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River Water Pollution in India: An Overview

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Abstract
Rivers are indispensable source for providing fresh water to human beings as well as other forms of lives on earth. It has been observed that despite the fact that several measures have been hitherto taken by the Central Government and other state Governments in India in recent times to cleanse river water but river water quality has been gradually deteriorating over time so much as to threaten human existence over a large part of India. It is worth noting that river water quality in India has gradually deteriorated over time through discharge of industrial waste, domestic sewage, agricultural runoff, oil spillage, religious remains immersion etc. Contaminated water both directly as well as indirectly adversely affects health of living organisms including fauna and floras in ecosystem. The whole riverine ecosystem is disturbed through pollution of river water. People suffer from several health related problems due to the consumption of contaminated water from the river. This review study highlights several important issues related to river water pollution in India such as sources of pollution, its impact on biodiversity, climate change, and economy and on human health and different steps taken by the government to mitigate the problem of rivers pollution.

Keywords*:* River Water Pollution, Sources, Impact, Act, Action, Human Health Effect.

INTRODUCTION

Water is a precious and very important liquid for all forms of life on earth. It is a colorless, odorless, tasteless chemical molecule, but the added minerals, nutrients, organic and inorganic compounds occur either naturally or through human activities that give color, smell, and taste to water (Nagarsekar, et al., 2014). Water resources are an integral part of our ecosystem. Fresh water sources are present in the form of rivers, glaciers, lakes, rainwater, groundwater, etc. They not only ensure sustenance for living organisms including lower to higher forms of lives but also facilitate economic growth, agricultural development, power generation, and industrial development. The human population living on the banks of rivers depends largely on it for livelihood through fishing and livestock production. But this dependence also plays a vital role in the deterioration of water quality of the different water sources. Increasing population, industrialization, and urbanization are some of the prominent factors responsible for the degradation of water quality (Tyagi, et al., 2013). Accumulation of waste and toxicants in the stream takes place while flowing from the upstream side to the downstream side (Al-Obaidy, et al., 2013, and Ravindra et al., 2003).

River water pollution is one of the major global environmental concerns today. Diminished river water quality upsets the balance of the aquatic ecosystem and leads to fatal consequences both for humans and

animals. Anthropogenic activities like direct sewage discharge, washing and bathing, waste disposal, and direct industrial discharge have deteriorated the river water quality globally (Dulo, 2008, and Milovanovic, M. 2007). River water pollution is one of the major concerns of many countries. In a country like India, where rivers are considered Goddesses, numerous factors are responsible for the degrading quality of river water.

River water pollution

River Water pollution occurs when pollutants are discharged directly or indirectly into rivers without adequate treatment of harmful compounds. River water pollution affects humans, plants, and organisms living in these rivers. Water pollutants are damaging not only the individual species and populations but also the natural biological communities. Moving water dilutes and decomposes pollutants more rapidly than standing water (Government of India, 2021). The main reasons for river water pollution are due to three main sources of pollution, namely industry, agriculture, and riverside residences. Industries and cities have usually located along rivers because rivers provide transportation and have traditionally been a convenient place for waste disposal. Agricultural activities are mostly concentrated near rivers because river floodplains are exceptionally fertile due to the numerous nutrients deposited in the soil when the river overflows (Government of India, 2021).

Source of pollutants in river

River water pollution can be broadly divided two groups-

A. Point source pollution refers to the pollution entering the waterway through a discrete source like pipes, channels, etc. from industries.

B. Non-point source pollution refers to the pollution that does not enter the waterway through a discrete source but is accumulative. The pollutants are collected in small amounts from over a large area (Government of India, 2021).These pollutants are:

- Disposal of Untreated Sewage: India produces 20,000 million liters of sewage per day (MLD), of which 30% is treated in sewage treatment plants (STP) and the rest of the sewage is discharged untreated into natural waters. A survey of sewage treatment plants in India was conducted by the Central Pollution Control Board (CPCB). According to this survey, most wastewater treatment plants are not operating at design efficiency. About 30,000 MLD of pollutants enter Indian rivers, 10,000 million liters from industrial plants alone (Kamble, R., & Patil, D. 2012).
- Littering: The volume of waste in India is 0.2 to 0.6 kg of waste per capita per day. Waste is often dumped in the river or on the side of the road, which is then carried down the drain to the river (Kamble, R., & Patil, D. 2012). Many rivers in India are nothing more than bodies of water, little more than flowing dumps, with up to 57% of waste ending up in the rivers.
- Disposing of Ritual Materials: India is a country with 82% of Hindu population by religion. Many people perform various rituals, including throwing the ritual material into the river as it is considered a sacred body of water. In some places, even dead bodies are dumped into the river. One of the critical issues is the dumping of thousands of plaster sculptures (POPs) at various festivals. POP tones are deposited in the river bed and the inorganic paints of the sculptures add toxic pollutants to the river.
- Human Activities: The river being the most important source of water is used by humans in every possible way. People bath, wash cloths and clean utensils in the river. Open defecation is

practiced widely in rural and some urban regions, during the rainy season it causes pollution, as it is washed into the river.

