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UNENDURABLE WATER POLLUTION BY WASTE DUMPING IN BURIGANGA RIVER AND THREAT TO PUBLIC HEALTH: A MINI REVIEW

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Abstract: A number of countries, particularly those in South and Southeast Asia, are suffering with river pollution; Bangladesh is among those affected by water pollution. The Buriganga River is regarded as one of the most contaminated rivers in Bangladesh. The river is almost dead from a biological and hydrological standpoint due to pollution. Most of the rivers around Dhaka city are polluted because of anthropogenic causes. People occasionally dispose of their rubbish into rivers and on their banks due to a lack of knowledge and inadequate facilities. Water quality is negatively impacted by the careless release of human waste in large quantities.The main causes of the current state of Buriganga are the transportation network, the sewage system for human feces, fishing, and waste canals from industry. The main cause of the pollution in the Buriganga River is also the environmental department's and civil society's negligence. The hygienic level was also not in a good condition because so many wastes like plastic materials and other daily use materials were thrown out into the river. That's why public health conditions around the Buriganga River become vulnerable nowadays. This study highlights some of the issues brought on by practices like unlawful garbage dumping and suggests mitigating actions.

Keywords: Bad odor, Buriganga river, Ecosystem, Garbage, Human waste, Water quality.

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INTRODUCTION

The term 'human impact on the environment' refers to the entirety of human behaviors and acts that have an influence, both favorable and unfavorable, on the fragile ecology of the Earth's surface including local biodiversity (Prakash and Verma, 2022). Approximately one million species are at risk of extinction due to human activities, according to an analysis conducted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Approximately 22% of the 380,000 plant species that have been identified are endangered, according a

survey conducted by the Royal Botanic Gardens (Beaumont *et al.*, 2009; Vezzoli and Manzini, 2008; Hoque, 2023).

Globally, there is a growing danger to ecosystems due to factors such as heavy land use, invasive species, changing habitat variability, increased fragmentation of habitats, pollution, microplastics and decreased dispersion capacities (Verma and Prakash, 2022; Singh *et al.,* 2023; Arya *et al.,* 2024). For endangered animals, protected places are usually their only refuge. In reality, the effects of these variables on protected areas may be amplified by changes in the climate (Verma, 2021).

Bangladesh, one of the low-lying riverine countries of Asia, is located in the southern region. Including waterways that run through the nation, there are about 600 rivers in Bangladesh. The capital city of Bangladesh, which dates back 400 years, is one of the world's megacities (Chakraborty *et al.*, 2021). The Buriganga River, as it was then known, where this city first began to exist (Baki *et al.*, 2015).

The Buriganga River serves as an important waterway in Bangladesh's capital city of Dhaka. The Mughal emperors founded old Dhaka around 1608-1610 on the northeastern bank of the Buriganga River as their regional headquarters. For the people of Dhaka, this river is extremely important. The Burunganga River's capacity to offer necessary services is currently severely compromised due to excessive pollution. Significant population growth throughout the past three decades has led to a number of environmental issues, such as issues with sewage, drainage, and the disposal of solid waste (Bhuyan and Islam, 2017). The capital of Bangladesh, Dhaka city has the Buriganga (Old Ganga) river beside it, which is one of the main rivers flows (Wieczorek *et al.*, 2018) in the area. Buriganga is mainly a part of the greater Ganges, which is a transboundary river it flows through the country of India and Bangladesh. Buriganga is only 18 km long whereas the greater Ganges is 2525 km long (Ahammed *et al.*, 2016).

River water pollution is currently a major issue in the city of Dhaka. Every water way in the vicinity of Dhaka, including the Buriganga River, is becoming more and more contaminated day by day. Bangladesh remains a third-world country with one of the highest population densities. Although over 97% of the population has access to water, the quality of the water is unacceptable (Halder and Islam, 2015; Hasan *et al.*, 2019). The Buriganga River is one of the most polluted rivers in the nation and is fighting for its life. It is contaminated by chemical wastes from industry, medical wastes, household waste, sewage, plastics, dead animals, and occasionally oils spilled by boats and other river transportation systems.

