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Water Pollution: Perceptions, Source and Variety of Factors

Dr. Sanjay Shahi
Associate Professor, Department of Geography, J S Hindu P.G. College, Amroha, (MJP Rohilkhand University, Bareilly), India

Corresponding Author: shahibisen@gmail.com

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ABSTRACT
There is a severe issue of water pollution all over the world because of the limited fresh water supply and the increasing output of waste water, which pollutes rivers, lakes, water bodies and the ground water that is available. Water pollution in India is also a major threat to human health, aquatic life, vegetation, and the overall ecological balance. There have been a plethora of environmental laws implemented around the world, including India, to address this worrisome problem, but the situation is only becoming worse over time. There are many factors that contribute to water pollution, but the authors of this research have taken an international viewpoint with an emphasis on India, in order to provide an overall picture as well as direct the attention of policymakers on how best to battle this problem.

Keywords: *water pollution, toxic substances, waterways, factors*

I. INTRODUCTION

It's widely accepted that water is the most important of all natural resources. Because of its high salt content, it is unfit for human consumption; 98 percent of our water is seawater. Fresh water makes up only 2% of Earth's total water supply, but glaciers and polar ice caps store the remaining 1.6 percent. A further 0.36 percent is found beneath the surface in aquifers and wells. Only 0.036 percent of the planet's total water supply may be found in lakes and rivers, which is a small fraction of the total. Women and children are responsible for collecting water in the vast majority of families (76 percent) in 45 developing countries, according to a WHO/UNICEF survey. This is time that could be spent earning a living, caring for loved ones, or going to school. Every country in the world faces a major problem with water contamination. Toxic effluents spread through a water system and alter water quality, which results in pollution. Freshwater resources are being depleted as a result of water contamination caused by unchecked growth in urban, industrial, agricultural, and other infrastructural development around the world. As unintended by-products, virtually all production processes generate pollution. Water contaminants caused by human activities include microbial diseases, nutrients that consume oxygen, heavy metals, pesticides, and oxygen-consuming compounds, as well as suspended sediments, nutrients, and pesticides. Pollutants like heat, which raise the water's temperature, can also cause stratification. Most of the time, pollution is to blame for a significant drop in water quality around the world. Overpopulation of nutrients (mostly phosphorous and nitrogen) leads to eutrophication, the most common problem with water quality around the world. Polluting rivers, lakes, and coastal areas in underdeveloped countries is the result of unprocessed sewage. A number of polluting industries, including leather and chemicals, are shifting from developed countries to developing ones.

It is not just the bodies of water that are being harmed by water pollution, but the land, agriculture, aquatic life, and human health as well. The soil in rural and some suburban regions serves as a conduit for residential wastes, which are either partially or completely untreated, to enter the environment and contaminate it. There are sewage pipes in metropolitan areas that collect and transport domestic wastes, which are either treated or discharged into waterways without treatment (this is considered the major potential source of water pollution). Controlling urban sewage is usually possible because it is handled by established government entities (Boyd and Tucker, 2012). Industries and geographic locations produce a wide range of industrial trash. Wastes high in organic matter can be handled by the same procedures used to dispose of residential wastes, such as those generated by dairy and food processing companies and meat-packing houses. Others generate wastes that are low in organic matter but heavy in harmful substances such as metals, acids, or alkalis. Examples include chemical and mining plants, as well as textile mills. Many industrial and natural chemical compounds are polluting freshwater systems, and this is a major environmental issue that affects people all over the world. Due to the ever-increasing world population and rapid industrialization, water is becoming increasingly scarce, making it more and more valuable in more and more countries. Water

is a precious resource in many regions of the world. According to a study published recently in the scientific journal Nature, Reddy said that 80 percent of the world's population is at high risk of losing access to safe drinking water to the ever-increasing world population and rapid industrialization, water is becoming increasingly scarce, making it more and more valuable in more and more countries. Water is a precious resource in many regions of the world. According to a study published recently in the scientific journal Nature, Reddy said that 80 percent of the world's population is at high risk of losing access to safe drinking water.

