

THERMAL POLLUTION

Pollution due to heat which changes the physical and chemical properties of the water that affects man, animals and the aquatic system.

Sources of thermal pollution

1. Industrial waste water

Industries generating electricity like coal powered and nuclear power plants need huge amount of cooling water for removing heat. Industries like textile, paper and pulp release heat in water to lesser extent. The discharged water will have higher temperature of 6 to 9° C. than the receiving water.

2. Nuclear power plant

Nuclear explosion, nuclear experiments discharged large amount of heat with toxic radio nuclides in to receiving water sources. A leakage of radiation from nuclear power plant raises the temperature water bodies.

3. Domestic sewages

The domestic which contains high BOD, COD and low dissolved oxygen when discharged in to rivers and others water with out treatment raises the temperature of water bodies.

4. Hydro electric power

An electric power industry with cooling arrangements also causes thermal pollution in receiving water bodies.

5. Coal fired power plants

These constitute the major sources of thermal pollution. Their condenser coil are cooled with water froe near by lake from river are discharged hot water back in to the stream. This increases the temperature by 15°C. This decreases the dissolved oxygen and killing the aquatic life.

Effects of thermal pollution

1. reduction in dissolved O_2 as the temperature of water increases

Increase in toxicity

Increase in temperature increases the toxicity of the poison present in water

Ex; a rise of $10^\circ C$ doubles the toxic effect of KCN. A rise of $80^\circ C$ triples toxic effects of orthoxylene causing massive death of fish.

Change in water properties

Rise in temperature changes physical and chemical properties of water

Food shortage for fishes; Change in temperature alters the seasonal variation in type and abundance of lower organisms. Thus fish may lack right food at right time.

Interference with reproduction:

In fishes the activities like nest building, hatching, migration and reproduction depend upon optimum temperature. Change in temperature affects the above process.

Direct mortality:

The increase in the temperature exhausts the micro organisms and shortens their life span. Above a particular temperature a fish dye due to the failure in respiratory and nervous system.

Control of Thermal pollution:

Cooling towers:

Cooling towers transfers some of the heat from hot water to the surrounding atmosphere by the process of evaporation. Cooling towers are used to spread the recovered waste heat to eliminate the problems of thermal pollution.

Types of cooling towers:

Wet cooling Towers:

Hot water coming from the reactor is allowed to spray over baffles .Cool air with high velocity is passed from the sides which takes away the heat and cools water.

Dry cooling tower:

Hot water is allowed to flow in long spiral pipes. With the help of fan cool air is possible over these hot pipes thereby cooling water.

Cooling Points:

Heated effluents on the surface of water in cooling points maximize dissipation of heat to the atmosphere and minimize water area and volume. Thus warm water wedge acts like cooling points.

Spray Points:

The water from the condenser is allowed to pass in to the ponds through sprayers. Water is sprayed through nozzles as fine droplets. Heat from the fine droplets gets dissipated to the atmosphere.

Artificial lakes:

The heated effluents from the thermal power industries are discharged in to the artificial lakes at one end while cool water is transferred back from the other end. Heat is evaporated through dissipation in this method.

Source : <http://nprcet.org/e%20content/eee/EVS.pdf>