300	Carbon Monoxide	0.1
Carbon Dioxide	318	Ozone	0.02
Neon	18	Nitrogen Dioxide	0.001
Helium	5.2	Sulphur	0.0002
Methane	1.3		

Meteorology and Air Pollution

Primary Meteorological Parameter

- Wind Speed
- Temperature
- Atmospheric Stability
- Mixing Height

Secondary Meteorological Parameters

- Precipitation
- Humidity
- Solar Radiation
- Visibility - fog

Air Pollutants

- These are compounds causing Air Pollution
- They are Classified as:
 - Primary Air Pollutants
 - Secondary Air Pollutants

Primary Air Pollutants

- ✓ Oxides of Carbon
- ✓ Oxides of Nitrogen
- ✓ Oxides of Sulphur
- ✓ Volatile Organic Compounds
- ✓ Hydrocarbons
- ✓ Particulate Matter – SPM and RSPM
- ✓ Radioactive Pollutants

Oxides of Carbon – Carbon Monoxide

Sources

- Incomplete combustion of materials containing carbon
- Automobile Exhausts
- Oxidation of Methane by anaerobic Decomposition
- Small Amount – Volcanic Eruption, Forest Fires

Ill-Effects

- Formation of Carboxyl Haemoglobin
- Impairment of Central nervous system
- Changes in cardiac and pulmonary functions
- Drowsiness, respiratory failure, coma, fatality

Oxides of Carbon – Carbon Dioxide

Sources

- 318ppm conc. In clean air
- Burning of Fossil Fuels
- Complete combustion of materials containing carbon

Ill-Effects

- No Direct Health Effects
- Conc. more the 10% activates Green House Effect (56% of Green House Gases)
- One of the air pollutant causing Acid Rain

Oxides of Nitrogen

Nitrogen Oxides at normal temperature are harmless but at high temperature combines with oxygen to produce nitric oxide

Sources

- Automobile Exhaust
(Diesel Engines)
- Electrical Power Plants
- Marine Steamers

Ill-Effects

- High Conc. – Lung Cancer and cause suffocation
- Low Conc. – Pneumonia, Swelling and Irritation to Skin
- Major Air Pollutant for Acid Rain
- 6% contributing Green House Gas

Oxides of Sulphur

Amongst the oxides of Sulphur, Sulphur Dioxides is the dominant Air pollutant and found in traceable concentrations and has Pungent and unpleasant odour

Sources

- Burning of fuels
- Volcanic Eruptions (35% to 65%)
- Industrial Boilers and Metal Smelter
- Burning of Domestic Coal
- Forest Fires

Ill-Effects

- High Conc. – Reduced Lung Functioning
- Low Conc. – Irritation to mucous membrane of Eyes, Nose and Throat
- Major Air Pollutant for Acid Rain

Volatile Organic Compound

- VOC are categorized as :
 - Methane (MVOCs)
 - Non Methane (NMVOCs)
 - Benzene
 - Toulene

VOC - Methane

Contributes 1.3ppmv of Natural Clean Air

Sources

- Natural Clean Air
- Natural gas system and Manure management
- Landfills
- Coal Mining
- Wastewater Treatment
- Composting

Ill-Effects

- Odour Nuisance
- Green House (contributing 18%)

VOC - Benzene

It's a organic compound composed of 6 carbon atom in a ring with 1 hydrogen atom attached to each carbon atom

Sources

- Industries (Rubber, chemical, tannery, petroleum)
- Volcanoes, Forest Fires and crude Oil Evaporation
- Emission from glues, adhesives

Ill-Effects

- Odour Nuisance
- Green House effect (contributing 18%)

VOC - Toluene

It's a organic compound with sweet odour with composition
(C₇H₈, C₆H₅, CH₃)

Sources

- Emission from Paint Thinner, Adhesives
- Emission from evaporation of Gasoline, Kerosene

Ill-Effects

- High Conc. – Light-headness, Dizziness, Sleepiness, unconsciousness and even fatality
- Low Conc. – Tiredness, Confusion, Memory Loss, Nauseas, Loss of hearing and colour vision

Hydrocarbons

It's a organic compound entirely consisting of Hydrogen and Carbon Atoms

Sources

- Automobile Emissions
- Emission of Isoprene from trees like eucalyptus, spruce, oak

Ill-Effects

- High Conc. (500-1000 ppmv) are carcinogenic to lungs
- Low Conc. – Irritation to mucous membrane of eyes and nose, leading to respiratory disorder
- Plants leaves turning Yellowish

Particulate Matter

It is fine particles or tiny particles of solid or liquid suspended in a gas

Sources

- Volcanoes, Dust-storms, forest fires, Sea Sprays
- Burning of Fossil Fuels

Ill-Effects

- High Conc. – Respiratory disorder, Altered lung function and may lead lung cancer
- Low Conc. – visibility reduction
- Primary Pollutant for Photochemical Smog

Radioactive Pollutants

Sources

- Nuclear Power Plants
- Mining and Refining of Plutonium, Thorium, Uranium
- Nuclear Weapons (Production and Explosion)
- Transportation of Radioactive Materials
- Disposal of Radioactive Waste
- Preparation of Radioactive Isotopes

Ill-Effects

- Nuclear Fallout

Secondary Pollutants

The major Secondary Pollutants are:

1. Ground Level Ozone
2. Photochemical Smog
3. PAN (Peroxy Acetyl Nitrate)
4. Acid Mist
5. Chlorofluorocarbons (CFCs)
6. Formaldehyde
7. Persistent Organic Pollutants

Ground Level Ozone

- Formed by Photochemical Reaction between Oxides of Nitrogen, Volatile organic Compound and Carbon monoxide.



