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Innovation The Research Concept

Thermal Pollution and Its Consequences

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Abstract

Thermal pollution defined as the addition of excess of undesirable heat to water thereby making it harmful to man, animal or aquatic life. Thermal pollution may also cause neither significant departures from nor activities of aquatic communities. Thermal pollution has been used to indicate the detrimental effects of heated effluents discharged by various power plants. It denotes the impairment of quality and deterioration of aquatic and terrestrial environments. The heated water discharged from industrial plants like thermal, atomic, nuclear, coal fired plants, factories in rivers ,lakes, streams and ponds etc., have reduced concentration of dissolved oxygen which produces distinct changes in aquatic biota ,bacteria ,protozoa, micro-organisms organic matter production and has over all deleterious effects on the ecosystem. Heated effluents, either from natural or manmade sources, contaminated with water supplies, May harmful to life because of their toxicity, reduction in normal oxygen level of water, aesthetically unsuitable and spread diseases. Thermal pollution will continue to grow alarmingly because of dramatic increase in the electricity power production .prevention of thermal pollution in nature stream can be done through plant sitting, coupled with effective use of regulated river system.

Keywords: Thermal Pollution, Micro-Organism, Terrestrial Environments, Aquatic Biota, Industrial Effluents.

Introduction

Thermal Pollution may come in the form of worm and cold water being dumped in to lake, river or ocean. In other words thermal pollution is defined as the change in the water temperature of lake, river and ocean caused by made main industries or practices. The addition of undesirable heat to water thereby making it harmful to man, animal or aquatic life. Any practice that affects the equilibrium of an aquatic environment may alter the temperature of that environment and subsequently causes thermal pollution.

Aim of the Study

Causes of Thermal Pollution

The sources and causes of thermal pollution are varied, which makes it difficult to calculate the extent of the problem. Many human and natural factors contribute to the problems of thermal pollution:-

Use of Water as Cooling Agent

We know that many manufacturing industries and plants are biggest source of thermal pollution. Power plants use water from nearby water bodies to cool their equipment. After that hot water is released back to its original source and may increase water temperature by as much as 30 degree and severely affects grow of aquatic animals and plants. The sudden change in temperature decrease oxygen supply and affects eco system composition.

Deforestation

Trees and plants prevent sunlight from falling directly on lakes, ponds, river and ocean or other water bodies. When deforestation takes place these water bodies are directly contact with sunlight, due to this reason these water bodies absorb more heat and raising its temperature. Deforestation eliminates shade which exposes the water to sunlight. Deforestation is also responsible to global warming in the atmosphere.

Chemical Pollutants Discharged in to Water

Industries and refineries like textile, paper, pulp and sugar manufacturing release their chemical waste directly in to the natural water bodies. This does not only causes of thermal pollution but also makes the water poisonous and that affect water ecosystem and also the life of aquatic animal and plant.

Agricultural Practices

Agricultural practices have a significant effect of water quality. Agricultural practices may contributes to thermal pollution by dumping warm or cold water or sediment into nearby rivers, lakes, or other bodies of water. The causes of agricultural NPS pollution include over grazing, over-plowing, and improperly used pesticides or fertilizer, due to these activities thermal pollution increase.

Natural Geothermal Activities

Natural causes like volcanoes and geothermal activities under the oceans and sea can trigger warm lava to raise the temperature of bodies. Lightening can also introduce massive amount of heat into the oceans. This means overall temperature of water sources will raise, having significant impacts on the aquatic life of plant and animals.

Human Waste and Water Discharged from Urban Areas

Many urban areas like parking places roads, and hospitals deposits their chemicals and waste into rain water and discharged the heated water back into original water bodies. This heated water disturb the normal temperature of natural water bodies which is harmful to aquatic life of plant and animals.

Coal Fired Power Plants

Coal fired thermal power plants also responsible for thermal pollution. Some thermal plants utilized coal as fuel. The burning of coal release many pollutants like oxides of nitrogen and sulphur. They emit green house gases such as CO_2 and CH_4 which are responsible to global warming and climate change. In these plants large quantity of water are often needed to remove impurities from coal , their condenser coils are cooled with water, when this warm water remove from environment that increase the temperature of nearby water bodies like river, pond etc. to about 15 degree. The heated effluents decrease the dissolve oxygen content of water. It results into killing of fish and other aquatic life can be affected.

