

Energy and Environment Engineering

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ENVIRONMENT AND ECOSYSTEMS

Introduction: Concept of an ecosystem- structure and functions of ecosystem. Components of ecosystem - producers, consumers, decomposers, Food chains, food webs, ecological pyramids, Energy flow in ecosystem. Bio-geo- chemical cycles, Hydrologic cycle Components of Environment and their relationship, Impact of technology on environment, Environmental degradation. Environmental planning of urban network services such as water supply, sewerage, solid waste management.

ENVIRONMENTAL POLLUTION

Water, air, soil, noise, thermal and radioactive, marine pollution: sources, effects and engineering control strategies. Drinking water quality and standards, Ambient air and noise quality standards

GLOBAL ENVIRONMENTAL ISSUES AND ITS MANAGEMENT

Engineering aspects of climate change. Acid rain, depletion of ozone layer. Concept of carbon credit. Concepts of Environmental impact assessment and Environmental audit. Environmental life cycle assessment

Thermal Pollution

Thermal pollution, sometimes also called "thermal enrichment," is the degradation of **water quality** by any process that changes ambient water temperature.

A common cause of thermal pollution is the use of **water as a coolant** by power plants and industrial manufacturers. Other causes of thermal pollution include soil erosion/deforestation .

Types of thermal pollution:

1. Natural
2. Anthropogenic



Thermal Pollution Sources- Anthropogenic



Deforestation is responsible for high concentration green house gases i.e., further sunlight exposed to the water bodies global warming



Volcanoes and geothermal activities can trigger the warm lava to raise the temperature of water bodies



Consistent soil erosion causes water bodies to rise making them more exposed to sunlight

Thermal Pollution Sources- Natural

Sources of Thermal Pollution

The major sources of thermal pollution are discharge of heated water or hot waste material into water bodies from

1. Nuclear power plant
2. Industrial effluents
3. Hydro-electric power
4. Coal fired power plants
5. Thermal shock

Other causes are :

1. Deforestation
2. Soil erosion

- Nuclear power plants use water as a cooling agent
- In coal based power plant Condenser coils are cooled with water from nearby lake or river
- Discharged water from steam-electric power industry using turbo generators will have a higher temperature ranging from 6 to 9°C than the receiving water
- Generation of hydro electric power sometimes results in negative thermal loading in water systems.
- When a power plant first opens or shuts down for repair or other causes, fish and other organisms adapted to particular temperature range can be killed by the abrupt change in water temperature known as "thermal shock."

Effect of Thermal Pollution

1. Decrease in Dissolved oxygen level
2. Loss of biodiversity
3. Affect the reproductive system
4. Increase the metabolic rate
5. Ecological impact
6. Migration of aquatic animals
7. Increase in toxicity
8. Increase in plant growth rate
9. Increase in anaerobic condition

Measures to control the thermal pollution

The following measures can be taken to prevent or control high temperature caused by thermal pollution:

❖ Cooling Pond

❖ Colling Tower

❖ Artificial Lake

1. Heated water from the industries can treated before discharging directly to the water bodies.
2. Heated water from the industries can be treated by the installation of cooling ponds and cooling towers.
3. Industrial treated water can be recycled for domestic use or industrial heating.
4. Through artificial lakes: In this lake Industries can discharge their used or heated water at one end and water for cooling purposes may be withdrawn from the other end. The heat is eventually dissipated through evaporation.

Thank You