

A photograph of a lush green forest. In the upper left, a waterfall cascades down a mossy rock face. The surrounding area is covered in dense, vibrant green foliage, including various plants and trees. At the bottom of the image, a stream flows over dark, wet rocks, creating a smooth, blurred effect. The overall scene is a serene and healthy natural environment.

Environmental Pollution

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Soil Pollution

- Any change in the physical, chemical, and biological properties of soil due to natural or anthropogenic activities that leads to adverse effects on human health, plants, animals or environment is known as soil pollution.
- Major Soil Pollutants and their effects
 - 1) Heavy Metal (Mercury, Lead, Arsenic, Cadmium)
 - 2) Chemical waste
 - 3) Pesticides, fertilizers and other agricultural products
 - 5) Radioactive waste

Soil Pollution

- Causes of Soil Pollution

- Industrial waste
- Mining
- Agricultural waste
- Domestic waste
- Radioactive wastes

- Effects of Soil Pollution

- Reduces the fertility of the soil
- Causes an increase in the number of mosquitoes and flies, which are vectors of several deadly diseases
- Reduces the aesthetic value of land
- Radioactive elements present in polluted soil enter human body and cause a number of adverse health effects such as cancer, deformities in bones, etc.

Soil Pollution

■ Control of Soil Pollution

- Treatment of industrial waste before being disposed to reduce soil pollution.
- Garbage from urban waste should be segregated into biodegradable and non-biodegradable waste products. Biodegradable waste can be used for production of manures and biogas, non-biodegradable waste can be recycled and reused.
- Planting of trees must be encouraged.
- Reduction in the amount of radioactive materials released in the soil
- Reduction in the use of chemical fertilizers and pesticides
- Solid waste can be used for electricity generation.

Solid waste

- Solid waste is that material (such as domestic trash, garbage, metal scrap etc.) which arises from various human activities and which is normally discarded as useless or unwanted. It is responsible for land pollution in urban and industrial areas.
- Refuse means all decomposing and non-decomposing combustible and non-combustible solid wastes such as garbage, ashes, paper, cans, wood scraps, plastic etc.
- Garbage refers to the putrescible solid waste (Solid waste that contains organic matter capable of being decomposed by microorganisms easily) constituents produced during the preparation or storage of meat, vegetables, etc.
- Rubbish is a non-putrescible solid waste constituents, either combustible or noncombustible. Combustible waste includes paper, wood, wood scrap, rubber, leather, etc. Non-combustible wastes are metals, glass, ceramics etc.

Important source of solid waste

- Domestic garbage refers to household wastes such as plastic, paper, glass pieces, metal objects etc.
- Pathological wastes include dead animals and human waste.
- Industrial wastes generally include chemicals, paints, sand, metal ore processing, fly ash, sewage treatment sludge, etc.
- Agricultural wastes contain mainly farm animal manure and crop residues.
- Municipal Solid waste (MSW) is commonly known as trash or garbage and consists of everyday items such as product packaging, furniture, bottles etc.
- Mining wastes result from mining activities. Eg. Heavy metals.
- Radioactive wastes: Nuclear explosions, nuclear testing, use of radioactive substances in medical and scientific research etc.
- Biomedical wastes (BMW) includes disposable needles, syringes, blades, tissues etc.
- E-waste refers to electrical and electronic equipment wastes.

Effects of Solid Waste

- Solid waste helps disease-causing organisms such as mosquitoes, flies, etc., to thrive freely and increase in population.
- It runs off with rainwater and mixes with the nearby water bodies causing water pollution.
- Burning of solid waste leads to air pollution.
- Radioactive substances present in solid waste cause a number of diseases in human beings.
- Solid waste reduces the aesthetic value of land.
- Non-biodegradable solid wastes such as polythene, plastic, rubber, etc., release toxic gases when burnt hence causing air pollution.

Solid waste management

- Indiscriminate disposal of solid wastes—especially of hazardous waste causes adverse environment effects.
- The main objective of solid waste management is to minimize these adverse effects before it becomes too difficult to rectify in the future.

