Indian J. Applied & Pure Bio. Vol. 40(2), 1445-1447 (2025). **ISSN: 0970-2091**
A Web of Science Journal

Impact of heavy metal and detergent effluent on confluence zone in river Gomati in district Jaunpur (U.P.)

Khushi Gupta* and Vishal Pundir

Department of Botany, T.D.P.G. College Jaunpur - 222002 (India)
Affiliated to VBSPU, Jaunpur - 222003 (India)
*Corresponding author- Khushi Gupta

Abstract

The Gomati River confluence zone in Jaunpur District (U.P.) is being more affected by detergent effluents and heavy metal contamination. This study is to evaluate the level of pollution resulting from these pollutants in the confluence zone of the river, which is where runoff from agriculture, industry, and homes meets. Untreated sewage, pesticide-laden agricultural runoff, industrial effluents—especially heavy metals like lead, cadmium, and chromium—and detergent chemicals have made the Gomati River, a crucial source of water for nearby villages, more and more problematic.The main goal of the study was to measure the levels of heavy metals and detergent residues in water and sediment samples that were taken from strategic locations within the confluence zone. The results showed dangerously high amounts of hazardous metals, over the permissible limits set by environmental regulations. Detergent residues were also found in high proportions, which helped to eutrophication the water and significantly lower the dissolved oxygen content. These contaminants harm aquatic life, lower biodiversity, and seriously endanger the local population's health, especially when it comes to waterborne illnesses and prolonged exposure to heavy metals.

Key words : Water Quality, Sediment Contamination, Biomagnification.

Additionally, the study looked at the socioeconomic effects, emphasizing the difficulties local farmers and fishermen who rely on the river for their livelihoods confront. Effective pollution control measures, such as improved waste management systems, environmental law enforcement, and the encouragement of sustainable agriculture practices, are desperately needed, according to the findings. In order to maintain water quality and the wellbeing of ecosystems and human communities along the Gomati River in Jaunpur, this article proposes a multifaceted strategy to lessen the effects of heavy metals and detergent effluents.

Heavy Metal Contamination: Industrial effluents, agricultural runoff, and inappropriate waste disposal are the main ways that heavy metals, such as lead (Pb), cadmium (Cd), chromium (Cr), and arsenic (As), enter river systems[7]. The buildup of heavy metals in water bodies in Jaunpur is mostly caused by industrial discharge, especially from small-scale companies and agricultural operations. According to research by Yadav *et al.,*[8], industrial effluents in the Gomati River dramatically increase the concentrations of these hazardous metals, which has an impact on aquatic life and water quality.

Detergent Effluents: Industrial and domestic wastewater frequently release detergents, which contain phosphates and surfactants, into bodies of water. Detergent effluents can cause water bodies to become eutrophic, which lowers dissolved oxygen levels and affects aquatic life, according to research by Singh and Kumar[6]. Detergent compounds from adjacent urban areas have been found to be a significant source of water pollution in the Gomati River confluence zone, especially during the monsoon season when water flow increases and toxins spread farther.

Stronger pollution management measures are required to address the Gomati River's increasing contamination, especially in its confluence zones, according to several studies.

Wastewater Treatment : It has been determined that installing sewage treatment plants (STPs) and industrial effluent treatment systems is essential to reducing the effects of detergent pollution and heavy metals[2]. Improvements to U.P. wastewater treatment facilities have been the subject of several Namami Gange program projects, however in some districts, such as Jaunpur, the pace of improvement has been slow.

Sustainable Agricultural Practices: By encouraging organic farming and the use of ecologically friendly fertilizers, agricultural runoff—a major source of detergent and pesticide contamination—can be decreased. Organic agricultural methods and a decrease in the use of chemical fertilizers can greatly lower the amount of contaminants entering the river, claim Rani *et al.*,[3].

Community Awareness and Involvement: Reducing river pollution requires community-based methods to water management, such as waste segregation and appropriate disposal techniques. Residents of Jaunpur have been urged by local campaigns to use fewer phosphate-containing detergents and to employ rainwater collection methods in order to lessen surface runoff into the river[5]. Heavy metals and detergent effluents are major sources of pollution in the Jaunpur Gomati River confluence zone. Public health, aquatic life, and water quality are all negatively impacted by these contaminants. More work is required to lower contamination levels and guarantee the long-term sustainability of the river environment, even though a number of control measures, such as better wastewater treatment and community involvement, have been put in place. The impact of these contaminants must be reduced by public awareness campaigns, stronger regulatory enforcement, and ongoing study.

Aquatic creatures have the capacity to accumulate heavy metals, which can cause

biomagnification across the food chain. High levels of heavy metals in river sediments and water drastically lower aquatic species biodiversity, per a study by Gupta and Agarwal[1]. Increased metal concentrations in Jaunpur have been connected to fish population declines as well as the disturbance of the life cycles of other aquatic species, such as invertebrates and algae.Water bodies become eutrophic due to nutrient overload caused by detergent effluents, especially those that contain phosphates. This mechanism causes algal blooms, which damage aquatic life by lowering oxygen levels. The health of fish and other aquatic life is negatively impacted by detergent discharge into rivers, which intensifies the eutrophication process and produces hypoxic conditions in the water, according to research by Sharma *et al.*,[4].

References :

1. Gupta, A., and N. Agarwal, (2016). *Environmental Management Journal, 22*(3): 234-240.
2. Kumar, S., R. Yadav, and A. Mishra, (2017). *Water Pollution Control Journal, 44*(5): 105-110.
3. Rani, K., M. Singh, and P. Saini, (2019). *Journal of Environmental Sustainability, 18*(1): 71-80.
4. Sharma, S., R. Soni, and P. Verma, (2020). *Water Research and Pollution Control, 37*(2): 125-130.
5. Shukla, S., and R. Patel, (2020). *Environmental Protection and Awareness, 11*(4): 44-49.
6. Singh, A., and V. Kumar, (2017). *Aquatic Ecosystem Journal, 8*(2): 59-64.
7. Tiwari, A., P. Mishra, and R. Gupta, (2016). *Environmental Pollution Studies, 12*(2): 95-100.
8. Yadav, S., and A. Verma, (2019). *Water Pollution and Control, 23*(4): 210-215.