In addition, Dhaka dumps over 4,500 tons of solid waste into the river every day (Kawser *et al.*, 2016). The Buriganga River's aquatic life forms and water quality are both impacted by a variety of circumstances. The most worrisome aspect, however, is that almost none of the water parameters, including pH, DO (dissolved oxygen), BOD (biochemical oxygen demand), and chlorides, can come close to meeting Bangladesh's Department of Environment's standards (Ali *et al.*, 2009).

Anthropogenic and other natural factors are the main causes of this pollution; numerous studies have indicated that the industrial revolution, population density, Dhaka's rapid urbanization, and climate change are the main causes of the river's pollution, making the Buriganga River more contaminated than other rivers (Khan, 2001; Ahammed *et al.*, 2016). These issues are made worse by the growth of residential areas, the accretion of land surrounding riverbanks, the loss of aquatic biota, and the depletion of fish

supplies. The water supply in Dhaka city mainly comes from the Buriganga River and the water purification process is not up to the mark to remove all particulate matter and pathogens. As a result drinking of such water without boiling may cause serious water born diseases and illness of inhabitants around Dhaka city. This assessment uses data from earlier publications to provide an overview of the river's current situation.

CURRENT CONDITION OF BURIGANGA RIVER

A 16-kilometer length of the Buriganga River (fig. 1) has been lost due to villagers and real estate developer's encroachment and other anthropogenic activities. Using cutting-edge equipment, scientists discovered that although the river is now only 25 kilometers long, its true length was 41 kilometers. Because government institutions have been so indifferent, influential people have been able to fill up the Buriganga over time. Many of the industrial and commercial buildings that once occupied the water bodies connected to it have since been replaced (Saha *et al.*, 2010).

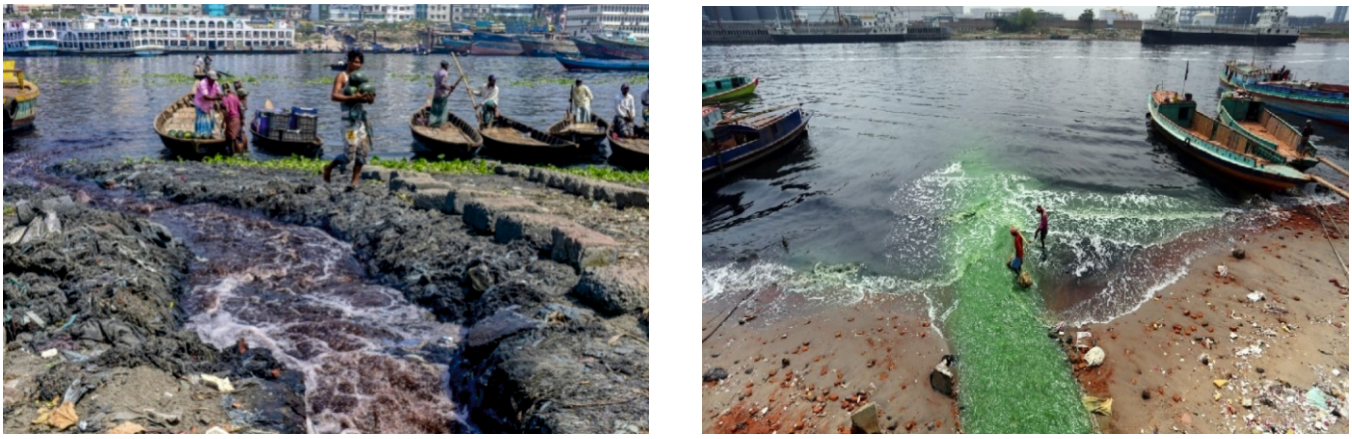

Fig. 1: Devastating state of Buriganaga River

Additionally, 4,500 m^3 of liquid waste are discharged into the Buriganga River daily by various companies, including those that produce fertilizer, dye, work with aluminum, iron, and steel, plastic, medicines, battery production, washing, hardware, and cold storage units (Shakib *et al.*, 2022; Pasa *et al.*, 2023). These wastewaters contain a variety of hazardous substances, such as oil, asbestos, urea, methanol, cyanide, epoxy, polyurethane, epilux, enamel, hydrochloric acid, alkalis, lime, caustic soda, aluminum, zinc chromate, zinc phosphate, and others.