II. POLLUTION IN THE WORLD'S WATERWAYS

In many countries, the impacts of filthy drinking water are a major source of illness and death due to water-borne diseases. To maintain good health, infants and children must have access to clean drinking water. More than 1.8 million people die each year from diarrheal illnesses, according to the World Health Organization (2005). If your immune system is compromised, such as if you have AIDS, you are more susceptible to water-borne illnesses than the average person. People who drink contaminated water are at a greater risk of contracting diseases spread by contaminated water. While the number of homes relying on an unclean water source has decreased across the developing world, it is highly improbable that all households will have access to a clean water source in the near future (c.f. Mintz et al. 2001). Unimproved drinking water sources were used by 884 million people worldwide in 2010, according to UNICEF (2010: 7-9). UNICEF predicts that by 2015, 672 million people will still be relying on unimproved drinking water sources. When you have an unclean water source in your home, you need to know why you're treating it.

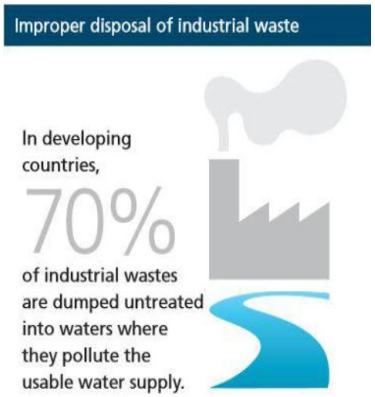

Figure 1: Improper Disposal of Industrial Waste

About 1.5 billion people lack safe drinking water, and at least 5 million people die each year from waterborne diseases, according to the World Health Organization. People have long assumed that the oceans, which cover more than 70% of the planet, could serve as an endless landfill for garbage. This is simply not the case. A growing number of pollutants have begun to surpass the oceans' natural capacity to cleanse them, and most of the world's coastlines now suffer from a toxic buildup. Sea life is beginning to suffer as a result of beach closures around the world due to high levels of germs from sewage treatment. If you look at pollution, you'll notice that it doesn't seem to care about national borders. At a time when the United Nations was still in existence (UN), Sweden hosted and funded the first major worldwide meeting on environmental issues in 1972. Some countries in the poor world were wary of attending this meeting, which the United States presided over, because they feared that the developed world would use environmental preservation as a tool to keep the developing world economically oppressed. The conference's most significant accomplishment was the founding of the United Nations Environmental Program (UNEP).

40% of America's rivers are unfit for fishing, swimming, or sustaining aquatic life. America's lakes are much more contaminated, with 46 percent of them unfit for fishing or swimming. More than half of the estuaries and bays in the United States have been severely or moderately damaged by eutrophication (nitrogen and phosphorus pollution). The Mississippi River, which drains 40% of the continental United States, including its heartland farmland, dumps an estimated 1.5 million metric tonnes of nitrogen pollution into the Gulf of Mexico each year. As a result, the Gulf of Mexico experiences a hypoxic coastal dead zone the size of Massachusetts each summer. US waters are polluted by 1.2 trillion gallons of untreated sewage, storm water, and industrial waste each year. The Environmental Protection Agency (EPA) in the United States has warned that by 2016, sewage levels in rivers could return to levels comparable to those of the 1970s.

Among the most polluted rivers on Earth are those in Asia. Compared to the global average, they contain three times as many bacteria from human waste and 20 times more lead. In 2004, half of China's seven major rivers' tested sections were judged to be unfit for human consumption due to pollution. An increase in the percentage of locations failing to fulfil regulations has been reported for swimming and other water sports in Europe's rivers and lakes between 2004 and 2005. In Slovakia, only 22.4 percent of the country's freshwater areas are in compliance with European Union rules. In 30% of cases, Irish waterways are polluted with sewage or fertilizer. The Sarno River is Europe's most filthy, containing sewage, untreated agricultural waste, industrial waste, and chemicals. Coastal waters in Greece are the cleanest, followed by Spain and Germany. The Estonian and Lithuanian seas are the dirtiest. An acidic state caused by mining has made the King River Australia's most contaminated waterway. About half of the world's population has a problem with freshwater pollution. Approximately 250 million people are affected by water-related illnesses each year, with an estimated 5 to 10 million deaths. Diseases induced by drinking contaminated water include cholera, typhoid fever, schistosomiasis, dysentery, and other gastrointestinal illnesses. As a result, the country has some of the world's most polluted groundwater. Arsenic, which is found in sediments, is the contaminant in this case. One million Bangladeshis have already been poisoned and millions more are at risk due to arsenic-contaminated groundwater contamination. More than a million seabirds and countless fish die each year as a result of plastic garbage entering the water and coastal areas.