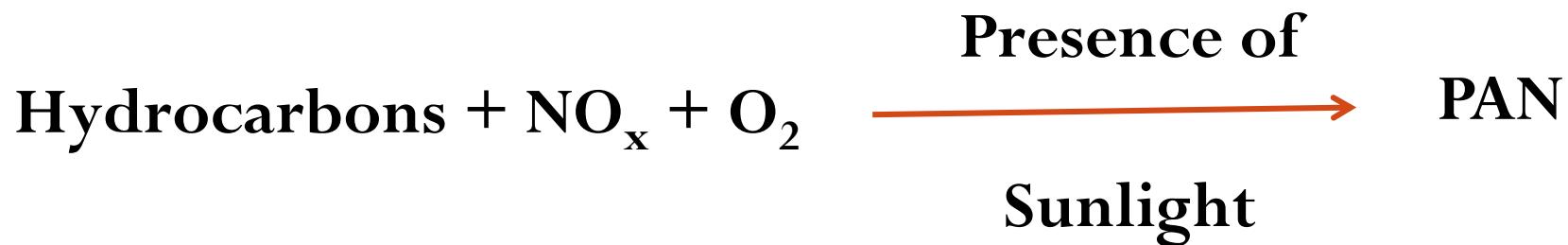
Photochemical Smog

- Formed by Photochemical Reaction between Hydrocarbons, Nitrogen Oxides and oxygen.



Peroxy Acetyl Nitrate (PAN)

- Formed by Photochemical Reaction between Hydrocarbons, Nitrogen Oxides and Oxygen.



Acid Mist

- Mist containing a high concentration of acid particles of any toxic chemicals such as Carbon Tetrachloride and Silicon Tetrachloride.



Chloro-Fluoro-Carbons (CFCs)

- It is a organic compound of Carbon, Chlorine and Fluorine produced as a volatile derivation of methane and ethane

Formaldehyde

- It is a organic compound of with formula CH_2O .
- It is simplest Aldehyde and its systematic name is Methanol

Persistent Organic Pollutants

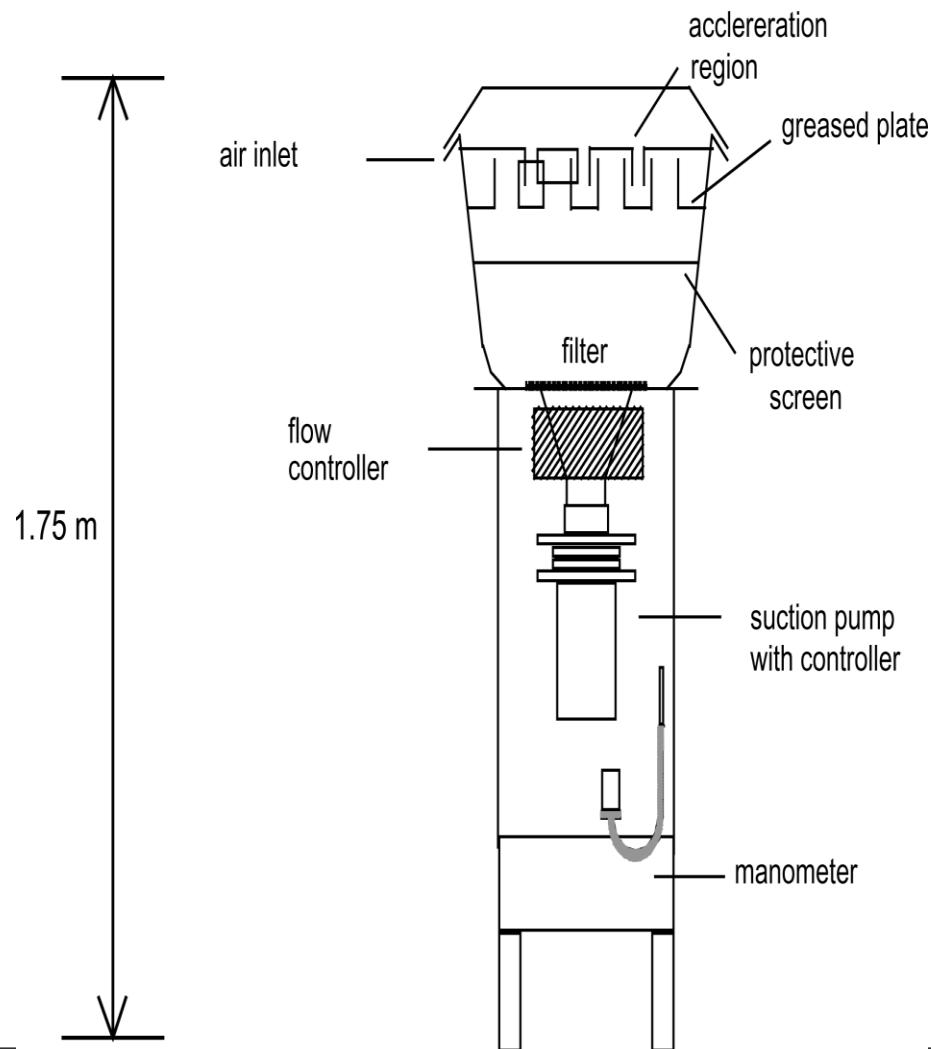
- These are organic compounds that are resistant to environmental degradation through biological and photolytic processes

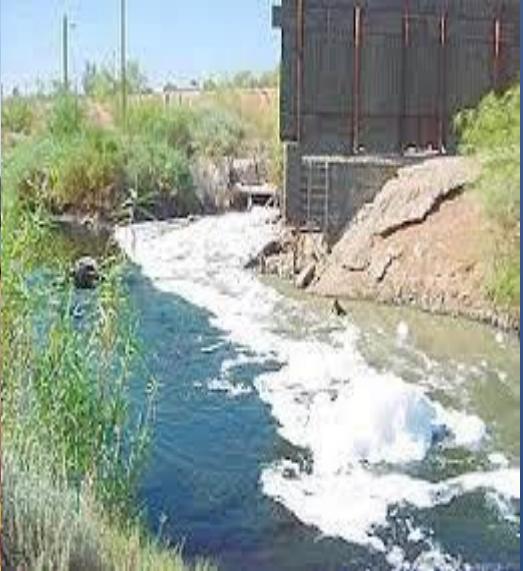
Other Air Pollutants

- Hydrogen Sulphide
- Hydrogen Fluoride
- Chlorine and Hydrogen Chlorine
- Ammonia

(Definition, Sources, Effects – HAPP)

Measurement of High Volume Sampler





Water Pollution

Water Pollution

Water pollution, the release of substances into subsurface groundwater or into lakes, streams, rivers, estuaries, and oceans to the point where the substances interfere with beneficial use of the water or with the natural functioning of ecosystems. In addition to the release of substances, such as chemicals or microorganisms, water pollution may also include the release of energy, in the form of radioactivity or heat, into bodies of water.