HEATH IMPACT OVER PEOPLE

A number of Rivers including the river studied are much polluted, with heavy metals, hazardous industrial wastes, and other contaminants that endanger the health of the surrounding populations. The prior report noted that test animals' body weight increased following exposure to contaminated drinking water (Sunjida *et al.*, 2016). Similar to this, persistent infections have also been connected to increased protein production by the liver and spleen as well as inflammation in these organs (in this case, induced by bacteria found in the polluted water) (Kocadal *et al.*, 2020). The rising rate of tissue inflammation and protein synthesis in different organs as a defense against pathogenic infestations brought on by drinking conta-minated water may contribute to the overall weight gain. Similar hematological alterations have been seen in previous investigations when test animals were given contaminated water or water contaminated with hazardous heavy metals from industrial waste (Ghosh *et al.*, 2023). The internal organs may have been inebriated by the contaminated water, as shown by the histological tissue study. The rats may become anemic as a result of this restriction of erythropoiesis in the hemopoietic organs, which could lower the RBC, PCV, and Hb counts (Gaber *et al.*, 2013).

Many other sources of heavy metal pollution include batteries, electronic wastes, lead-based paint and fuel leaks from cargo ships, traffic, industrial waste discharge, launch and automated boat discharge, and inappropriate home waste disposal, among other sources (Verma and Prakash, 2020). Despite the fact that several studies have found that fish, sediment, and water in a number of rivers, including Buriganga, are enriched in heavy metals (Begum *et al.*, 2013). Variable fish species that were consumed and collected from the Buriganga River had varying levels of heavy metal accumulation, with variable quantities found in each species. Higher quantities of Cr, Mn, Ni, Cu, Zn, and Pb were found than the FAO/WHO recommended Maximum Allowable quantities (MAC) in fish. Numerous studies revealed that skin infections and diarrhea are the most prevalent illnesses in the Buriganga River region.

TOXICITY RELATED HEALTH PROBLEMS

Infectious disorders that largely spread through contaminated water are known as waterborne infections. However, these illnesses are dispersing across the area either directly or by insects like flies or filth mosquitoes. There are instances when these diseases are spreading more quickly. Due to unsanitary conditions, many illnesses are more common in the vicinity of the river. The inhabitants of the Buriganga area are susceptible to digestive illnesses, which are spread via feces. These human wastes were thrown straight from the unauthorized colonies into the Buriganga River. The defecation of infected individuals contains a variety of pathogens (viruses, bacteria, protozoa, and parasites) that cause disease. Waterborne illnesses including cholera, typhoid, dysentery, and hepatitis are therefore widespread among the general population.

Frequent exposure to severely contaminated water can result in illnesses like diarrhea as well as health issues including skin irritation and respiratory issues. Additionally, mosquitoes and a variety of other parasites find habitat in the stagnant outflows of the Buriganga River. Among these, malaria the parasite that infects the most people in the vicinity of the river. Dumping causes a significant amount of recognized and also unknown substances to enter the river. It is impossible to determine each chemical's toxicity and impact on health.

CHEMICALS IN BURIGANGA RIVER

A number of pesticides including carbonates and organophosphates disturb the ecological balance of an ecosystem and can cause cancer by interfering with the neurological system (Kumar, 2018; Prakash and Verma, 2020; Masih, 2021). There are more carcinogens in certain insecticides than is advised. Additionally, they include chlorides that harm the endocrine system and reproduction. Lead has the ability to disrupt the central nervous system as well. Lead poisoning usually affects children and expectant mothers. The primary cause of 'blue baby' syndrome is nitrate. Aquifers in the Buriganga River watershed are tapped by a large number of the local population for their drinking water. It is also connected to malignancies of the digestive system. It results in algal bloom as well.