III. WATER POLLUTION VARIETY OF FACTORS

When we talk about water pollutants, we're talking about any substance that has the ability to alter the water's physical, chemical, or biological properties. These are harmful to living things. A stream, river, or lake becomes polluted when pollutants enter it. There are several sources of water pollution. These can be broken down into:

- Sources from Both Near and Far
- Resources are derived from both natural and human sources.

3.1 Sources both Pointed and Pointless

Pollutants and effluents from well-defined sources such as home and industrial waste water can be efficiently monitored and controlled through the use of point sources of pollution. On the other hand, non-point causes of water contamination are widely dispersed. When contaminated runoff from agricultural fields, building sites, abandoned mines, and solid waste disposal sites finds its way into streams and lakes, these types of sources are responsible for the majority of the toxins in the water. Controlling non-point sources is a challenge

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3.2 Both Natural and Man-made Sources

Pollution can also be defined as a rise in the concentration of naturally existing chemicals. Natural sources are the origins of such a growth in the population. One such natural source is siltation, which is composed of soil, sand, and mineral particles. It's a regular occurrence in most bodies of water. Deforestation in an indiscriminate manner loosens the soil, allowing flood waters to carry sediment from the mountains into rivers, lakes, and streams. Anthropogenic or man-made sources of water contamination, on the other hand, are the outcome of human activities. For example, home (sewage and wastewater), industrial, and agricultural wastes that are discharged into waterways are examples of anthropogenic sources of contamination.

IV. TOXIC SUBSTANCES IN THE WATER

Among the most common causes of water pollution is runoff from untreated industrial and commercial wastes, as well as waste water from municipal sewage systems, animal excrement, pesticides, fertilisers, radioactive wastes, and erosion of riverbanks.

- Inorganic Waste in Liquid Form
- Non-biodegradable organic wastes
- Germs/microorganisms
- Nutrient-rich materials
- Inorganic substances
- Inorganic compounds
- Sediment and sand
- Hot water

4.1 Inorganic Waste in Liquid Form

When "oxygen-demanding" pollutants are dumped in the ocean or another body of water, bacteria and other microorganisms, along with water-dissolved oxygen, break them down. In addition to sewage and other liquid organic waste, run-off from rainfall and storm events can also contain organic waste from the land. These run-off events include rain, flooding, and storms. Fish and aquatic plant life suffer or perish as the concentration of dissolved oxygen declines as well.

4.2 Non-biodegradable Organic wastes

Industrial waste accounts for the majority of the inorganic liquid wastes that wind up in rivers, where they are diluted and rendered harmless. Toxic inorganic waste can accumulate in the food chain, eventually reaching fish. Heavy metals and other inorganic compounds have been found in fish or crops that have been eaten by humans, leading to a substantial number of deaths and major injuries from water contamination.

4.3 Germs/Microorganisms

With the faces of animals, garbage from sewers, latrines, and other sources of pollution in the water, many kinds of bacteria and viruses spread out and pollute the water. Such micro-organisms are supplied to waterways by poultry farms, tanneries, and slaughterhouses.

4.4 Nutrient-Rich Materials

Excessive usage of fertilisers, minerals containing nitrate, and domestic chemicals are all interfering with water. Plants that shouldn't be growing so quickly are encouraged to do so by this nutritional ingredient. A few days later, these plants begin to decompose, causing the water to taste and smell bad. It's called "eutrophication" when aquatic plants begin to grow out of control.

4.5 Inorganic Substances

This category includes various cleaning agents, soaps, detergents, insecticides, and other chemicals. Compounds of this type are produced by several industries as well.

4.6 Inorganic Compounds

There are a number of inorganic contaminants, including arsenic, lead, cadmium, and mercury, that are found in many types of metals.

4.7 Sediment and Sand

Erosion of the soil results in the accumulation of silt and sediment in waterways. Because of agricultural and building operations, soil erosion has increased by 5 to 10 times.

4.8 Hot water

To keep their engines from overheating, thermal industries require a large volume of cold water. Depletion of DO is caused by the release of this hot water into neighboring water bodies.