Water Masses

Water Masses on Earth

- Lakes
- Rivers
- Oceans
- Ground Water

Water Pollutants Sources can be,

- Direct Sources
- Indirect Sources

Water Pollutant - Types

Water Pollutants Sources can be,

- Direct Sources
- Indirect Sources

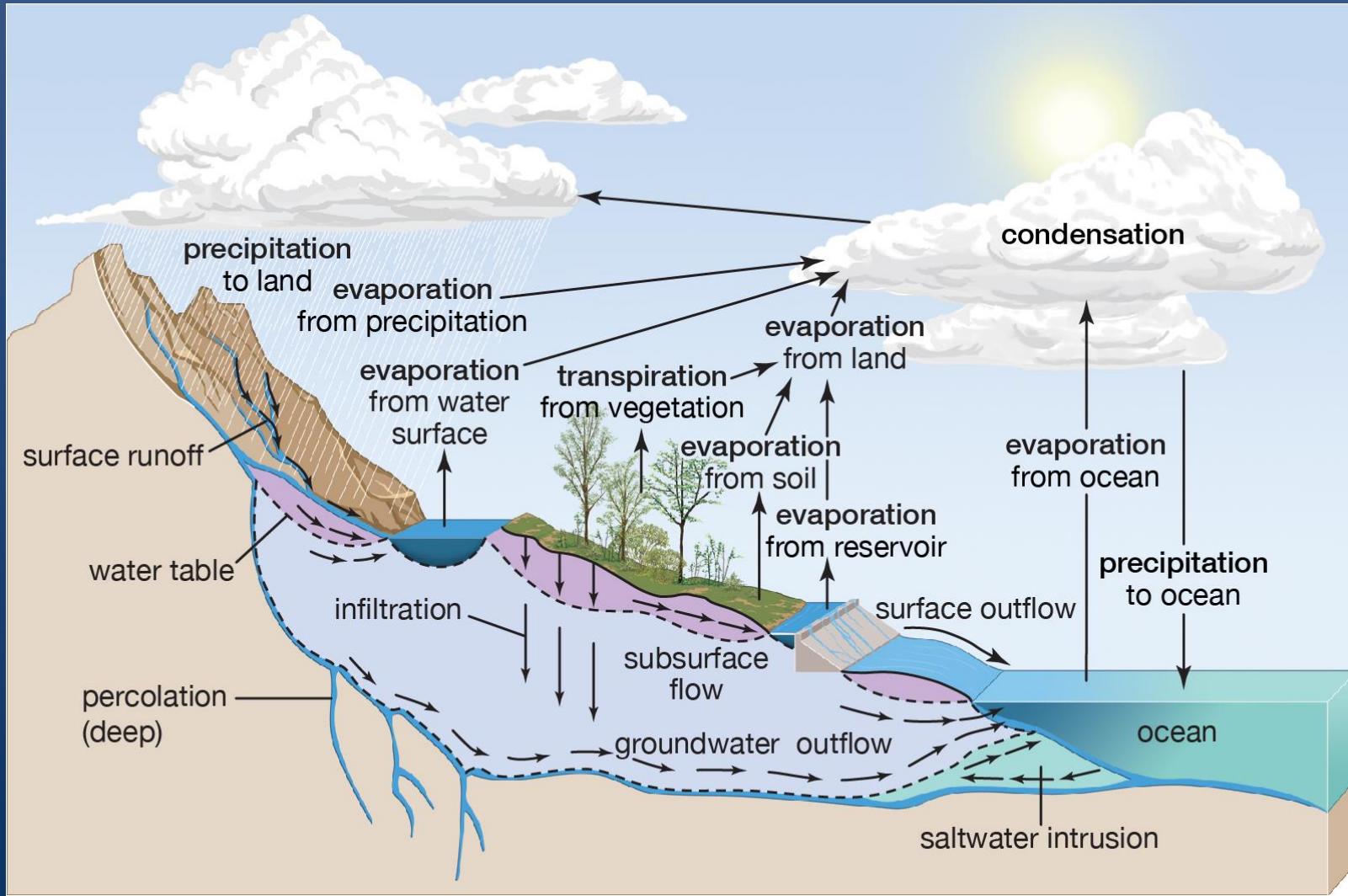
Types of Water Pollutants

- Organic Water Pollutants – Biological Process for Oxidation/Reduction by chemical process
- Inorganic Water Pollutants – Physical or Chemical Process for oxidation/Reduction

Anthropogenic Activities - Water Pollution

- ✓ Domestic Activities
- ✓ Industrial Activities
- ✓ Agricultural Activities
- ✓ Shipping Industrial Activities
- ✓ Thermal Power Plants
- ✓ Nuclear Activities
- ✓ Mining Activities

Role of Hydrological Cycle in Water Pollution



Key Sources of - Water Pollution

- ✓ Domestic Sewage
- ✓ Industrial Effluents
- ✓ Agricultural Waste

Types of Water Pollution

Based on Characteristics of Water

- Physical Water Pollution – (Colour, Turbidity, Taste, Odour, Foams, Temperature)
- Chemical Water Pollution – (Toxic Compounds, Inorganic Compounds, Heavy Metals)
- Biological Water Pollution – (Pathogenic Micro-organisms)
- Physiological Water Pollution – (Chemical Agents)

Types of Water Pollution

Based on Source and Storage

Ground Water Pollution – Wells Infiltration Galleries

Factors on which GWP depends are:

