

MODULE –II

ENVIRONMENTAL POLLUTION

2.3 WATER POLLUTION

- Types of water pollution
- Causes of water pollution
- Consequence of water pollution
- Control measures of water pollution



2.3 WATER POLLUTION

When the quality or composition of water changes directly or indirectly as a result of man's activities such that it becomes unfit for any useful purpose is said to be polluted.

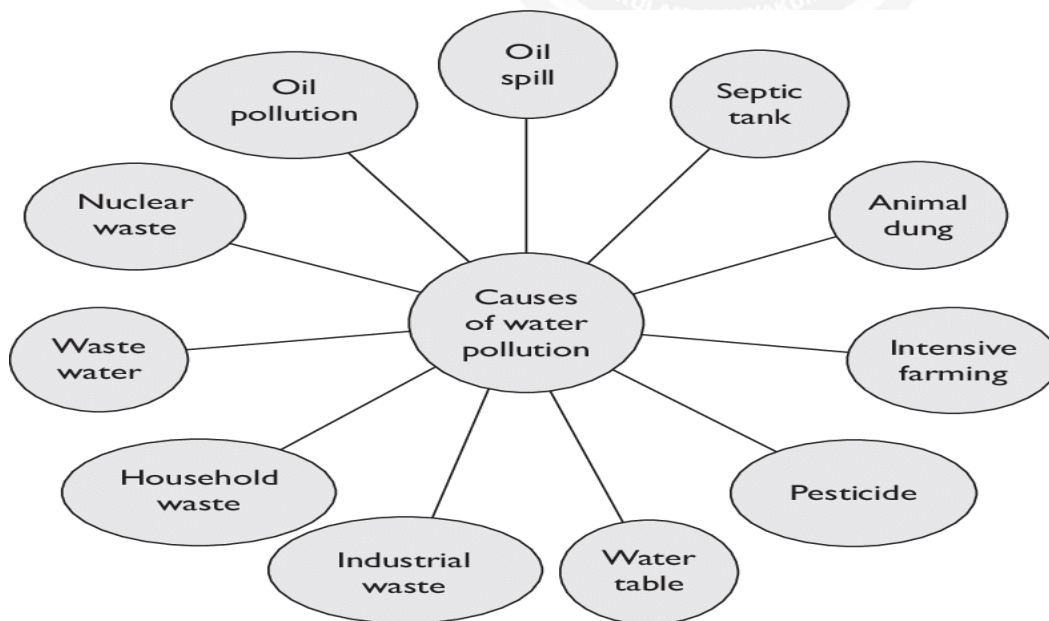
Water pollution (or aquatic pollution) is the contamination of water bodies, usually as a result of human activities. Water bodies include for example lakes, rivers, oceans, aquifers and groundwater. The alteration in physical, chemical, and biological characteristics of water, which may produce harmful effects to humans and aquatic life.

The main water pollutants include bacteria, viruses, parasites, fertilizers, pesticides, pharmaceutical products, nitrates, phosphates, plastics, faecal waste and even radioactive substances. These substances do not always change the colour of the water, meaning that they are often invisible pollutants.

Two types of pollutions:

Point source of pollution: This source of pollution can be readily identified because it has a definite source and place, where it enters the water. Eg: Municipal industrial discharges pipes.

Non point source of pollution: When a source of pollution cannot be readily identified such as agricultural runoff, acid rain etc, it is called as non point source of pollution.



Source :Fig 2.3.1 Environmental science & Engineering by Ravikrishna

Water pollutants

- Domestic sewage
- Industrial pollutants
- Pesticides
- Herbicides
- Fertilizers
- Plankton blooms
- Temp
- Silt
- Radio activity
- Bacteria & virus
- Oils.

Causes of water pollution

- Domestic sewage : The city sewage is released into the river. Domestic sewage consists of human faces, urine and dirty used-up water in houses. It contains a large noof pathogenic bacteria & Virus.
- Industrial effluents : All industrial plants produce some organic & inorganic chemical wastes. The non-usable chemicals are dumped in H₂O.
- The industrial waste include heavy metals (Hg,Cu,Pb,Zn),detergents, petroleum, acids, alkalies, phenols, carbonates, alcohol, cyanides, chlorine.
- Thermal pollution
- Many industries use water for cooling process. so, the resultant warm H₂O is discharged into rivers. This brings about thermal pollution.
- Fertilizers : The fertilizers used for crops are washed into ponds and rivers.
- Pesticides : Pesticides are used to control pests in fields and houses. They include DDT,BHC,Endrin.