V. WATER POLLUTION'S NEGATIVE EFFECTS

` Water contamination has a negative impact on the environment on both a local and global scale. People and the environment are negatively impacted by it. Many different things can be harmed as a result of pollution, both on land and in the water. We can expect a decrease in production as a result of all of this. When huge quantities of harmful compounds are dumped into streams, lakes, and coastal waters in the ocean, biomass and diversity of communities can be expected. Organic waste is the primary source of water contamination. Secondary productivity can be increased while the aquatic community's character is altered as a result of this waste. It is common knowledge that many species of fish, particularly those sought after as food by humans, are among the most vulnerable to pollution. A polluted water supply can harm human health. When bacteria and viruses are transported into surface and groundwater, they spread disease. The water we drink is tainted, putting our health at risk. Plant and animal nutrition is directly linked to human health. Nitrogen, phosphorus, and other elements that stimulate aquatic plant growth may be in overabundance, resulting in algal darkness and overgrown weeds. Adding odour, flavour, and sometimes colour to water is a result of this. The ecological balance of a body of water is ultimately disrupted. A combination of sulphur dioxide and nitrogen oxides plus the production of carbon dioxide can generate acid rain, which decreases the pH value of soil and causes ocean acidification.

Table 1: Water pollution and its environmental consequences

S. No	Polluted	Effects
1	Pathogens	Effects of water on health (causing a foul odor) (causing outbreaks of water-borne diseases)
2	Non-biodegradable pollutants (oil and grease, pesticides and weedicides, plastics, detergents)	The toxicity (damaging to aquatic life), the possibility of genetic consequences and cancer, the death of fish, Eutrophication and aesthetics
3	Pesticides that contain inorganic toxins (phosphate and nitrate)	Methemoglobinemia is caused by algal blooms and eutrophication.
4	Acids and basesare	Water that is inappropriate for drinking, irrigation, or industrial usage can be killed with this method.
5	Non-nuclear substances	Deficiencies in DNA and cancer
6	Heat	This depletes the oxygen levels in aquatic habitats.
7	Sediment	The water quality is harmed, and the number of fish drops.

VI. INDIAN CONTEXT

There is a corresponding rise in the volume of gray/wastewater as a result of the rapid growth of cities and home water supplies. According to CPHEEO, between 70 and 80 percent of the water used for domestic purposes is discarded as trash. Around 98 lpcd of wastewater is generated per capita in India's class-I and class-II cities and towns, which together account for 72% of the country's urban population. In contrast, the National Capital Territory of Delhi alone generates approximately 220 lpcd of wastewater (out of which only 61% is treated) (CPCB, 1999). It is estimated that the total amount of waste generated by Class I cities (498) and Class II cities (410) in the country is 35,558 MLD. Since only 11,553 MLD of sewage treatment capacity has been added (Figure 2), a gap of 26,468 MLD in sewage treatment capacity exists. Rapid urbanisation and increased use of public water supplies have both increased the amount of gray/wastewater that must be disposed of. According to CPHEEO, 70 to 80 percent of the water used for domestic purposes is wasted. Class-I and class-II cities and towns in India produce about 98 LPCD of waste per person. These cities and towns account for about 72% of India's urban population. There is roughly 220 LPCD of waste generated in Delhi's National Capital Territory alone (which is treated for just 60 percent of it) (CPCB, 1999). It is anticipated that Class I cities (498) and Class II cities (410) generate 35,558 MLD of garbage annually. Since only 11,553 MLD of sewage treatment capacity has been built (Figure 2), there remains a sewage treatment capacity gap of 26,468 MLD. representing 26% of the total installed power capacity. Despite having a total capacity of only 5.6 percent, the Series of Waste Stabilization Ponds is also used in 28 percent of the plants. Stabilization ponds, according to a World Bank report (Shuval et al. 1986), are the best option for wastewater treatment in underdeveloped nations because land is often available at a fair opportunity cost and experienced labour is in short supply.