- ✓ Rain Pattern
- ✓ Depth of Water Table
- ✓ Distance from the source of contaminants
- ✓ Soil Properties such as texture , structure and filtration rate

Types of Water Pollution

Based on Source and Storage

Surface Water Pollution – lakes, Ponds, Rivers, Streams, Dams

Factors on which SWP depends are:

- ✓ Hydrological Characteristics of diluting biocides and extent of self purifications
- ✓ Vegetation soil type and degree of weathering rocks
- ✓ Waste Water Disposal Systems
- ✓ Physical, Chemical and Biological characteristics of Wastewater entering surface Waters
- ✓ Hygiene and Health situation of the communities residing near surface waters

Types of Water Pollution

Based on Source and Storage

- ✓ Surface Water Pollution
- ✓ Lake Water Pollution
- ✓ Rivers Water Pollution
- ✓ Sea Water or Marine Pollution

Types of Water Pollution

Terminology

- ✓ Biological Oxygen Demand
- ✓ Chemical Oxygen Demand
- ✓ Eutrophication
- ✓ Dissolved Oxygen

Types of Water Pollution

Based on Impurities Analyzed

- ✓ Microbiological Pollution
- ✓ Oxygen Depletion Pollution
- ✓ Oil Pollution
- ✓ Nutrients Pollution
- ✓ Suspended Matter Pollution

Ground Water Pollution

- Agriculture is a key source of water pollution, especially for groundwater.
- Fertilizers and pesticides applied to crops can seep into the ground and contaminate underwater rivers and waterbeds, thus compromising the quality of wells, boreholes and other places from which groundwater is extracted for human use.

Surface Water Pollution

- Referring to all water sources above ground, such as rivers, lakes, seas and oceans; surface water pollution can occur both naturally, accidentally and intentionally.
- Monitoring has an all-important role in natural flood management, which can lead to poor water quality.
- While accidental oil spills and negligent industries emptying waste into water bodies are also key contributors.

Chemical Water Pollution

- The most common type of water pollution, chemicals can infiltrate both underground water sources and those sitting on the Earth's surface.
- As an integral component of the agricultural industry, it's unsurprising that much of chemical contamination comes from the pesticides and fungicides used in farming, but metals and solvents from industrial sites are also leading contributors.

Microbiological Water Pollution

- Unlike most others on this list, microbiological pollution is a naturally occurring form of water contamination.
- Microorganisms such as bacteria, protozoa and viruses can infiltrate water supplies, causing diseases such as gastroenteritis and cholera.
- Humans are most susceptible to this kind of pollution in places where adequate water treatment systems are not yet in place.

Nutrients Water Pollution

- An excess of nutrients can upset the delicate balance of water-based ecosystems.
- Fertilizers contain a high concentration of nutrients which (if they contaminate water bodies) can cause algal blooming that can block out sunlight and inhibit the growth of other organisms.



Oxygen Depletion Water Pollution

- Another consequence of algal blooms is their consumption of oxygen supplies.
- This means that those species which depend upon oxygen to survive are killed off, while anaerobic ones thrive.
- Some anaerobic microorganisms are capable of producing ammonia, sulphides and other harmful toxins, which can make the water even more dangerous to animals (and humans).

Suspended Water Pollution

- **Improperly discarded waste, such as fragments of plastic, rubber or other manmade materials, can find themselves into water sources and persist for a long time.**
- **Because they are too robust to dissolve in the water and too big to mix effectively with the molecules, they simply float on its surface and prevent oxygen and sunlight from penetrating below.**

Effects of Water Pollution

- ✓ Effect of Infectious Agents
- ✓ Effect of Pesticides
- ✓ Effect of Heavy Metals
- ✓ Effect of Acid Mine Drainage
- ✓ Effect of Inorganic Pollutants
- ✓ Effects of Sediments
- ✓ Effect of Detergents
- ✓ Effect of Plant Nutrients
- ✓ Effect of Radioactivity Pollutants
- ✓ Effect of Thermal Pollution

Effects of Water Pollution

Zinc	Cobalt	Manganese
Copper	Nickel	Sulphide
Barium	Boron	Salinity
Iron	Acidity and Alkalinity	Oil/Grease/Oil Sludge
Cadmium	Phosphates and Nitrates	Aluminium
Mercury	Chlorine	Pesticides/Insecticides
Lead	Radioactive Materials/Substances	Phenols
Arsenic	Fluoride	Cyanides
Vanadium	Selenium	Salinity
Silver	Chromium	

Effects of Water Pollution

Zinc (Zn)

- Zinc is essential element for humans, animal and plants. It is also an important cell component in several metalloenzymes. Infants need 3–5 mg/day, adult males 15 mg/day, pregnant and lactating females 20–25 mg Zn/day. However, heavy doses of Zn salts (165 mg) for 26 days causes vomiting, renal damage, cramps, etc.

Copper (Cu)

- Excess of Cu in human body (>470 mg) is toxic, may cause hypertension, sporadic fever, uremia, coma. Copper also produces pathological changes in brain tissue. However, Cu is an important cell component in several metalloenzymes. Lack of Cu causes anaemia, growth inhibition and blood circulation problem.

Barium (Ba)

- Excess of Ba (>100 mg) in human body may cause excessive salivation, colic, vomiting, diarrhoea, tremors, paralysis of muscles or nervous system, damage to heart and blood vessels.

Iron (Fe)

- It is one of the essential mineral for humans and animals. Degree of absorption depends upon solubility and stability of compound. It is a component of blood cells and liveral metalloenzymes. However, more than 10 mg per kg of body weight causes rapid respiration and pulse rates, congestion of blood vessels, hypertension and drowsiness. It increases hazard of pathogenic organisms, as many of them require Fe for their growth.

