

QNo:1

Define and explain the Eutrophication in water body? (2020)

Ans:-

Eutrophication in Water Bodies

Introduction:-

Water is one of the most essential natural resources for sustaining life on Earth. However, in recent decades, the quality of water bodies such as lakes, rivers, and ponds has been severely affected by human activities. One of the most significant environmental issues related to water pollution is the eutrophication. Eutrophication refers to the process of nutrients, enrichment in water bodies, primarily caused by excessive amounts of nitrogen and phosphorus entering through runoff from agricultural fields, sewage, and industrial waste. These nutrients stimulate the overgrowth of algae and aquatic plants, disturbing the natural balance.

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of aquatic ecosystem.

Process of Eutrophication

Once excess nutrients enter the water body, they act as fertilizers for algae and aquatic plants. This results in the rapid multiplication of algae, forming thick layers known as algal blooms on the water surface. This blooms block sunlight from reaching underwater plants, reducing photosynthesis and disturbing aquatic habitats.

As the algae die and decompose, bacteria involved in decomposition consume large amounts of dissolved oxygen from the water. This leads to oxygen depletion, a condition known as hypoxia. Aquatic animals like fish, insects and other organisms that depend on oxygen either die or migrate, leading to a significant decline in biodiversity. Over time, the water body may turn stagnant,

Foul-smelling and unsuitable for drinking or recreational purposes.

Causes of Eutrophication

There are following causes of eutrophication.

- 1- Agricultural Runoff
- 2- Sewage Discharge
- 3- Industrial Effluents
- 4- Animal wastes
- 5- Use of Phosphate-based Detergents.

1- Agricultural Runoff

Excess use of chemical fertilizers rich in nitrogen and phosphorus is washed into nearby rivers and lakes during rain fall. It started the eutrophication in rivers.

2- Sewage Discharge

Domestic sewage from households contains human waste, food particles, detergents, and soaps rich in nutrients like phosphate

and nitrates. In many many developing countries, Sewage is discharged directly into water bodies without proper treatment, which increases nutrients levels and triggers algal blooms.

3- Industrial Effluents

Certain industries such as food processing, paper, textile, and chemical plants release effluents containing high level of organic matter and nutrients. If these effluents are not adequately treated before being released into the environment, they contribute significantly to nutrients pollution and eutrophication.

4- Use of Phosphate-based Detergents

Many household cleaning agents and detergents contain phosphates that improve their cleaning efficiency. However, when these detergents are washed down drains, they reach sewage system or directly enter water

hydrogen sulfide and methane. This makes the water unpleasant to smell and taste, rendering it unfit for drinking and recreational activities.

4. Decrease in water Quality

Eutrophication turns clear and healthy water into murky, dirty and oxygen poor water. It reduces the aesthetic value of lakes and rivers and increases the cost of water purification for human use.

5. Economic losses

Eutrophication negatively affects fisheries, tourism, and water supply industries. Fish kills reduce fishermen's income, while polluted water bodies discourage tourism and recreational activities such as boating and swimming. Water treatment becomes more expensive as well.

Control of Eutrophication

Controlling eutrophication requires both preventive and corrective measures.

Preventive methods focus on reducing nutrient inflow, while corrective methods aim to restore already affected water bodies.

1. Reducing Fertilizer Use

Farmer should adopt sustainable agricultural practices, such as using organic fertilizers and precision farming techniques.

2. Wastewater treatment

Sewage should be properly treated before being discharged into water bodies.

3. Buffer Zones

Planting vegetation near lakes and rivers can act as natural filters, absorb nutrients before they enter the water.

4. Public Awareness

Educating people about the dangers of nutrient pollution can encourage eco-friendly behavior, such as using

bodies, enriching them with phosphorus and speeding up the eutrophication process.

5- Animal waste

Animal farming produces large amounts of manure and urine that are rich in nutrients. Improper disposal or over-application of animal waste on farmlands leads to nutrient leaching into nearby water bodies during rainfall or irrigation, contributing to eutrophication.

Effects of Eutrophication

There are following effects of eutrophication.

- 1- Death of Aquatic life
- 2- Loss of biodiversity
- 3- Foul odor and bad Taste
- 4- Decrease in water quality
- 5- Economic losses

1-Death of Aquatic Life

Due to oxygen depletion, many aquatic animals like fish, snails, and insects suffocate and die. Sensitive species disappear first, while only a few tolerant species remain. This leads to loss of biodiversity and the collapse of aquatic ecosystem.

2-Loss of biodiversity

Eutrophication creates an unbalanced environment where only a few fast growing algae and plants species dominate, while others perish due to lack of oxygen or sunlight. This reduces the variety of life forms in water bodies and weakens the ecosystem's stability and productivity.

3- Foul odor and Bad taste

Decomposition of dead algae releases foul-smelling gases such as

phosphate-free detergents and reducing chemical use.

Conclusion

In summation, eutrophication is a serious environmental problem that ^{poses} ~~process~~ a ~~threat~~ threat to aquatic ecosystems and human well-being. It primarily arises from human negligence and excessive nutrient pollution. The phenomenon leads to oxygen depletion, loss of biodiversity, and deterioration of water quality. Therefore, collective action is required from individuals, governments, and industries to prevent further nutrient enrichment of water body.

By promoting sustainable agricultural practices, effective waste water management and public awareness, eutrophication can be controlled ensuring cleaner and healthier water system for future generation.