Solid waste management

- Main Functional Elements:
 - Waste generation
 - Waste management
 - Storage
 - Collection
 - Transfer/transport
 - Processing/Recovery
 - Disposal

Solid waste management

- Solid waste management (SWM) is a three-step process:
 - Collection of solid waste
 - Transportation of solid waste
 - Disposal of solid waste

Collection of solid waste

- Large number of dustbins must be provided to enable proper collection of solid wastes according to categories.
- Door to door collection of domestic garbage, is the most common and popular practice.
- Rag pickers contribute to waste management. They segregate recyclable materials from other wastes and hence save the cost and time.

Transportation of solid waste

- Transportation of solid wastes from urban areas to the dumping grounds with the help of tractors, trucks etc.
- Transfer station
 - Reduces
 - transportation cost
 - vehicular emission
 - maintenance cost.

Processing/Recovery of solid waste

- Reduction of the use of raw materials
- Reuse of waste materials
 - Repair
- Recycling of materials
 - Reformation of old products
 - Formation of new products

Disposal of solid waste

- Open dumping
- Land fill
- Ocean dumping
- Burning (Incineration)
- Composting
- Reduction at source

Disposal of solid waste

- **Sanitary landfill**

- Garbage is spread out in thin layers, compacted and covered with clay/plastic foam
- Bottom is covered with impermeable linings to prevent the percolation of leachates.
- When the landfill is full, it is covered with clay, sand and gravels
- Monitoring wells are drilled near the landfill area
- Landfill gas (Methane) is produced.

- **Composting**

- It is done due to the shortage of landfill area
- Decomposed in oxygen-rich medium
- Nutrient rich manure is produced

- **Incineration**

- Burning of waste in very high temperature
- Initial cost is very high
- Dioxin, furan, lead, cadmium etc. can be released. So, battery or plastics should be removed before burning

Noise Pollution

- Noise: Unpleasant/ unwanted sound
- Noise pollution: The noise propagates through the atmosphere that leads to discomfort and health hazards is known as noise pollution.
- Noise measurement is expressed as Sound Pressure Level (SPL)
- SPL is a logarithmic ratio of sound pressure to a reference pressure.
- International reference pressure is 2×10^{-5} Pa. (average threshold of hearing)
- Unit of SPL is decibel.
- Threshold of pain is 130 dB
- Types of noise: Continuous, Intermittent, Impact/Impulsive

- **Industrial areas: 70-75 dB**
- **Commercial areas: 55-65 dB**
- **Residential areas: 45-55 dB**
- **Silence zone: 40-50 dB**

- **Indoor limit: 30 dB According to WHO**
- **Noise greater than 75 dB over long exposure can cause hearing damage.**
- **Noise above 120 dB can cause biochemical changes in human bodies.**

Sources of Noise Pollution

- Natural phenomena such as violent volcanic eruptions, thunder, fierce storms, etc.
- Domestic appliances such as mixers, washing machines, telephones, etc.
- Industries such mills and factories
- Automobiles –music system n constant honking by drivers, Noise by Trains, ships, and aircrafts
- Bursting of crackers and playing loud music during social gatherings and festivals.
- Entertainment devices such as radio, television, etc.

Effects of Noise pollution

- **Auditory effects:**
 - Temporary or permanent hearing loss
- **Non-auditory effects:**
 - Heart problems
 - Change in blood pressure
 - Loss of working efficiency
 - Insomnia
 - Emotional and behavioral change
- **Effects on wildlife**
 - Habitat loss
 - Problems in laying eggs
 - Damage in vocal chords

Control of Noise Pollution

- **Control at source**

- Designing, fabricating and using quieter machines to replace the noisy ones
- Proper lubrication and better maintenance of machines
- Installing noisy machine in soundproof chamber
- Using vibration dampener
- Using silencers in automobiles

