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WATER POLLUTION

Definition

Water pollution may be defined as, “the alteration in physical, chemical and biological characteristics of water which may cause harmful effects on humans and aquatic life.”

The pollutants include sewage, industrial chemicals and effluents, oil and other wastes. Besides, chemicals from the air dissolved in rain water, and fertilizers, pesticides and herbicides leached from the land also pollute water.

Types, effects and sources (causes) of water pollution

Water pollution is any chemical, biological or physical change in water quality that has a harmful effect on living organisms or makes water unsuitable for desired uses.

1. Infectious Agents

Eg : Bacteria, viruses, protozoa and parasitic worms.

Human Sources (causes)

Human and animals wastes.

Effects

Variety of diseases.

2. Oxygen Demanding Wastes (Dissolved oxygen)

Eg : Organic wastes such as animal manure and plant debris that can be decomposed by aerobic(oxygen-requiring) bacteria.



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This degradation consumes dissolved oxygen in water. Dissolved oxygen (DO) is the amount of oxygen dissolved in a given quantity of water at a particular pressure and temperature.

The saturated point of DO varies from 8-15 mg/lit.

Human Sources (causes)

Sewage, animal feedlots, paper mills, and food processing facilities.

Effects

Large populations of bacteria decomposing these wastes can degrade water quality by depleting water of dissolved oxygen. This causes fish and other forms of oxygen-consuming aquatic life to die.

3. Inorganic chemicals

Water soluble inorganic chemicals

- (i) acids,*
- (ii) compounds of toxic metals such as lead (Pb), arsenic (As) and selenium (Se) and*
- (iii) salts such as NaCl in ocean water and fluorides (F⁻) found in some soils.*

Human Sources (causes)

Surface runoff, industrial effluents and household cleansers.

Effects

- (i) Can make fresh water unusable for drinking or irrigation.**
- (ii) Causes skin cancers and neck damage.**
- (iii) Damage the nervous system, liver and kidneys.**



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- (iv) Harm fish and other aquatic life.
- (v) Lower crop yields.
- (vi) Accelerates corrosion of metals exposed to such water.

4. Organic Chemicals

Eg Oil, gasoline, plastics, pesticides, cleaning solvents, detergents.

Human Sources (causes)

Industrial effluents, household cleansers, surface runoff from farms.

Effects

- (i) Can threaten human health by causing nervous system damage and some cancers.
- (ii) Harm fish and wild life.

5. Plant Nutrients

Water-soluble compounds containing nitrate(NO_3^-), phosphate (PO_4^{3-}) and ammonium(NH_4^+) ions.

Human Sources (causes)

Sewage, manure, and runoff of agricultural and urban fertilizers.

Effects

- (i) Can cause excessive growth of algae and other aquatic plants, which die, decay, deplete dissolved oxygen in water and kill the fish.
- (ii) Drinking water with excessive levels of nitrates lower the oxygen carrying capacity of the blood and can kill urban children and infants.



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6. sediments

Soil, silt, etc.,

Human Sources (causes)

Land erosion.

Effects

- (i) Can reduce photosynthesis and cloud water.
- (ii) Disrupt aquatic food webs.
- (iii) Carry pesticides, bacteria, and other harmful substances.
- (iv) Settle out and destroy feeding and spawning grounds of fish.
- (v) Clog and fill lakes, artificial reservoirs, stream channels and harbours.

7. Radioactive Materials

Radioactive isotopes of iodine, radon, uranium, cesium, and thorium.

Human Sources (causes)

Nuclear power plants, mining and processing of uranium and other ores, nuclear weapons production and natural sources

Effects

Genetic mutations,
birth defects, and
certain cancers.



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8. Heat (Thermal Pollution)

Excessive heat

Human Sources (causes)

Water cooling of electric power plants and some types of industrial plants. Almost half of all water withdrawn in United States each year is for cooling electric power plants.

Effects

1. Lowers dissolved oxygen levels and makes aquatic organisms more vulnerable to disease, parasites and toxic chemicals.
2. When a power plant first opens or shuts down for repair, fish and other organisms adapted to a particular temperature range can be killed by the abrupt change in water temperature known as thermal shock

9. Point and Non-point Sources of Water Pollution

1. Point Sources

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

Includes factories, sewage treatment plants, abandoned underground mines and oil tankers.

2. Non-point sources

They are usually large land areas or air sheds that pollute water by runoff, subsurface flow or deposition from the atmosphere. Location of which cannot be easily identified.



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Include acid deposition and runoff of chemicals into surface water from croplands, livestock feedlots, logged forests, urban street, lawn, golf courses and parking lots.

Control measures (methods) of water pollution

- 1. The administration of water pollution control should be in the hands of State or Central Government.**
- 2. Scientific techniques are necessary to be adopted for the environmental control of catchment areas of rivers, ponds or streams.**
- 3. The industrial plants should be based on recycling operations, because it will not only stop the discharge of industrial wastes into natural water sources but by products can be extracted from the wastes.**
- 4. Plants, trees and forests control pollution and they acts as natural air conditioners.**
- 5. Forests in and around big cities and industrial establishments are capable of reducing the sulphur dioxide and nitric oxide pollutants to a greater extent from the atmosphere. Hence the national goal should be “Conservation of Forests” and campaign should be “Plant more trees”.**

The global destruction of forests should be discouraged or atleast minimized and afforestation should be encouraged because no one on this earth will escape from the adverse effects of a balding earth

- 6. It is not advisable to discharge any type of waste, either treated, partially treated or untreated, into streams, rivers, lakes, ponds and reservoirs. The**



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industries are expected to develop close-loop water supply schemes and domestic sewage may be used for irrigation.

7. Highly qualified and experienced persons should be consulted from time to time for effective control of water pollution

8. Public awareness regarding adverse effects of water pollution is a must. So there should be propagand a for water pollution control on radios, TVs etc.,

9. Suitable laws, standards and practices should be framed to regulate the discharge of undesirable flow of water in water bodies and such regulations should be modified from time to time in order to accommodate the changing requirements and technological advancements.

10. Basic and applied research in public health engineering should be encouraged.

11. The possible reuse or recycle of treated sewage effluents and industrial wastes should be emphasized and encouraged.