Effects of Water Pollution

Cadmium (Cd)

- Cd is very toxic, 50 mg may cause vomiting, diarrhoea, abdominal pains, loss of consciousness. It takes 5–10 years for chronic Cd intoxication. During first phase, discolouration of teeth, loss of sense of smell, mouth dryness occurs. Afterwards it may cause decrease of red blood cells, impairment of bone marrow, lumber pains, disturbance in calcium metabolism, softening of bones, fractures, skeletal deformations, damage of kidney, hypertension, tumor formation, heart disease, impaired reproductive function, genetic mutation, etc.

Mercury (Hg)

- Mercury is very toxic. Excess mercury in human body (more than 100 mg) may cause headache, abdominal pain, diarrhoea, destruction of haemoglobin, tremors*, very bad effects on cerebral functions and central nervous system, paralysis, inactivates functional proteins, damage of renal tissues, hyper coagulability of blood, mimamata disease, and even death. It may cause impairment of vision and muscles and even coma. It disturbs reproductive and endocrine system. Also causes insomnia, memory loss, gum inflammation, loosening of teeth, loss of appetite, etc.

Lead (Pb)

- More than 400 mg of lead in human body can cause brain damage, vomiting, loss of appetite, convulsions, uncoordinated body movements, helplessly amazed state, coma. It is retained in liver, kidney, brain, muscle, soft tissues, bones. Leads to high rate of miscarriages, affects skin, and respiratory system, damages kidney, liver and brain cells. Disturbs endocrine system, causes anaemia, and long term exposure may cause even death.

Effects of Water Pollution

Arsenic (As)

- Poisonous to fishes, animals and humans. Greater than 25 mg of arsenic causes vomiting, diarrhoea, nausea, irritation of nose and throat, abdominal pain, skin eruptions inflammations and even death. It binds globulin of blood haemoglobin in erythrocytes. May cause cancer of skin, lungs and liver, chromosomal aberration and damage, gangrene, loss of hearing, injury to nerve tissue, liver and kidney damage. Minor symptoms of As poisoning, weight loss, hair loss, nausea, depression, fatigue, white lines across toe nails and finger nails.

Vanadium (V)

- It is very toxic, may cause paralysis.

Silver (Ag)

- Causes pathological change in kidney, liver and may even damage kidney. May cause Argyria (discolouration of skin). Effects mucous membranes and eyes. In high doses, it may be fatal to humans.

Radioactive materials/ metals/substances

- These generally cause 'Gene' mutation, ionization of body fluids, chromosomal mutations and cancers. Destroy body cell tissue, adversely effects reproductive system. When mother is exposed to radiation during pregnancy, it causes severe mental retardation and leukaemia in infants. Radioactive metals like heavy metals are nephrotoxic and damage kidneys.

Fluoride

- Excess fluoride intake in body results in progressive crippling scourge (sponging)/fluorosis of bones, teeth. May cause metabolic alternations in soft tissues and their functional mechanism.

Effects of Water Pollution

Selenium (Se)

- Signs of Se poisoning (more than 4 mg) are fever, nervousness, vomiting, falling of blood pressure, causes damage to liver, kidney and spleen, loss of nails and hair, causes blindness to animals. Cats are most susceptible. It affects enzyme systems and interfere with Sulphur metabolism. It can cause growth inhibition, skin discoloration, bad teeth, psychological problem, gastro intestinal problems, but trace amount of Se is protective against poisoning by Hg, Cd, Ag.

Chromium (Cr)

- Any chromium compound is toxic but hexavalent Cr greater than 70 mg is very toxic. It causes cancer, anuria, nephritis, gastrointestinal ulceration, perforation in partition of nose. It penetrates cell membrane and badly affects central nervous system. Causes respiratory trouble, lung tumors when inhaled. May cause complications during pregnancy. Has adverse effects on aquatic life. Trace amount of Cr is essential for normal glucose, protein and fat metabolism and hence it is a essential trace element in diet.

Manganese (Mn)

- Mn is essential for mammals but in concentration greater than 100 ppm, is toxic, and causes growth retardation, fever, sexual impotence, muscles fatigue, eye blindness.

Cobalt (Co)

- High dose (27 mg or above) can cause paralysis, diarrhea, low blood pressure, lung irritation, bone defects.

Nickel (Ni)

- More than 30 mg may cause changes in muscle, brain, lungs, liver, kidney and can also cause cancer, tremor*, paralysis and even death. Essential for plant growth in traces. Harmful to crops and affects metabolic activities of plants in higher concentration. Affects central nervous system.

Effects of Water Pollution

Alkalinity and Acidity

- Permissible range of pH value if violated may cause health problems to human and animals and loss of productivity in agriculture.

Phosphate and nitrates

- Soil nutrient and not toxic in low concentration. Deplete oxygen by excess Algae production-giving bad odour and taste of water and detrimental to aquatic life. They are toxic for human and animal life if concentration is beyond permissible limits. Nitrates also cause cyanosis or blue body disease.

Chlorine (Cl)

- Destroys plant and aquatic life and is a biocide.

Sulphides

Gives bad odour, toxic to many aquatic organisms and animals.

Salinity

- Very bad for soils which retain salinity. Destroys agricultural land.

Oil/Grease/Oil Sludge

- Petroleum product in general are very harmful for soils, aquatic life, animal, human and plant life. They are very toxic. Agricultural land may suffer accumulation of oily waste affecting aeration and fertility. Many constituents of oily sludge are even carcinogenic and potent immunotoxicants.

Surfactants and detergents

- They are toxic and harmful for aquatic life, animals and humans. Inhibit self-purification of water.

Effects of Water Pollution

Phenols

- Toxic and impart objectionable odour. Also subdue plant growth generally. Some phenols (nitrophenyls etc.) are carcinogens.

Cyanides

- Cyanide poses a serious health hazard. Apart from acute toxicity and chronic toxicity, it leads to development of iodine deficiency disorders.

Pesticides/Insecticides

- Highly poisonous for humans and animals. Also they lower seed germination, plays a role in development of Parkinson's disease, destruction of nerve cells in certain regions of brain resulting in loss of dopamine which is used by nerve cells to communicate with brain. Some of these are physical poisons, some are protoplasmic poisons causing liver damage, some are respiratory poisons and some are nerve poisons.

