

Water Pollution

Definition

Addition of foreign substances, which are harmful to life because of their toxicity, reduction of normal oxygen level of water is called as **water pollution**

Sources of water pollution

Point source water pollution is an easily-identifiable source, as in a specific pipe that can be identified.

Non-point source water pollution has its source over large areas, as in farmland, grazing lands, roadsides. **(In other words, you can't see the pollution coming out of a pipe.)**

Causes of water Pollution

1- Inorganic Pollutants

acids, trace elements, metallic complexes from industry

2- Toxic metals:

From industrial activities ex. Cd, Hg, As etc.

3- Organic Compounds:

Domestic sewage, Industrial waste, Paper mills and tanneries, waste from slaughter house, etc

4- Sediments:

The natural or made process of soil erosion in water.

5- Oxygen demanding waste:

6- Radio active pollutants in water:

By nuclear reactor, radioactive fallout, radioactive ore processing etc.

7-Thermal Pollutants:

Chemicals from industries etc.

8-Pesticide pollutants in water:

By runoff, rain water, domestic sewage

Eutrophication

- Eutrophication is the process by which lakes are enriched naturally or more usefully by human activity

Types of Eutrophication

- Natural Eutrophication

By natural mean

- Cultural Eutrophication

by human activities, 80 % Nitrogen

75 % Phosphorus

Division of lake on the basis of productivity

- Eutrophic lake (Eu=True, Trophic= Nutrient)
- Oligotrophic lake (oligo= less)
- Dystrophic (Dys= Poor)

Effect of eutrphication

- Algal bloom: leads to O₂ depletion in water due to its decomposition.
- Development of harmful pathogenic bacteria.
- Macrophytes in high population
- Alga and weeds clog the water course.

Effects of water Pollution

- High water temp.
- Increase BOD
- Increase COD
- Sediments clog the respiration in fishes
- Itai – Itai = cadmium
- Minimata = Mercury
- As = affects CNS

Water Treatment

- 1-Primary Treatment
- 2- Secondary Treatment
- 3- Tertiary Treatment

Thermal Pollution

- The heated effluents discharged by various power plants / Industry..
- The heated effluent are discharged at a temperature 8 to 10 ⁰ C higher than the temperature of intake water.

DEFINITION

- Addition of excess of undesirable heat to water that makes it harmful to man, animal or aquatic life.

SOURCES

- **Coal fired power plants**
- **Industrial Effluents**
- **Nuclear Power Plants**
- **Domestic Sewage**
- **Hydro-electric Power Plant**

HARMFUL EFFECTS

- Reduction of dissolve oxygen
- BOD
- Growth of Blue-Green Algae:
ex. Algae grow best at : 35-40 ° C
- Invasion of harmful organism
- Activities of pathogenic micro-organism are accelerated by higher temperature.

- **Interference with biological activities and reproduction**
- **Direct mortality: The increase in temp. exhausts the micro-organism and shorten their life span.**

CONTROL OF THERMAL POLLUTION

- **Cooling towers:**
 - Cooling towers are designed to control the temperature of water.
 - Cooling tower transfer some of heat from cooling water to atmosphere by the process of **evaporation**.



- **Types of Cooling towers**

- 1- Natural Draft towers

- 2- Mechanical draft towers

Disadvantages of cooling towers:

- They generally cool the water by 10 to 15 °C.
- But they evaporate 2 to 5% of water in the atmosphere during the process.
- They may form fog under some temp. condition.

Cooling pond and Artificial lake



SOIL POLLUTION

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- Soil pollution is the presence of man-made chemicals or other alteration in the natural soil environment.

Source of soil pollution

- Industrial waste:
- Domestic waste:
- Agricultural waste:
- Radioactive waste
- Biological waste:

EFFECTS OF SOIL POLLUTION

- Harmful chemical kill many beneficial species of micro-organism.
- Nitrate Fertilizer– Blue **baby syndrome** or **methaenoglobinaemia**.
- **Siltation** affects local water reservoir.
- If Soil acidic, their capacity to absorb Cations is reduced ex. Ca^{2+} and Mg^{2+}
- Radio-active waste: such as **strontium** behaves as calcium in food chain.

- High **concentration of Zinc is Phytotoxic**, reducing growth of plants or kill them.
- Similarly **arsenic, chromimum, copper, mercury, nickel** are considered to be the greatest hazard.

CONTROL OF SOIL POLLUTION

- **Waste from industries and municipality must be dumped properly at suitable site.**
- **Before land filling, size of waste must be reduced by incineration or by making pellets.**
- **Organic manure should be used in place of chemical fertilizers.**

- **Bioremediation:** Natural soil micro-organism should be used in place of pesticides and insecticides.
- **Recycling and Reuse** of water from industries can greatly minimize soil pollution.

NOISE POLLUTION

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- **Creation of sound is a mean of communication.**
- **Loud intensity sound = Noise**
- **Noise Pollution “A sound of unpleasant and annoying nature”**
- **Sound intensity measured in decibel = dB**

Noise level of various source of sound

- **Normal Breathing = 20 dB**
- **Rustling of leaves due to gentle air = 20 dB**
- **Whispering Sound = 30 dB**
- **Normal Conversation = 50 dB**
- **Traffic on a busy road = 70 dB**
- **Small scale factory (Printing Press) = 90 dB**
- **Jet air Craft = 100 to 110 dB**
- **Rocket engine = 180 to 190 dB**

AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

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

SOURCES OF NOISE POLLUTION

- 1- Industrial Noise
- 2- Transport Noise
- 3- Neighborhood Noise

EFFECTS OF NOISE POLLUTION

1- AUDITORY EFFECT

2- NON- AUDITORY EFFECTS

1- AUDITORY EFFECT (Effect of Hearing)

- Auditory fatigue/damage ear or even deafness.
- **80-90 bB Noise** may cause **Temporary threshold shift (or temporary deafness)**.

- **Permanent Threshold shift:** Exposure of up to **100 dB due** to continuous exposure.
- **Chronic loss to Ear** may occur due to high intensity impulsive noise (More than 150 dB).

2- NON- AUDITORY EFFECTS (Physiological Effects)

- Headache, Pain in heart, eyes strain, increase the rate of heart beat, emotional disturbance depression etc.
- Whit fingers, Dead hand or Pneumatic drill disease
- Damage to bones

CONTROL OF NOISE POLLUTION

1- Control at the Receiver's End:

Ear plugs, Noise helmets, headphones etc.

2-Suppression Noise at source:

- Proper lubrication and maintenance in machine
- Installing noisy machine in sound proof chambers.
- Silencers in automobile etc.
- Covering noise-producing machine parts with a sound absorbing material.

3- Acoustic zoning: Distance between source and receiver should be increased by zoning:

- Industrial area
 - Bus Terminal and Railway station
- etc.

4- Creating silence zone:

Near residential, educational and hospital etc

5- Planting of trees

6- Legislative Measures

- **Banning of pressure horns in automobiles**
- **Minimum use of loud speaker and amplifiers especially near silence zone etc**
- **Noise control Act**