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WATER POLLUTION

Definition: Any alteration in physical (temperature), Chemical and biological properties of water, as well as contamination with any foreign substance which would constitute a health hazard or otherwise decrease the utility of water.

2.2.1 Major Categories of Water Pollutants

1. Infectious agents

Examples: Bacteria, viruses, protozoa and parasitic

Major Human Sources: Human and animal wastes

Harmful Effects: Diseases like jaundice, typhoid and gastrointestinal diseases

2. Oxygen-Demanding Wastes

Examples: Organic wastes such as kitchen waste, animal manure and plant debris that can be decomposed by aerobic bacteria.

Major Human Sources: Sewage, animal feedlots, paper mills, and food processing facilities.

Harmful Effects: Large population of bacteria decomposing these wastes can degrade water quality by depleting water of dissolved oxygen. This causes destruction of fish and other form of aquatic life.

3. Inorganic Chemicals

Examples: acids, compounds of toxic metals such as lead, arsenic and selenium and salts such as sodium chloride in ocean water and fluorides found in some soils.

Major Human Sources: Surface runoff, industrial effluents and household cleansers.

Harmful Effect: (a) Make fresh water unusable for drinking or irrigation, (b) Cause skin cancers and crippling spinal and neck damage (F^-), (c) Damage the nervous system, liver and kidneys (Pb and As), (d). Harm fish and other aquatic life, (e) Lower crop yields, and (f) Accelerate corrosion of metals exposed to such water.

4. Organic Chemicals

Examples: Oil, gasoline, plastics, pesticides, cleaning solvents and detergents.

Major Human Sources: Industrial effluents, household cleansers, surface runoff from farms and yards.

Harmful Effects: (a) Cause nervous system damage (pesticides), reproductive disorders (solvents), cancers (gasoline and solvents), (b) Harm fish and wildlife.

5. Plant Nutrients

Examples: Water soluble compounds containing nitrate, phosphate, and ammonium ions.

Major Human Sources: Sewage, manure, and runoff of agriculture and urban fertilizers.

Harmful Effects: can cause excessive growth of algae (eutrophication) and other aquatic plants, which die, decay, deplete water of dissolved oxygen and kill fish. Drinking the water with



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excessive level of nitrates lowers the oxygen-carrying capacity of blood and can kill unborn children and infants (blue baby syndrome).

6. Sediments

Examples: Soil, silt

Major Human Sources: Land erosion

Harmful Effects: (a) Cloud water and reduce photosynthesis, (b) Disrupt aquatic food web, (c) Carry pesticides and bacteria, (d) Settle out and destroy feeding and spawning grounds of fish, and (e) Clog and fill lakes, artificial reservoirs, and harbors.

7. Radioactive Materials

Examples: radioactive isotopes of iodine, radon, uranium, cesium, and thorium.

Major Human Sources: Nuclear power plants, mining and processing of uranium, nuclear weapon production and testing, natural sources.

Harmful Effects: genetic mutations, miscarriages, birth defects, and certain cancers.

8. Heat (Thermal Pollution)

Examples: excessive heat

Major Human Sources: Water cooling of power plants, and industrial plants.

Harmful Effects: Lowers dissolved oxygen levels and makes aquatic organisms more vulnerable to disease, parasites and chemicals. Fish and other organisms are killed due to thermal shock.

Sewage

Sewage is a liquid waste, which includes human and house-hold waste waters, industrial wastes, ground wastes, street washings and storm waters. Sewage, besides about 99.9 percent water contains organic and inorganic matter in dissolved, suspension and colloidal states.

Aerobic and anaerobic decomposition:

Sewage contains both aerobic and anaerobic bacteria, which can bring about oxidation of organic compounds present in it. In the presence of good amount of dissolved or free oxygen organic compounds undergo a process of oxidation brought about by aerobic bacteria to non-toxic and inoffensive smelling compounds. This kind of oxidation is called **aerobic decomposition**.

As the oxygen content is exhausted the anaerobic bacteria becomes active and decompose the organic compounds to offensive smelling compounds. This decomposition in the absence of oxygen is called **anaerobic decomposition**.

The organic pollution load of a wastewater can be measured by two indexes “Biological Oxygen Demand” (BOD) and “Chemical Oxygen Demand” (COD).

BOD is the amount of oxygen required to biologically oxidize the organics. Whereas COD is the amount of oxygen required to chemically oxidize organic matter in your wastewater into inorganic matter.



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The more the BOD and COD values more are the pollution load of the water

Control Measures:

- 1) Reduce water pollution from point source by legislation
- 2) Treat and dispose. Dilute and dispose and concentrate and contain.