Only 60% of the 13468 MLD of wastewater created by industries gets treated, in addition to the sewage generated by people's daily activities. Common Effluent Treatment Plants (CETP) have been established for clusters of small-scale enterprises that cannot afford the expense of waste water treatment plants (CPCB, 2005b). Sludge drying beds, secondary clarifiers, flash mixers, and clarifloculators are only a few of the treatment processes used in these plants to remove the sludge from the wastewater. Prior to secondary treatment, steps such as screening, grit removal, and sedimentation are used to remove coarse material and settable solids from the waste stream. Industrial waste water from CETPs is mixed with river water and disposed of in the waterways. Among the several Delhi CETPs that discharge their waste into the Yamuna River is one that has a capacity of 133 MLD and is home to 10 of those facilities. To put it simply, conventional wastewater treatment is expensive and time-consuming. The total cost of building a treatment system for all home wastewater is expected to be around Rs. 7,560 crores (CPCB, 2005a), which is approximately 10 times the amount that the Indian government expects to spend (Kumar, 2003). Comparing the costs of various treatment levels using traditional metrics is shown in Table 1. (CPCB, 2007b). It has been shown that the removal, treatment, and handling of sludge in sewage treatment facilities (STPs) in India are among the most neglected aspects of plant operations.

Inadequate design, poor maintenance, frequent power outages, and a lack of technical personnel have resulted in poorly functioning wastewater treatment facilities (CPCB, 2007b). A lot of the time, the biogas produced by UASB reactors or sludge digesters cannot be effectively utilised.

VII. INDIAN REGULATIONS ON WATER POLLUTION

India's environmental challenges and regulations are overseen by the Ministry of Environment and Forests and Climate Change (MoEFCC), which is a government department based in the capital. Keeping water clean and pollutants under control is the primary goal of the Water Quality and Pollution Prevention Act. As part of the Ministry of Environment and Forestry (MoEF), the Central Pollution Control Board (CPCB) is responsible for ensuring that pollution is kept at a safe level. The Central Ground Water Board (CGWA) is India's primary groundwater agency. It is government-created and overseen by the Ministry of Water Resources.

Acts-

- As revised in 1988, the Water (Preventing and Controlling Pollution) Act, 1974
- A 2003 act amending the Water (Prevention and Control of Pollution) Act

Rules-

- The Central Pollution Control Board (Amendment) Rules, 2012
- Wetland Regulations for 2010

Policy-

- Policy for the use and conservation of water resources in the United States.
- The state of California's water policy

VIII. CONCLUSION

Water contamination is a global problem that needs to be addressed in a long-term strategy. An improved research and development structure is needed in order to produce new, financially viable innovations. In order to prevent rivers, lakes, and other bodies of water from becoming contaminated, industrial, urban, agricultural, and other infrastructure development should be prohibited in river basins and catchment areas. It's also important to conduct an integrated environmental planning process with legal backing and well-defined simulation models that aim to protect and restore the quality of water.

REFERENCES

1. Reddy, M. C. (2004). *Management of lakes in India*. Available at: worldlakes.org.
2. D. Harikishore Kumar Reddy. (2012). Water pollution and Treatment Technologies. *Environmental & Analytical Toxicology, 2*(5).
3. Singh, R. (2012). *Urban lakes and wetlands: opportunities and challenges in Indian Cities- Case study of Delhi*. Available at: https://hal.archives-ouvertes.fr/hal-00739984/document.
4. OWA, F.D. (2013). Water pollution: sources, effects, control and management. *MCSER, 4*(8).
5. Joshua Nizel Halder, & M Nazmul Islam. (2015). *Water pollution and its impact on human health*.
6. Sulaiman A., & Alrumman, A. (2016). Water pollution: Source & treatment. *American Journal of Environmental Engineering*, 88-98
7. Gupta BG, Biswas JK, & Agrawal KM. (2017). Physico-chemical parameters, water quality index and statistical analysis of surface water contamination by bleaching and dyeing effluents at Kalikapur, West Bengal, India. *J. Environ. Sci. Pollut. Res., 3*(2), 177-180.
8. Staff, R. (2017). *Study links pollution to millions of deaths worldwide*. Available at: https://www.reuters.com/article/us-health-pollution/study-links-pollution-to-millions-of-deaths-worldwide-idUSKBN1CO39B).
9. Sharma S, & Bhattacharya A. (2018). Drinking water contamination and treatment techniques. *Appl. Water Sci., 7*(1), 1043-1067.
10. Thushari, G.G.N., & Senevirathna, J.D.M. (2018). Plastic pollution in the marine environment. *Heliyon, 6*(8), e04709.