The heavy metals are the reason of kidney and nervous system damage and further metabolic disturbances. The Buriganga River's growing hazardous chemical and heavy metal pollution load is to blame for a number of issues. The quality of the river water is deteriorated by some of the chemicals dumped into it, including epoxy, polyurethane, enamel, hydrochloric acid, alkalis, lime, caustic soda, aluminum, zinc chromate, zinc phosphate, chromium, and ammonia.

BAD ODOR PROBLEM AROUND BURIGANGA

Based on estimations from the locals, several of the communities along Buriganga's riverbanks have doubled or tripled in size as a result of land reclamation and the city's fast population growth. The majority of these incursions are made up of low-income housing and slums. Among these are the powerful establishments that prominent and political locals have established. A further small number consists of the illicitly established industrial entities driven by financial pressure. In terms of trash disposal, air and household water pollution, and exponential increases in pollutant density, all of these have a substantial effect on the areas along the Buriganga river bank.

Even at a distance of half a kilometer from any location along the Buriganga River, one can smell

the horrible black water pollution (fig. 2). Because of the unequal warming of the land and water bodies, the river breeze pushes inward towards the area on windy days. The surrounding populace has been experiencing a number of psychological illnesses as a result of the odor problem, including decreased food cravings, decreased water intake, decreased breathing, nausea, vomiting, and mental stress.

Fig. 2: Close view of water at Buriganag river.

POSSIBLE WAYS TO REDUCE WATER POLLUTION

It is not possible to completely eliminate river pollution in Buriganga but attempt should be taken as much as possible to reduce pollution. Buriganga river pollution is mostly caused by Dhaka's massive population increase. Approximately 900 cubic meters of untreated household and industrial wastewater are released into the Buriganga-Turag system every day, according to many studies. A single person equals an additional quantity of pollution. Therefore, we should raise public awareness and halt Dhaka city's population increase in order to prevent contamination of the Buriganga river. The river flows at a mere 50 cubic meters per second (cumec) during the dry season. Connecting the rivers of Dhaka with the Jamuna River, which has a minimum dry season flow of about 3500 cumec, is one way to find a solution. This will assist Dhaka's surrounding rivers' water quality as well as water supply, irrigation for agriculture, fishing, and navigation. An excellent example of integrated water resources management is this one. Initiating the move of the leather tanneries from Hazaribagh to Hemayetpur, Savar with Common Effluent Treatment Plant (CETP) capabilities is the responsibility of the Ministry of Industries.

Strict steps need to be made to guarantee that no industrial trash is dumped into the river. Before releasing industrial waste into a river, the government is required to make every effort to guarantee that it is processed in accordance with statutory requirements. It should be strictly forbidden to discharge medical waste from nearby hospitals next to the river system. Medical wastes are contaminated with several germs that cause sickness. It is not appropriate to dispose of treated hospital wastewater in rivers. At least temporarily, a 'River Patrol Guard' should be deployed to stop the disposal of plastics, solid debris, and organic stuff into the river from launches and the shore. The government must form a strong central committee made up of environmentalists, scientists, administrators, and university faculty with expertise in environmental sciences in order to accomplish all of the aforementioned mitigations.

CONCLUSION

Due to the growing population, there is an increased need for water, to the point where surface water treatment alternatives are now required. As this study has indicated, the Buriganga River faces threats from land grabbing, pollution, poor river flow, and encroachment. The Buriganga River is a vital supply of water for the city of Dhaka, but owing to a number of flaws in the appropriate management framework, it is regrettably getting more and more contaminated with time. The Buriganga pollution rate has reached a concerning level that may endanger the survival of Dhaka metropolis. In order to address the Buriganga River's pollution issue, appropriate action must be taken right now.

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