- Oil Seepage and Agricultural Pollutants: Spillage of oil through vessels and leakage through pipelines is one of the components responsible for river water pollution. Excess fertilizers are washed into the nearby water body and join the river course (Kamble, R., & Patil, D. 2012).
- Industries: The uncontrolled flow of sewage and industrial effluents into rivers has compromised their purity. All of this industrial waste is toxic to the life forms that consume this water (Drishtiias, 2021).
- Urbanization: Rapid urbanization in India during the recent decades has given rise to numerous environmental problems such as water supply, waste water generation, and its collection, treatment, and disposal (Drishtiias, 2021).
- Plastic Waste: Plastic bags, bottles, packaging, and other non-biodegradable materials accumulate in rivers, clogging their flow and harming wildlife. The improper disposal of plastic waste into rivers has become one of the most visible forms of pollution, especially near urban areas.

Impact of river pollution

This pollution affects aquatic life as dams are now being built on various rivers which act as water reservoirs which is dangerous to animals. Not only aquatic life but also people are affected as people end up drinking that polluted water, using it for daily uses, and making themselves affected to various diseases, for example, water-borne diseases such as typhoid, jaundice, cholera, etc. (blog. ipleaders, 2021). People are also exposed to chemically treated water for their daily activities such as cleaning, washing, etc., increasing the chances of spreading infectious diseases. Chemicals released into water bodies settle to the bottom, forming a thick layer on the river bed. The bacteria present in the water feed on it, leading to a decrease in oxygen which harms the aquatic life present in the rivers. It also has an adverse effect on the food chain of the animals present in the ecosystem. In addition to these, marine life is adversely affected by river water pollution which is increasing day by day, disrupting the ecosystem of seas and oceans.

The consequences of river pollution in India are widespread and affect multiple aspects of society, the environment, and the economy. The impact can be categorized into several key areas.

Loss of Biodiversity

Polluted rivers are no longer able to support healthy aquatic ecosystem. The high levels of nutrients, chemical and sediment in the water lead to the degradation of habitats for aquatic species. As oxygen levels decrease due to eutrophication, fish and other aquatic organisms are unable to survive. Additionally, the presence of toxic chemicals like mercury and lead in the water can disrupt the reproductive cycles of aquatic species, leading to the decline of biodiversity.

India is home to a number of unique aquatic species, including Ganga River dolphin and the Indian crocodile. These species, along with many others, are under threat due to the deterioration of their habitats as a result of river pollution. The loss of biodiversity also has cascading effects on the food chain, which affect the livelihoods of communities that depend on fishing.

Effects of water pollution on human health

Many water-borne diseases are spreading from man to man. 10% of the population depends on food and vegetables that are grown in contaminated water. Health risk associated with polluted water includes different diseases such as respiratory disease, cancer, diarrheal disease, neurological disorder, and cardiovascular disease (Ullah, et al., 2014). Nitrogenous chemicals are responsible for cancer and blue baby syndrome (Krishnan, et al., 2006). The mortality rate due to cancer is higher in rural areas than in urban areas because urban inhabitants use treated water for

drinking while rural people don't have facilities for treated water and use unprocessed water. Poor people are at greater risk of disease due to improper sanitation, hygiene, and water supply (Jabeen, et al., 2011).Contaminated water has large negative effects on those women who are exposed to chemicals during pregnancy it leads to an increased rate of low birth weight as a result foetal health is affected. Pollutants disturb the food chain and heavy metals, especially iron affects the respiratory system of fishes (Currie, J., et al., 2013). An iron clog to fish gills and it is lethal to fish, when these fishes are eaten by human beings leads to a major health issue. Metal contaminated water leads to hair loss, liver cirrhosis, renal failure and neural disorder.

Economic Impacts

The economic implications of river pollution are significant. Rivers in India are vital for agriculture, industry and tourism. The pollution of rivers leads to reduced water quality which effects irrigation for crops causing lower agriculture yield. This in turn effect food production and income for farmers. Furthermore, the high cost of water treatment to make it suitable for human consumption and industrial use is a financial burden on both the government and the business.

Tourism also suffers due to polluted rivers. Many of India's most famous tourist destinations, including the banks of the Ganga in Varanasi, are becoming less attractive due to the pollution of the river. The loss of tourism revenue has a detrimental effect on local economics, especially in regions dependent on river tourism.

Climate Change

Polluted rivers contribute to climate change in indirect ways. The contamination of rivers by industrial effluents especially those containing carbon compound, contributes to greenhouse gas emissions. Moreover, polluted rivers and the loss of their natural capacity to filter and regulate water cycles can exacerbate extreme weather events like flood and droughts. This further stresses the need for improved river management to mitigate climate-related risk.

