



A Monthly e Magazine  
ISSN:2583-2212

September 2024 Vol.4(9), 3555-3560

Popular Article

## Water pollution: A threat to aquatic life and ecosystem

Medida Harini, Jajjari Mahesh Babu, Modalavalasa Vagdevi, Batna Gayatri, Dr.K.Madhavi  
College of Fishery Science, Muthukur.  
<https://doi.org/10.5281/zenodo.13756248>

### *Abstract*

Aquatic habitats are severely impacted by the urgent problem of water pollution, which affects both plant and animal life. Because the exploitation of these species and their ecosystems increases the worrisome pace of extinction among aquatic life forms, the degradation of water quality not only hurts aquatic organisms but also poses a threat to their very survival. The ultimate reservoirs for pollutants are aquatic ecosystems. Human endeavors like urbanization, industrialization, and agriculture frequently result in water contamination, which can surpass a body of water's inherent potential for self-purification. Therefore, in order to avoid irreversible damage, it is crucial to routinely monitor and control the release of contaminants into surrounding water bodies. This page discusses the impact of pollution on aquatic life, analyses a case study & proposes measures to prevent pollution & protect aquatic ecosystems.

### **Introduction**

Water pollution, an unrelenting scourge, is wreaking havoc on our lakes, rivers, and oceans, leaving a path of destruction and hopelessness in its wake. Section 2(e) of the Water (Prevention & Control of Pollution) Act, 1974 defines pollution as any act that contaminates water, modifies its physical, chemical, or biological characteristics, or disposes of sewage waste in water that is likely to cause nuisance or endangers public health or safety, domestic, industrial, or other legitimate uses, or is detrimental to the lives and health of aquatic plants and animals. The following illustrates the startling degree of water pollution and how it affects aquatic life:

The vast majority (more than 80%) of waste water worldwide is discharged into the environment untreated. The world's rivers are seriously polluted in about half (around 40%), which has an impact on billions of people and numerous aquatic animals. Every year, pollution claims the lives of hundreds of thousands of marine animals, including well-known species like fish, birds, and sea turtles.

Just plastic waste is endangering more than 800 marine species, including fish, animals, and

3555



coral reefs. Since the 1970s, pollution and climate change have combined to cause an alarming 60% drop in fish populations worldwide. Wetlands, vital habitats for 40% of the world's biodiversity, are vanishing at a startling pace of 1% each year as a result of pollution and human activity.

### **Sources of pollution**

The Central Contamination Control Board (CPCB) states that untreated sewage is the primary cause of water contamination in India. Agrochemicals, heavy metals, eutrophication, plastics and microplastics, oil spills, and other factors are additional contributors of water pollution.

### **Sewage**

Sewage, a complicated combination of household, municipal, and industrial waste, is the main cause of water contamination. Because organic matter makes up the majority of sewage, receiving waterways lose oxygen due to a high biological oxygen demand (BOD). Aquatic life may be harmed by this, especially if the dissolved oxygen content drops below 5 mg/L. Ecosystems and fish are harmed by eutrophication, which is caused by decomposing materials and too many nutrients. Sewage-borne infections are a serious threat to human health and are responsible for 25% of fatalities worldwide. To lessen these effects, wastewater management must be done effectively.

### **Agrochemicals**

Water contamination has increased as a result of land removal and crop growth brought on by the growing demand for food. The need for food increases along with the population, which means that agrochemicals like pesticides, herbicides, and fertilizers are used more frequently. These substances have the potential to contaminate rivers, lakes, and coastal waters by runoff, drift, or leaching. Fertilizers can contaminate water sources by overusing them or by not allowing the soil or crops to absorb them. This can result in nutrient enrichment and toxic algal blooms. Water pollution can also result from an excess of organic manure. Pesticides and nutrient accumulation can be harmful to aquatic life as well as human health, increasing the risk of poisoning and cancer.

