Study impact of Municipal sewage and sludge in Freshwater Bodies of Jaunpur District (U.P.)

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Abstract

A major environmental problem nowadays is the discharge of municipal sewage and sludge into freshwater bodies, particularly in developing areas like Jaunpur District in Uttar Pradesh (U.P.), India. The influence of untreated and partially treated sewage and sludge discharge on the aquatic ecosystems and water quality of Jaunpur's rivers and lakes is examined in this study. The study uses a number of water quality tests and ecosystem health evaluations to show how water quality indices like dissolved oxygen, chemical oxygen demand (COD), biological oxygen demand (BOD), and nutrient loads, especially nitrogen and phosphorus, are declining.Eutrophication, algal blooms, and fish mortality are caused by the introduction of excessive amounts of organic matter, pathogens, and toxic heavy metals from untreated sewage and sludge. These factors have a negative impact on the local biodiversity and the usefulness of the water for agriculture and human consumption. The socioeconomic effects on nearby populations that depend on these bodies of water for everyday activities and livelihood are also examined in this study. The results highlight how urgently better sewage treatment plants, environmentally friendly sludge management techniques, and more stringent wastewater laws are needed. Such actions could improve the quality of life for residents of Jaunpur and conserve freshwater resources by reducing the negative consequences of sewage pollution.

Key words: Sewage, Sludge, Freshwater.

Environmental concern has been raised about the effects of urban sewage and sludge on freshwater bodies in the Jaunpur district (U.P.). The Gomati River and other water bodies in the area are heavily contaminated by untreated sewage and urban runoff, which includes both home and industrial waste,

according to studies. These contaminants contaminate the aquatic environment with hazardous bacteria, excess nutrients, and heavy metals including nitrates, phosphates, and arsenic.

Municipal sewage : A serious

contaminant Freshwater systems are negatively impacted by the organic matter, nutrients, pathogens, and chemicals found in municipal sewage.

Untreated sewage causes high levels of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), which deplete dissolved oxygen and affect aquatic life. This results in organic pollution and oxygen depletion. Sewage plays a major impact in oxygen depletion, according to studies conducted in Indian rivers including the Ganga and Gomti⁶.

Pathogenic Contamination: *E. coli* and other fecal coliforms are among the pathogens that are introduced into water bodies by municipal sewage. This presents serious health risks, particularly in rural regions where untreated water is frequently utilized for residential and drinking purposes⁴.

How sludge affects Freshwater organisms water contamination is also mostly caused by sludge, a result of direct deposition or sewage treatment. According to studies, sludge contains heavy metals like lead, mercury, and cadmium, which bioaccumulate in aquatic species and persist in the environment⁸. Longterm harmful impacts on human health and the aquatic food chain may result from this. Nutrient overload and Eutrophication: Singh and Tripathi¹⁰ found that excessive nutrient load in sludge worsens eutrophication in freshwater bodies by encouraging algal blooms that obstruct sunlight and lower oxygen levels in water bodies throughout Uttar Pradesh.

Research on the District of Jaunpur:

There are indications that municipal garbage has seriously contaminated the freshwater systems in Jaunpur District, including the ponds and rivers.

Gomti River Pollution: According to research by Tiwari *et al.*,¹¹, the Gomti River in Jaunpur is severely contaminated by untreated sewage, with significant concentrations of BOD, COD, and fecal coliforms found in several places.

Fish species variety and population density in Jaunpur's water bodies have declined, according to Mishra *et al.*,⁶, and this decline is directly related to the water quality degradation caused by sewage and sludge discharge.

Comparative studies and a wider Framework : The tendencies identified in Jaunpur District are supported and given perspective by findings from other areas.

Case studies in Indian urban areas: Untreated sewage pollutes groundwater, causes fish fatalities, and causes algal blooms in urban freshwater bodies like Kanpur and Lucknow².

International views : Research conducted in developing nations shows similar patterns, with water quality deteriorating due to increased urbanization and inadequate sewage treatment infrastructure¹.

Literature recommendations: Several strategies are recommended by the analyzed research to lessen the negative effects of municipal sewage and sludge on freshwater bodies:

Development of Treatment Infrastructure: It is imperative that Jaunpur have effective sewage treatment facilities (STPs). The necessity of decentralized treatment systems in rural and semi-urban areas was highlighted by Prakash *et al.*⁷.

Community awareness and engagement: According to Gupta *et al.*,³, direct sewage disposal into aquatic bodies can be decreased by local involvement in waste management and educational initiatives. Policy Measures: It is imperative to fortify regulatory structures to oversee the release of municipal and industrial trash into freshwater bodies⁹.

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