Unawareness among People

Day to day growing thermal pollution is the result of unawareness among people. People knowing the hazardous effect of thermal pollution on ecosystem, there are several industries which are continuously using ways that encourage this pollution.

Effect of Thermal Pollution

Thermal Shock

When manufacturers Industries and factories released the water used as coolant back in to water bodies the temperature sudden rise to an abnormal level. The sudden and abnormal level acts as a thermal shock for aquatic life. This is harmful for ecosystem composition.

Disturbance in Biological Activities of Water Animals

Thermal pollution leads to a disturbance in quality and temperature of water in various water bodies. This altered quality and temperature directly affect all the biological activities of animals. This disturbing the cycle of nature:

1. Thermal pollution affects the larva, eggs and fishes in rivers.
2. Deeper water can also get affected when their temperature increase, with increase in temperature dispersion of oxygen is reduces. And such conditions favour the growth of bacteria.

Migration of Water Animals

Due to thermal pollution the water animal which do not survive in the change water they start for an unexpected migration. Rises of temperature of water also affects the ecosystem. Thermal pollution also changes the metabolic response of organism.

Contamination of Water

Thermal pollution also results in contamination of water because chemical and other wastes get mixed up with the water that is disposed off back to rivers, ponds, lakes, etc., by various factories. If this contamination of water keeps on increasing, human can suffer from shortage of water.

Adverse Effect on Water Plants and Animals

The whole marine life gets disturbed due to thermal pollution. Change in temperature levels in extremely harmful for the aquatic life. Harmful effluents and chemicals released by thermal power plants and industries makes the natural water poisonous and have adverse effects on animal and plants living in it and it also reduced the amount of dissolve oxygen. It also makes difficult for water animals to survive.

Reduction in Dissolved Oxygen

Concentration of dissolved oxygen decreases with increase in temperature of water. This less solubility of oxygen in water mainly affects the metabolism of water animals.

Control of Thermal Pollution

The following methods can we adopted to control the high temperature caused by thermal pollution:-

Save Electricity

Production of electricity involves burning of coal in thermal power plants. In this process the waste heat generated thermal power plants is in large quantities and can causes excess thermal pollution. Hence when we save electricity we indirectly prevent thermal pollution.

Reuse of Heated Water

If people start working upon the idea of recycling the used water in plants and factories, the problems of thermal pollution will definitely be lessened to a significant extent.

Tree Plantation

The tree would help control air pollution and result in a better and more stable and clean ecosystem. The trees around sources of water help in absorbing the harmful sun rays and prevent them from falling directly upon the water. This helps in prevention of heating water bodies. Trees do not help in controlling thermal pollution but also give a better environment including fresh air.

Co-Generation

Co-generation works on the principle of “reuse”, where the released heat from the generation the electricity is used to provide heat to homes and buildings. Co-generation is an effective measure to prevent thermal pollution.

Artificial Lakes

Artificial lakes are very helpful for normalizing the temperature of hot water. In this process the hot water will not be disposed back to the lakes, rivers, etc. and will we used other then suitable task. Artificial lakes used evaporation is convection technique for cooling down the water. These artificial lakes generally contain two ends. From one and, the hot water is transferred in to the lake, it is processed throw evaporation and finally when it cools down, it is taken out from the other end. The evaporated heat dissolves in the air.

Environmental Awareness

In present condition the issues of thermal pollution are set to increase over a period. The only solution of these problems is awareness of people. Group of people can initiate a discussion with different power plant and industries. These groups can discuss the harmful effect of thermal pollution on aquatic life and our environment. We can also aware others about the problem of thermal pollution.

Use of Better Technologies

Use of better technology is strongly recommended for solving the problem of thermal pollution.

Conclusion

The problems associated with thermal pollution can be alleviated by the following methods:

1. Prevention of thermal pollution in natural streams can be done through plant sitting, coupled with effective use of regulated river systems.
2. Channeling of thermal effluents.
3. Using adequate cooling tower or ponds.
4. Efficient designing of out-falls to prevent thermal block from occurring.
5. Avoiding interference of hot water mass with fish migration.
6. Temperature prediction models can be used to develop the safe engineered designs.
7. By improving the efficiencies of electric power generating plants.

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