

ENVIRONMENTAL  
POLLUTION.

# ENVIRONMENTAL

## POLLUTION.

Any undesirable changes in the physical, chemical, biological characteristics of any component of the environment which produces harmful effects on various lives as on property of the environment.

Types of pollution :-

1) Air pollution

2) water pollution

3) Soil pollution

4) Marine pollution

5) Thermal pollution

6) Noise pollution

7) Nuclear pollution.

Air pollution :-

The presence of one or more contamination like dust, smoke, moist and odour in the atmosphere which are injurious to human beings, plants and animals.

## Sources of Air pollution

### Natural sources

- a) Forest fires
- b) Volcanic eruption
- c) Radio active material in earth.

### Man Made sources :-

- a) Burning of fossil fuels
- b) Emission from thermal power plants.
- c) Automobiles.

## Types of Air pollution

### a) Primary pollutants

Directly emitted from a process Eg) Ash.

### b) Secondary pollutants.

Formed when primary pollutants react

Eg.  $O_3$

## Sulphur dioxide ( $\text{SO}_2$ )

Source :- Produced by volcanoes.  
In various industrial processes  
combustion of coal and petroleum.

### Effect :-

Breathing problems.

Reduces visibility.

Acid deposition Damages soil

Aquatic life in lakes.

## Nitrogen dioxide ( $\text{NO}_2$ )

Source :-  $\text{NO}_2$  is emitted from  
combustion. Acid and fertilizer  
industry. Gets converted into nitric  
acid in presence of moisture.

### Effect :-

Reacts with haemoglobin in  
red blood cells reduces ability of  
blood to bring oxygen to body cells  
and tissues causes anaemia and  
headache.

## Ozone

Source :- Highly reactive irritating gas with an unpleasant smell, major component of photochemical smog.

## Effect

Breathing problems, eye, nose and throat irritation.

## General Effects of Air pollution

Global warming.

Acid rain

Ozone layer depletion.

## Control measures.

### Source control.

- \* Reduce the number of private vehicles
- \* Encourage people to walk to use cycle
- \* Use only unleaded petrol.
- \* Use fuels having low sulphur and ash content.

## In Industrial centres

\*. Emission rates should be restricted to permissible level.

\*. Use pollution control equipment scrubbers, bag house filter cyclone separator.

\*. continuous monitoring of the atmosphere for the pollutants.

## Emission control requirements:

1. Gravitational settling chamber
2. cyclone separators.
3. Continuous monitoring.
4. Bag house filters.
5. Electrostatic precipitations
6. Wet scrubber.

## Water pollution

The alteration in physical, chemical, biological characteristics of water which may cause harmful effects on human and aquatic life.

The substances which cause water pollution.

## Sources and Effects of water Pollution

### \* Infectious Agent:

Source: Bacteria, Virus, Protozoa, which is originated from human and Animal wastes.

Effect: Variety of disease.

### \* Oxygen demanding waste.

Source: sewage, animal feed, Paper mills and food processing facilities.

Effect: Fish and other adequate life to die.

### \* Inorganic chemicals.

Include oil, fertilizers, Plasters, pesticides.

Source: Industrial effluents, Household cleanliness.

Effect: causes cancer, damage to nervous water system.

## \* Plant Nutrients.

Sources :- Sewage, Manure and Agro fertilizers.

Effects : Nitrate fertilizers causes eutrophication in fresh water bodies leads to algal blooms, finally foul smell of water.

## \* Inorganic chemicals.

Toxic metals like lead, cadmium, mercury, arsenic, cobalt fluorides of some salts etc.,

Sources. Industrial effluents

Effects :

⇒ Makes water unusual for irrigation and drinking purposes

⇒ Harmful to fish and aquatic life.

⇒ causes skin cancer, damage liver and kidneys.

⇒ Accelerate corrosion of metals.



### \* Sediments

Source :- Soil erosion

Effects : \* causes turbidity and reduce photosynthesis.

### \* Radioactive materials

Source : Nuclear power plants, Mining nuclear weapons and Nuclear sources

Effects :- Birth defects, cancer and Genetic mutation.

### \* Point sources

Point sources are discharged pollutants at specific locations through pipes, ditches into water bodies.

Eg. Industries  
Sewage.

### \* Non-point sources

They are large land areas OR air sheds that pollutants water by runoff, deposition by atmosphere

eg. Runoff of chemicals from croplands, urban streets.