- **Control in transmission**

- Noise barrier

- **Control at receptor**

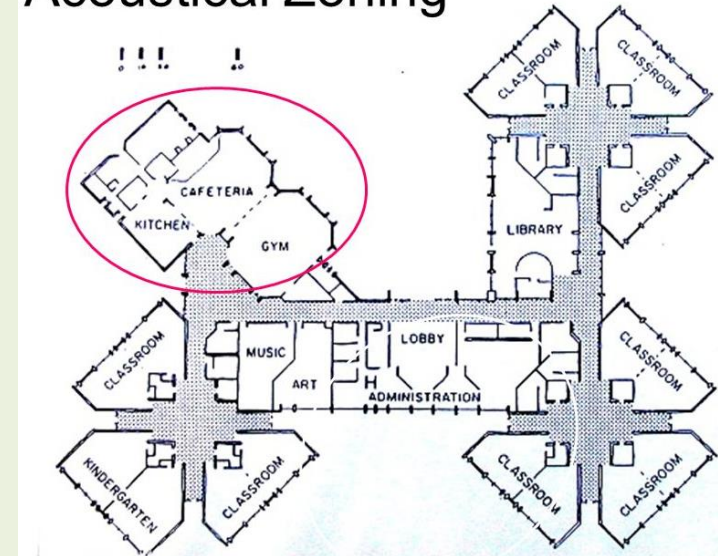
- Ear-protection aids like earplugs, noise helmets, headphones etc.

Control of Noise Pollution

- Other methods
 - Acoustic Zoning
 - Planting of Trees
 - Legislative measures



Acoustical Zoning



Radiation Pollution

- Radiation pollution is the emission of any form of ionizing (alpha and beta) or non-ionizing (gamma) radiation as a result of natural or human activities.

- **Causes**

- Natural

- Cosmic rays from outer space
 - Radioactive Radon-222
 - Soil, rock, water, air and food may contain radioactive materials

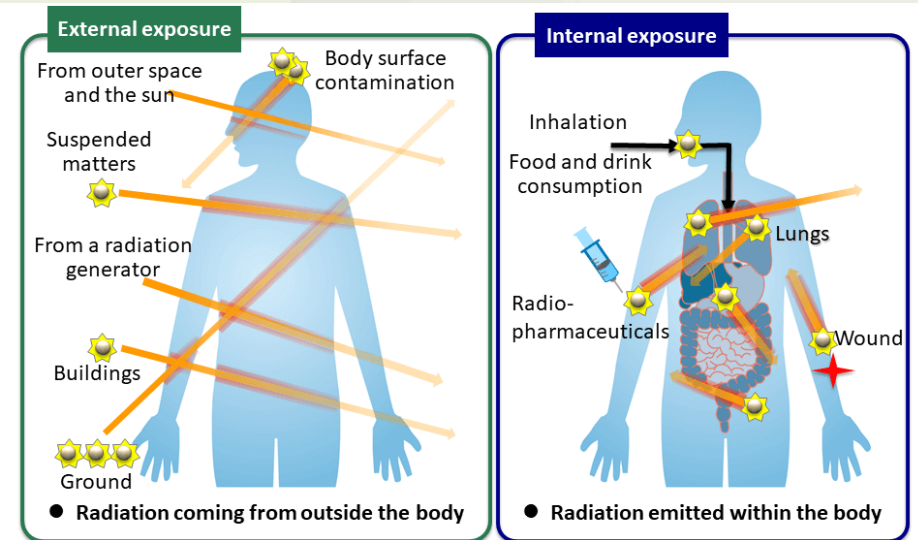
- Anthropogenic

- Nuclear power plants
 - Nuclear accidents
 - Medical X-rays, test laboratories



Radiation Pollution

- Unit of radioactive exposure
 - Rem (Roentgen equivalent man)
- Effects of Radiation Pollution
 - Somatic Effects (Change in body cells)
 - skin cancer
 - bone cancer
 - reduction of life span
 - premature ageing
 - Genetic Effects (Change in DNA)
 - Defect in child birth
 - Infant mortality



Radiation Pollution

- Control of Radiation pollution
 - Dense trees should be planted around atomic power plants.
 - Proper management of radioactive waste should be ensured.
 - Unnecessary X-ray examination should be avoided. Lead shields should be used by workers.
 - During nuclear installations, various aspects must be considered
 - Site selection
 - Design
 - Construction process
 - Operating conditions
 - Precautionary measures and preparedness for disasters



Emerging pollutants can be understood in a broad sense as any synthetic or naturally-occurring chemical or any microorganism that is not commonly monitored or regulated in the environment with potentially known or suspected adverse ecological and human health effects. These contaminants include mainly chemicals found in pharmaceuticals, personal care products, pesticides, industrial and household products, metals, surfactants, industrial additives and solvents. Many of them are used and released continuously into the environment even in very low quantities and some may cause chronic toxicity, endocrine disruption in humans and aquatic wildlife and the development of bacterial pathogen resistance.

Thank You