Aluminium (Al)

- Toxic specially for brain, sometimes may lead to Alzheimer's disease in humans.

Soil Pollution

Definition of Soil Pollution

Causes of Soil Pollution

- Agricultural Activities
- Mining and Quarrying Activities
- Sewage Sludge Deposition
- Dumping of Dredged Soil
- Dumping of Solid Wastes
- Deforestation
- Pollution Due to Urbanisation
- Industrial Activities



III Effects of Soil Pollution

- Due to Agricultural Activities
- Due to Mining and Quarrying Activities
- Due to Sewage Sludge Deposition
- Due to Dumping of Dredged Soil
- Due to Dumping of Solid Wastes
- Due to Deforestation
- Due to Urbanisation Pollution
- Due to Industrial Activities



Control of Soil Pollution

- Reduce, Reuse, Recycle and Recovery of Solid Waste
- Solid waste treatment
- Reducing chemical fertilizer and pesticide use
- Reforesting





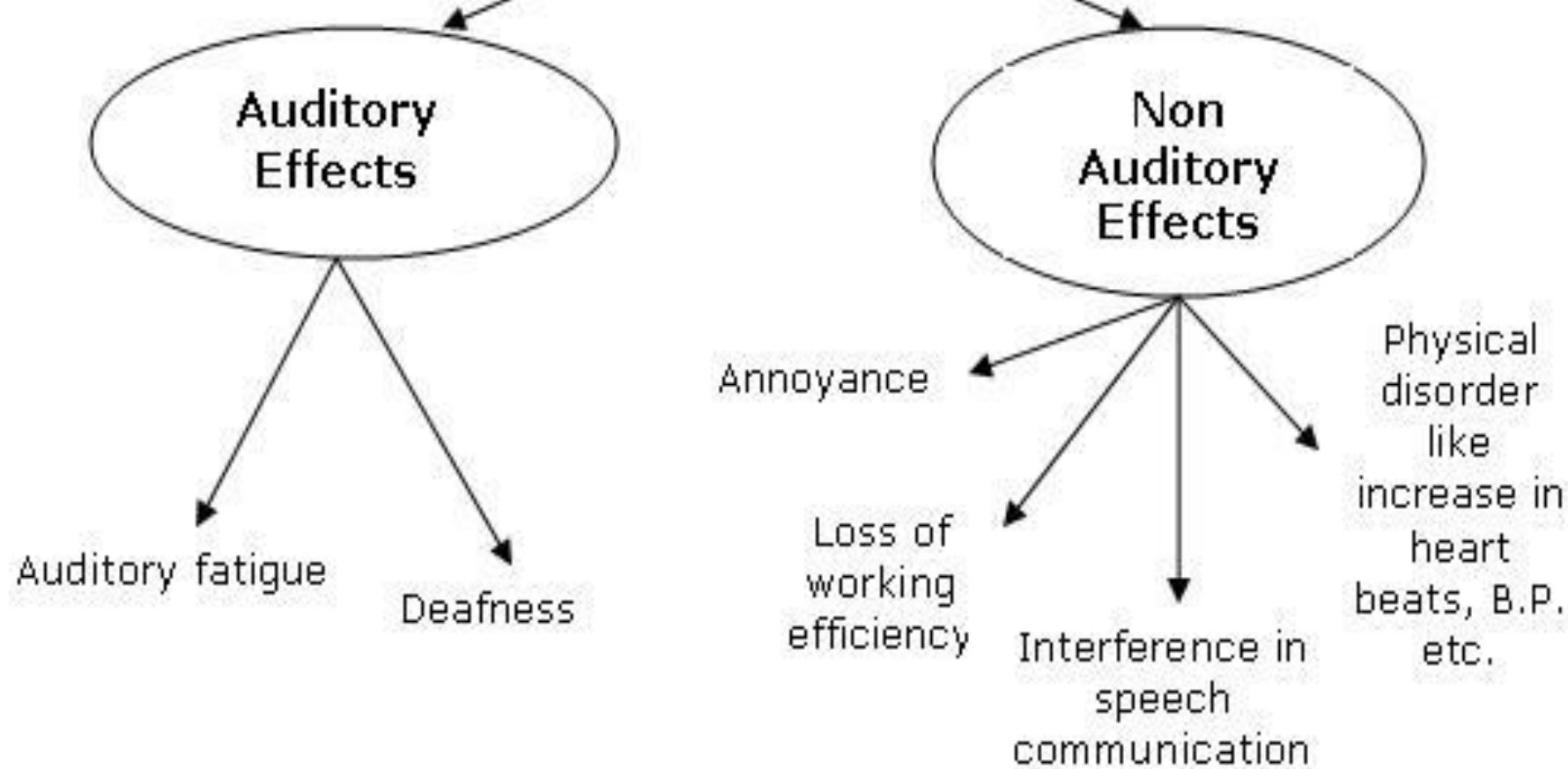
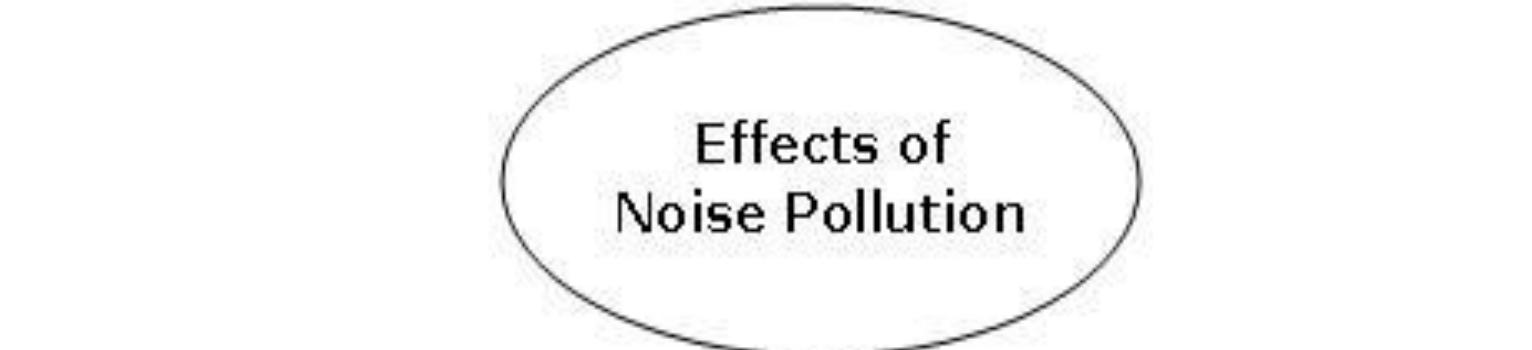
Noise Pollution

Noise Pollution:

The presence of loud, unwanted and disturbing sound in our environment is called noise pollution.