## Control Measures.

- \* Specific techniques should be adopted for pollution control of catchment.
- \* Proper monitoring of lakes, streams and rivers.
- \* Encouraging the use of Biofertilizers, Integrated pest Management, Nitrogen fixing plants.
- \* The industrial effluents should be recycled and let out.
- \* Planting trees should be encouraged to reduce and run off.
- \* Strict implementation of Pollution control acts.
- \* Public awareness about the effects of water pollution.
- \* Central Pollution Control Board to control, prevent & abatement of Pollution.

## Economical Treatment Methods

Physical Methods : Filtration, Flocculation, sedimentation

Chemical Method : chlorine treatment

Biological Methods : Oxidation or stabilization pond, Trickling filter Method.

## Soil pollution

Soil pollution is defined as "the contamination of soil by human and natural activities which may cause harmful effects on living beings."

## Sources

### 1) Industrial waste :

- a) Pulp and paper mills.
- b) chemical industries
- c) oil refineries
- d) Sugar factories
- e) Tanneries
- f) Mineral Mining industries
- g) Petroleum and Engineering.

## 2) urban waste

- Plastics and Metallic cans
- Paper and rubber materials.
- Fuel residues.
- Discarded Manufactured products.

## 3) Agricultural pollutants.

- Fertilizers
- Pesticides
- Herbicides and weedicides
- Manure, slurry.

## 4) Radioactive Pollutants.

- Explosion of weapons and cosmic radiations
- Wastes from Nuclear reactors.

## 5) Biological Agents.

- Sludges containing viruses
- Faulty sanitation and Municipal garbage.

## Testing of river water

Dissolved oxygen

COD & BOD

BOD : Biochemical Oxygen Demand

BOD is the amount of oxygen required for the biological decomposition of organic matter present in the water.

COD : Chemical Oxygen Demand

COD is the amount of oxygen required for the chemical oxidation of organic matter using some oxidising agent like  $K_2Cr_2O_7$  and  $KMnO_4$ .

## Effects of soil pollution

Soil productivity is reduced due to the use of pesticides.

Garbage dumping has many types of pathogenic bacteria & viruses which spread typhoid, cholera, plague, Malaria, malaria etc.,

Soil pollution also causes bio-accumulation by taking part in the food chain

Ground and surface water  
Pollution

Burning of solid wastes pollute the atmosphere.

### Control of soil pollution

- \*. Planting trees control soil erosion

- \*. Proper Dumping of unwanted materials.

- \*. Production of Natural fertilizer should be encouraged instead of excessive use of chemical fertilizers.

- \*. Bio-pesticides can be used instead of chemical pesticides.

- \*. Proper public awareness.

- \*. Proper Maintenance of hygienic

conditions

- \*. Recycling and Reuse of waste

- \*. Ban on Toxic chemicals

- \*. Proper treatment Methods.

## Marine pollution

The discharge of water substance in to the sea and affects the quality of sea water and cause harm to living organisms.

### Sources .

- \* River bring pollutant from their drainage basins

- \* oil spills near catchment areas

- \* oil drilling - oil pollution due to Petroleum .

- \* Thermal pollution

- \* Dumping of waste .

- \* Nuclear test conducted in Oceans

- \* Aquaculture practices along coastal regions .

### Effects

- \* oil in sea affects sensitive flora and fauna .

- \* The continuous oil films inhibit photosynthesis these by reducing growth of plants .

\*. Presence of heavy metals and organic pollutants causes of thinning of egg shells in birds.

\*. Thermal pollution increase Temp. of coastal sea water and affect quality of water.

\*. Coral reef gets affected by oil.

\*. Hydrocarbons and benzpyrene accumulation in food chains and consumption of fish by man causes cancer.

\*. Heavy metals in the water enter into food chains and cause biomagnification.

Eg.

Hg = Mercury (Minamata disease in Japan)



## Control Measures.

\* Toxic pollutants from the industries should not be distinguished into the sea.

\* Run off from the Non-point areas should be prevented to reach the coastal areas.

\* Dumping of toxic and hazardous wastes and sewage sludge banned.

\* Aquaculture practices should be banned.

\* Developmental activities in coastal areas should be minimised

\* Strong implementation of laws on marine pollution by the government.

\* Nuclear test should not be conducted in the ocean.

\* Depositioning the nuclear waste in marine environment is to be handled safely.

\* Creating public awareness.

## Cleaning process.

### Physical Method.

Skimming the oil off the surface with suction device.