- Radio active wastes : Liquid Radio active wastes are released into the sea around nuclear installations. The oceanic currents carry the radio activecontaminants every where.
- Oil pollution : Oil pollution is due to ship accidents, loading & discharging of oil at the harbor, oil refineries.
- Retting :The process of decaying coconut husk to get fiber for making coir is called retting. Retting releases H_2S . It makes water pollution.

Consequence of water pollution

- Water-borne Disenses : Diseases like jaundice, cholera, typhoid, diarrhea, are transmitted through contaminated water.
- Poor oxygenation : Oil present on the surface of water prevent water oxygenation. This reduces respiration& metabolism in aquatic organisms.
- Poor photosynthesis : Oil pollution prevent photosynthesis in phyto plankton.
- Biochemical oxygen demand (BOD) : BOD is the amount of oxygen required by the micro organisms in H_2O . BOD is higher in polluted H_2O and lesser in drinking H_2O . Increased BOD, reduces the dissolved oxygen in H_2O ,causing death of aquatic flora & fauna.
- Reduction in productivity : Intensive agriculture increases the amount of silt in lakes & river. Silt prevents the penetration of light to depths and thus reduces primary production.
- Eutrophication :The increased productivity of lakes & ponds brought about by nutrient enrichment is known as eutrophication. Because, domestic sewage & fertilizers contain large quantities of nutrients, which induces the growth of algae . The rapid growth also consumes all nutrients &oxygen in H_2O .
- Diseases.
- The chemical contaminants in H_2O make the fresh water is unfit for drinking purpose.
- Causes skin cancer, neck damage, damage the nervous system, liver & kidney.

Control measures of water pollution

- The sewage H_2O should not be allowed into river, pool, reservoirs.
- The sewage H_2O should be collected in separate tanks, and treated & recycled.
- Rain water should not be allowed to enter sewage drainage.

- Pesticides & chemical fertilizers should be used in the limited way.
- Bio fertilizers like blue-green algae are used instead of chemical fertilizers.
- Nitrogen fixing green plants are used to improve the fertility of soil.
- Surface run off of manure and fertilizers are allowed in the fields.
- Water should be properly chlorinated.
- Suitable laws, standards & practices should be framed to regulate the discharge.
- The administration of water pollution control should be in the hands of state (or) central government.
- Adopting the necessary scientific techniques for the environmental control of catchment areas of rivers, ponds (or) streams.

WATER QUALITY PARAMETERS – physical, chemical and biological

It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. It is most frequently used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to health of ecosystems, safety of human contact and drinking water.

Standards

In the setting of standards, agencies make political and technical/scientific decisions about how the water will be used. In the case of natural water bodies, they also make some reasonable estimate of pristine conditions. Different uses raise different concerns and therefore different standards are considered. Natural water bodies will vary in response to environmental conditions. Environmental scientists work to understand how these systems function, which in turn helps to identify the sources and fates of contaminants. Environmental lawyers and policymakers work to define legislation with the intention that water is maintained at an appropriate quality for its identified use.

The vast majority of surface water on the planet is neither potable nor toxic. This remains true when seawater in the oceans (which is too salty to drink) is not counted. Another general perception of water quality is that of a simple property that tells whether water is polluted or not. In fact, water quality is a complex subject, in part because water is a complex medium intrinsically tied to the ecology of the Earth. Industrial and commercial activities (e.g.

manufacturing, mining, construction, transport) are a major cause of water pollution as are runoff from agricultural areas, urban runoff and discharge of treated and untreated sewage.

Drinking water quality

The public health for drinking water, US recommended the following specification for drinking water.

- The water should be crystal clear.
- Colourless.
- Odourless.
- Free from disease causing bacteria.
- Turbidity should not exceed 10ppm.
- The pH should be in between 7-8.5.
- Total hardness should be less than 500ppm
- Total dissolved solids should be less than 500ppm
- The fluoride content should be less than 1.5ppm
- There should be no H₂S in the water.
- Pb,Cr,Mn.Ar salts should not be present in the H₂O.

(Notes

Sewage → waste of domestic (or) industrial origin

Sanitary Sewage → domestic wastage + industrial wastage

Sewer → waste carried pipe

Sullage → waste water from bathroom

Garbage → degradable solid waste, mostly organic partially inorganic

Drainage → the run off from roads, buildings and other catchment areas)