### **Heavy metals**

Both natural and man-made sources can introduce dangerous heavy metals into our water. They may get in through the air, soil, and water runoff directly or indirectly through pollution. Heavy metal pollution rises in proportion to the expansion of farms and enterprises. High concentrations of hazardous elements including arsenic, lead, and mercury have gotten into our water supply. These metals can be found in wastewater from industry and farms as well as stormwater. Due to their extreme toxicity and protracted presence in our water systems, they pose a serious threat. Certain metals, including arsenic and mercury, are utilized in pesticides, while others, like copper and zinc, are even included in fertilizers.

Because heavy metals are not eliminated from water, they build up in water reservoirs and eventually



find their way into the food chain, giving them significant ecological relevance. They usually attach themselves to particulate matter, which settles down and eventually becomes absorbed into sediments, once they are released into aquatic settings. One of the final sinks for heavy metals released into the aquatic environment is the sediments.

Certain heavy metals have the ability to change into very poisonous persistent metallic compounds that can bioaccumulate in organisms and become more pronounced in the food chain.

### **Eutrophication**

Around the world, freshwater and marine ecosystems are seriously threatened by eutrophication. It happens when too many nutrients, such as phosphorus and nitrogen, get into the water and cause an overabundance of algae and plants. Although this can occur naturally, human activities like industry, agriculture, and sewage disposal have sped up the process, with unfavorable results.

#### **Eutrophication can cause:**

- Toxic algal blooms that degrade water quality.
- Low oxygen levels in dead zones are detrimental to aquatic life.
- Reduced chemosensory capacities in living things. fishing grounds and recreational waterways being destroyed.
- Risks to public health

The most prevalent phytoplankton linked to hazardous algal blooms (HABs) is cyanobacteria. They have the capacity to create poisons and rule nutrient-rich freshwater environments. Additionally, eutrophication modifies the architecture of aquatic communities, favoring planktivorous and small-bodied fish.