Causes of Noise Pollution

- Road Traffic
- Air Traffic
- Rail Traffic
- Domestic Noise
- Industrial Noise



Norms for Noise Pollution as per CPCB

SCHEDULE

(see rule 3(1) and 4(1))

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

- Note:-
1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
 2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
 3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
 4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

Solutions for Noise Pollution



- Planting of trees at the point of source
- Regular maintenance of automobiles and machines
- Use of sound absorbing materials
- Restriction on usage of loudspeakers
- Zoning – by landuse
- Social awareness programs

Thermal Pollution Marine Pollution

Definition of Thermal Pollution

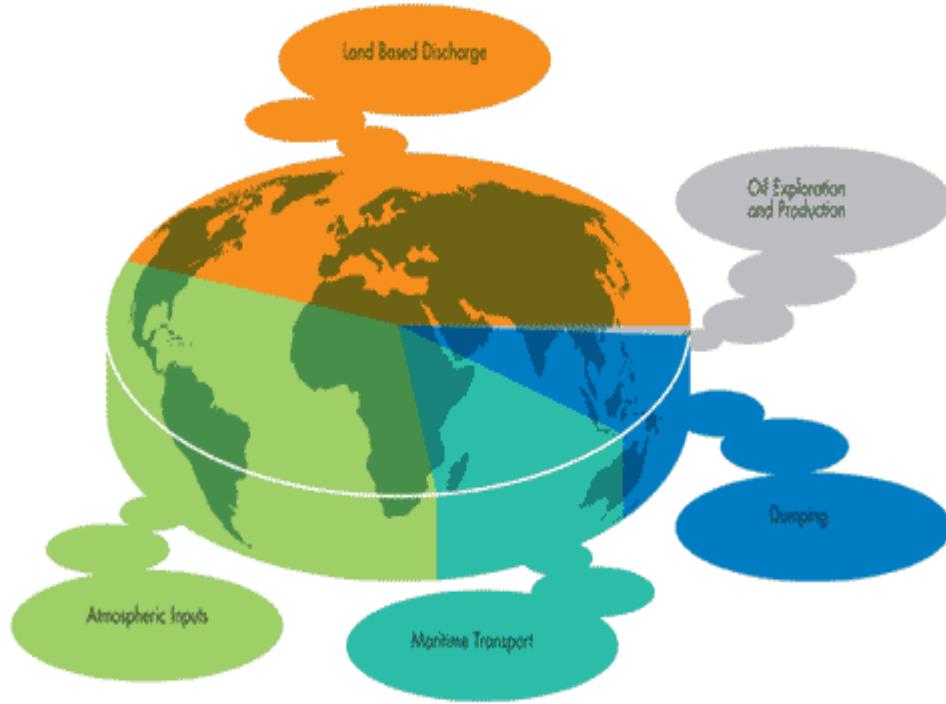
Sources/Causes of Thermal Pollution

- Waste Water from Cooling Agents in Industrial Facilities
- Deforestation of Shorelines
- Soil Erosion
- Agricultural Sources

III-Effects of Thermal Pollution

- Decrease in Dissolved Oxygen in Water
- Affecting Ecosystem Composition

Definition of Marine Pollution



Sources/Causes of Marine Pollution

- Land Based Discharge
- Oil Exploration and Production
- Dumping of Solid Waste
- Marine Transport
- Atmospheric Inputs

III-Effects of Marine Pollution

- Increase in Toxicity of Water
- Leads to Microbiological Pollution
- Leads to Oxygen Depletion Pollution
- Leads to Nutrient Pollution
- Leads to Oil Pollution