### Chemical Method.

- Dispersion
- Emulsification
- Using chemical additions, OR

### Coagulants

### Sources.

1. Natural source → Thunder
  2. Household noise → T.V., Stereo Player, domestic gadgets, Moving furnitures, radio etc.,
  3. Public address system → Use of loud speaker for religious function, birth, death, marriage, election etc.,
  4. Agricultural Machines → Tractors, thrashers, harvestors, tube wells, tiller.
- Industrial sources → Textile Mills, grinding mills, printing press, Metal works, generators.

Defence equipments .

exercising of military launching rockets explosion

Transport Noise .

Practices .  
exercising of military launching rockets, explosion  
airplanes shoots

Effects .

Physical effects .

\* Speaking and hearing ability.

\* Ear drum may be damaged.

\* Permanent deafness.

Physiological effect

\* Headache

\* Pain in the heart

\* Eye strain & Impairment of night vision.

\* Neurotic disorder

\* Decrease in the state of colour perception.

\* Muscular strain and Nervous break down.

\* Lowering of concentration.

## Psychological Effects.

\* Insomnia

\* Emotional disturbance.

\* Interfere own conversation, disturb concentration and upsets mood.

\* Depression and fatigue with which reduces efficiency of a person.

## Control measures.

1. Control at receivers end.

Providing factory workers with ear-plugs, ear muffs, Noise helmets, lead phones.

2. Suppression of Noise and source.

⇒ By improving working Method

⇒ Proper lubrication.

⇒ Careful selection of Machine

tools.

⇒ Using silencers in automobile.

⇒ Installing noisy Machines

in sound proof chambers.

3 Acoustic Zone

Silence Zone like residential areas, educational institutions, hospitals should be protected from noise pollution.

4. Legislative Measures.

• Framing a separate noise Pollution Control Act

• Minimise use of loudspeakers of Amplifiers especially near silence Zones.

• Banning pressure horns in automobile.

• Penalising noise Producing vehicles.

5. Planting trees.

• Acting as a barrier for noise.

Thermal pollution.

Increase in the normal temperature of water by industrial activities and makes it harmful to man, animal and aquatic life.

## causes .

- Nuclear power plants
- Industrial effluents .
- Domestic sewage .
- Petroleum refineries .

## Effects .

### 1. Physical effects

The physical properties (density, viscosity, surface tension, gas solubility) of water changes.

Evaporation rate increase

Reduces taste of water.

### 2. chemical effect

Reaction rate increase with increase in temperature which increase the toxicity of water.

Oxygen dissolved in water decrease .

### 3. Biological effects .

Shortens the life span of aquatic organisms .

Natural Migration of fishes are affected due to formation of thermal zones .

Increase the metabolic state of fish which increase their need for oxygen.

## Ecological Imbalance

### Control Measures

1. cooling ponds.
2. cooling to water
3. spray pond.
4. Artificial lakes.

## Nuclear Hazard (OR) Radio Active Pollution.

Nuclear waste is any material containing Radio active by products from various application of nuclear energy.

### Source.

#### 1. Natural sources.

Natural sources is space which emits cosmic rays, soil, rock air, water and the other sources.

#### 2. Man Made sources.

Nuclear power plants

X-rays

Nuclear accidents

Nuclear bombs

Diagnostic kits

Test Laboratories

Mining etc.,

Effects.

Genetic defect :-

Affects the chromosomes and cause mutation. Unborn children are vulnerable to

Brain damage

Mental Retardation.

Somatic Damage :

Internal bleeding and blood vessel damage, Strontium - 90 accumulate in the bones and causes leukemia (or) bone cancer.

I-131 - damages WBC, bone marrow spleen.

Effect of Human.

Acute → Large dose of radiation over short period.

- a) Sudden death.
- b) Death after some wear.
- c) Loss of hair
- d) Bleeding from Mouth and



**Chronic**  
Small continuous radiation over a long period of time.

- a) Leukemia.
- b) Anemia.
- c) cancers
- d) Mutation.

**Genetic.**

Long term affect of radiation, affect future generation

**Effects on plants & Animals.**

Radioactive pollutants fall on plants affect plant. cattle feed on plants get affected.

**Effect on environment.**

- Radioactive isotopes enter the environment during Mining of uranium.
- Radioactive particles in air causes water and soil pollution.
- Dumping and disposal of radioactive waste pollute radiation.
- waste water from research institution pollution river, stream and lake. Radio Iodine, phosphorous in water enters into the soil and

## Control Measures

- Nuclear devices should Not be exploded in air.
- Decrease the radioactive emission.
- Use of tightly sealed boxes for storage.
- care should be taken during the during the disposal of Nuclear wastes.
- Fission reaction should be control.
- Nuclear plants should have proper safety Measures.