It is worth mentioning that some major rivers have been severely polluted viz., Yamuna river, Brahmaputra river, Son river, Brahmani river, Mahanadi river, Ganga river, Cauvery river, Gomti river, Chambal river, Bandi river, Periyar river, Mithi river, Kali river, Narmada river, Damodar river, Mathabhannga river, Mula river, Musi river, and Kulti River (Panigrahi, A. K., & Pattnaik, S. 2019).

Water (Prevention and Control of Pollution) Act, 1974

This Act was India's first attempt to comprehensively address environmental issues. This law aims to prevent, control and reduce water pollution and to maintain or restore water bodies which are important sources of water. In addition, this law empowers established bodies, such as the Central Council and the State Council established by the central and state governments respectively, to control the pollution of

these waters (blog. ipleaders, 2021). The governing bodies are: 1. CPCB (Central Pollution Control Board) 2. State Board - State Pollution Control Board (SPCB). The Act, "pollution" means any contamination of water or any alteration of the physical, chemical, and biological properties of water or the discharge of sewage into water likely to cause water harm for public health or harmful to the life and health of aquatic animals and plants.

Government initiatives to tackle water pollution

Recently, the National Green Tribunal (NGT) directed the Ministry of Jal Shakti to devise an appropriate National River Rejuvenation Mechanism for effective monitoring of steps to control pollution of all polluted rivers stretches across the country (Drishtiias, 2021).

National Water Policy (2012): It aims to take cognizance of the existing situation, propose a framework for the creation of a system of laws and institutions, and a plan of action with a unified national perspective. Established by the Ministry of Water Resources, it emphasizes the importance of water for human existence and economic development activities. It offers frameworks for conserving water resources through optimal, economical, sustainable, and equitable means.

National Water Mission (2010): It ensures integrated water resource management leading to water conservation, less wastage, equitable distribution forming better policies.

National Mission for Clean Ganga (NMCG): It envisages a five-tier structure at the national, state, and district levels to take measures for prevention, control, and abatement of environmental pollution in river Ganga. It aims to ensure a continuous adequate flow of water to rejuvenate the River Ganga.

Namami Gange Project: It integrates the efforts to clean and protect the Ganga River in a comprehensive manner.

National Directorate for the Protection of Rivers: The National Conservatory Directorate of Rivers is the subordinate body to the Ministry of Jal Shakti which implements the protection of rivers and lakes across India under the National Rivers Conservation Plan and the National Conservatory Lakes Plan with endorsement by respective state governments.

The objectives of these plans are:

- Improve the quality of rivers and recognize them as an important source of fresh water in the country.
- Implementation of pollution reduction programs and labeling of the ethical use of water.
- Assess the concentration of pollutants in identified streams such as plastics, metals, chemicals, etc.
- Establish guidelines for prioritizing the conservation of the area and provide an action plan for doing so.
- Identify, prioritize and improve the capacity of regional institutions/organizations for long-term involvement in river conservation.

A total of 34 rivers were covered by this program, namely: Tamrabarani, Vaigai, Vennar, Adyar, Betwa, Dhipu & Dhansiri, Bhadra, Cooum, Narmada, Godavari, Gomati, Khan, Krishna, Rani Chu, Kshipra, Mahanadi, Mandovi, Mahananda, Musi, Pamba, Sabarmati, Brahmani, Cauvery, Satluj, Subarnarekha, Pennar, Tapti, Tunga, Cauvery, Chambal, Damodar, Tungabadra, Wainganga, Yamuna (blog. iLeader, 2021). The National River Conservation Plan focuses on treating the waste water that flows into the river, treating and establishing waste water treatment plans to treat such raw wastewater, to build sanitation facilities that prevent defecation on the river banks. This project will increase awareness and understanding of river conservation, protect aquatic life, expand anthropogenic influence and

hydrological regime, and concentrate major pollutants in rivers. This project will help preserve rivers and provide the way for systematic prevention of river protection across India.

Conclusion:

River pollution is a growing problem in India today. It is found that different factors responsible for polluting rivers in India are found to be uncontrolled discharge of industrial waste, excessive use of pesticides, insecticides and fertilizers in agricultural operations, oil spillage, social and religious rituals, disposal of untreated sewage, littering, urban human activities and uncontrolled discharge of domestic wastes. Among different enactments in force for prevention of water pollution in India a notable law is the Water Conservation Act but it needs to be strictly enforced and implemented in both letter and spirit. Industrial water needs to be reused after proper treatment. The government should make increased level of efforts to make the river water clean and it is high time that the government and several NGOs working in field should come together to spread awareness among general masses about the importance of rivers for sustenance of human and other forms of lives on earth. Government initiatives, improved waste water treatment, sustainable farming practices, public awareness, and strong legal frameworks can help mitigate the problems. By working together, India can restore its rivers to their former glory, ensuring that they continue to serve as lifelines for future generations.

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