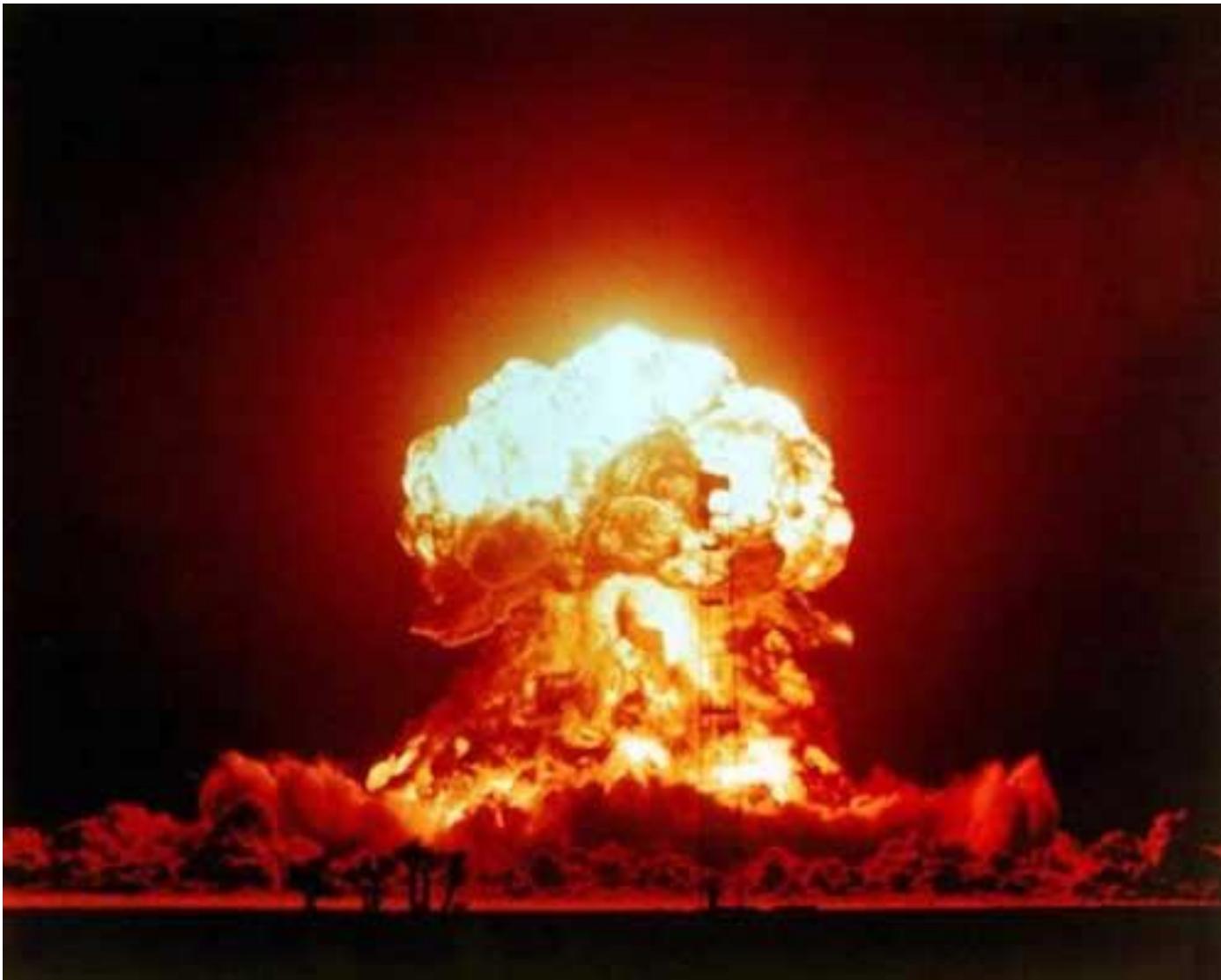
Radioactive Pollution

Radioactive Pollution

Definition

Radioactive pollution can be defined as the emission of high energy particles or radioactive substance into air, water or land due to human activities in the form of radioactive waste. Radioactive waste is usually the product of a nuclear process such as nuclear fission, which is extensively used in nuclear reactors, nuclear weapons and other nuclear fuel-cycles.

Radioactive Pollution



Radioactive Pollution

Sources

- Production of nuclear weapons
- Decommissioning of nuclear weapons
- Mining of radioactive ore (uranium, phosphate etc.)
- Coal ash
- Medical waste
- Nuclear power plants

Radioactive Pollution

- Continuous pollution: This type of condition exists in uranium mines, nuclear reactors, test labs etc. where the humans are under continuous exposure to radioactive contaminants and protective clothing is required to avoid radiation exposure.
- Accidental Pollution: This type of condition exists during accidental exposure to radiations by virtue of equipment failure, radiation leak, faulty protective equipment etc.
- Occasional Pollution: This condition exists during isolated experiment or test of nuclear substance.

Radioactive Pollution

Radioactive Waste Management

- Geological disposal – this is, effectively, the burying of radioactive material. Large geologic formations are located and tunnels as deep as 1000m underground are drilled. Rooms are then excavated at the bottom of these and radioactive material is stored here until it has decayed enough to not be dangerous any more. Radioactive waste has also previously been dumped into the world's oceans but following the sixteenth meeting of the LDC (London Dumping Convention) in 1993, the dumping of radioactive waste into the sea is banned, permanently.

Radioactive Pollution

Radioactive Waste Management

- Transmutation – transmutation of radioactive waste is the process of consuming this radioactive waste and turning it into less harmful waste. This is currently not used very often due to high costs, however, research is being done to make the process more efficient and more economically viable. This currently is our most environmentally friendly radioactive waste management technique and, as such, when perfected will effectively solve the problem of radioactive waste.

Radioactive Pollution

Radioactive Waste Management

- Re-use of radioactive waste – some radioactive isotopes, such as strontium-90 and caesium-137 are able to be extracted for use in other industries such as food irradiation. The re-use of radioactive waste means that the quantity of waste produced is reduced, so this serves as another good environmentally friendly management scheme.

Radioactive Pollution

Radioactive Waste Management

- Space disposal – space disposal is not currently used to reduce radioactive pollution, due to the potential problems which could occur when attempting to carry out the procedure. If, for example, a rocket used to launch the waste fails (and bear in mind that many rockets would have to be used due to the large amount of radioactive waste) then huge amounts of radioactive material would be released into the atmosphere, causing significant health risks to people within thousands of miles of the launch. Sometime in the future this may be possible, however, for now, it is best for us to avoid space disposal.

Pesticide Pollution

Pesticide Pollution



Pesticide Pollution

Definition

- Pollution caused due to use of pesticide for agricultural activities causing spraying in the atmosphere or deposition on soil leading to water and soil pollution is called as pesticide pollution

Pesticide Pollution

Caused by

- Skin contact: handling of pesticide products
- Inhalation: breathing of dust or spray
- Ingestion: pesticides consumed as a contaminant on/in food or in water.

Pesticide Pollution

Effects of Pesticide Pollution

- Death of the organism.
- Cancers, tumours and lesions on fish and animals.
- Reproductive inhibition or failure.
- Suppression of immune system.
- Disruption of endocrine (hormonal) system.
- Cellular and DNA damage.
- Teratogenic effects (physical deformities such as hooked beaks on birds).

Pesticide Pollution

- Effects of Pesticide Pollution
- Poor fish health marked by low red to white blood cell ratio, excessive slime on fish scales and gills, etc.
- Intergenerational effects (effects are not apparent until subsequent generations of the organism).
- Other physiological effects such as egg shell thinning.