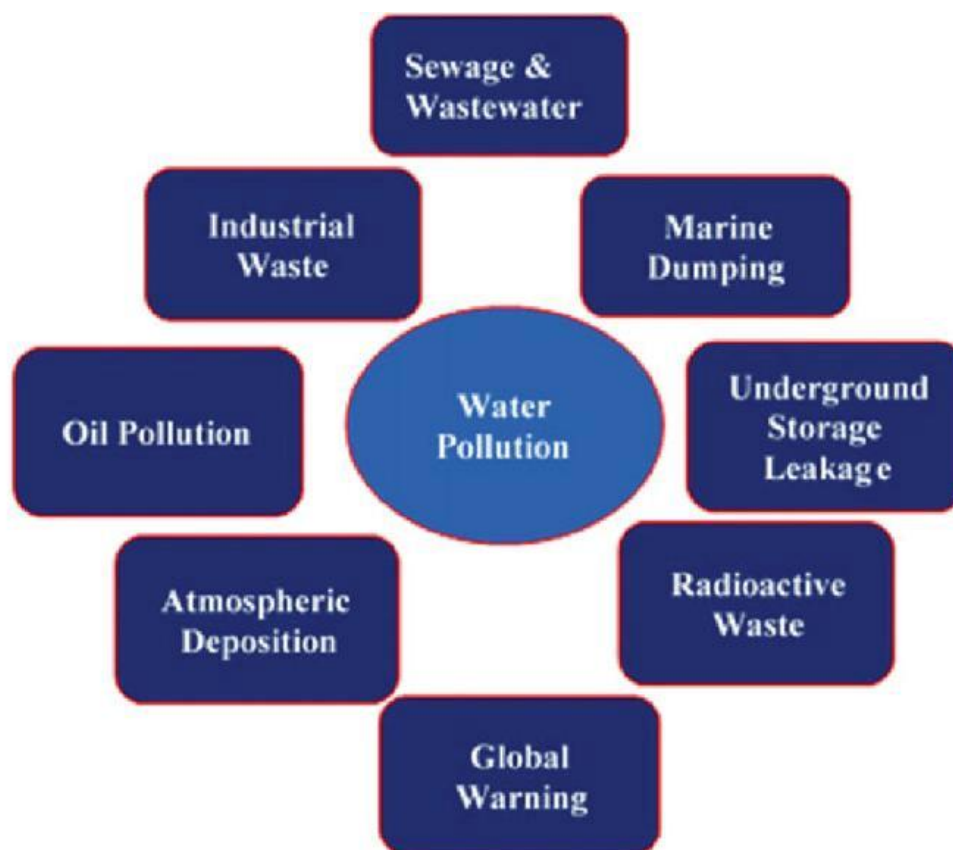
### **1. Plastics and Micro plastics**

One major issue facing our waterways and oceans is plastic garbage. Plastics are helpful, but they can linger a long time if not disposed of properly. This indicates that they accumulate in the ecosystem and endanger wildlife. From the Arctic to the deep sea, plastic debris can be found across the ocean. The majority of it is transported to the ocean by rivers from the land. Numerous animals are harmed by plastic debris, which tangles around them and contaminates the water.

Although we've been aware of plastic pollution since the 1970s, we didn't realize it was a worldwide issue until lately. Microbeads and single-use plastics like bags are a major contributor to the issue. They decompose into microscopic fragments known as microplastics, which animals consume and may be harmful to people as well.

Numerous sources, such as ships, runoff, and wastewater treatment facilities, produce microplastics. They include substances that can injure both people and animals.





## 2.Oil Spills

When human activity releases liquid petroleum hydrocarbons into the environment, mainly the ocean, it is called an oil spill. All living things, whether on land and in water, are toxic to petroleum hydrocarbons, which makes this kind of contamination extremely dangerous. Due to the potentially catastrophic effects that oil spills can have on marine life, researchers and environmentalists are becoming very concerned about these incidents. Economic losses can be substantial even if an oil spill's magnitude only slightly increases. They may originate from ships, facilities, pipelines, tankers, and other sources. Oil spills can occur unintentionally or on purpose and can have detrimental effects on the environment.

### Impact of oil spill on Coral Reefs

In marine ecosystems, coral reefs are essential. For young shrimp, fish, and other animals to grow and thrive, they offer a secure haven. Unfortunately, environmental and human activities pose a great deal of harm to coral reefs, which is causing a drop in the number, variety, and general health of the ecosystem. The damage that oil spills and the chemicals used to remediate them cause to these fragile ecosystems only gets worse. Studies have demonstrated that coral species, particularly in their



early phases of growth, can be harmed by even minute levels of scattered oil and oil dispersants.

### **Impact of Oil Spills on Marine Mammals**

"Bottlenose dolphins, fins, humpbacks, rights, sei whales, sperm whales, manatees, cetaceans, seals, sea otters, and pinnipeds are examples of marine mammals." Furred mammals are affected by physical contact with oil because they depend on their outer coats for warmth and buoyancy. Consequently, when oil flattens and sticks to the outer layer, these animals frequently die from freezing, drowning, and smothering.

### **Impact of Oil Spills on Sea Birds**

Aquatic birds are the most affected by oil spills because:

- They spend most of their time on the water's surface.
- Many are poor fliers or can't fly at all.
- When scared they dive into the water instead of flying away.

When oil gets on feathers, it

- Fills the air spaces that keep them buoyant & warm.
- Makes flying harder or impossible due to extra weight.

Causes them to lose insulation, leading to: rapid energy loss to stay warm & hypothermia & eventually death.

### **A Case Study on Yamuna's Pollution Problem**

Pollution is killing the Yamuna River, which is sometimes referred to as Delhi's lifeline. Due to numerous untreated sewage drains, there is no aquatic life throughout the 22 km stretch of the national capital. The river upstream from Wazirabad is home to fish, turtles, crocodiles, and aquatic vegetation until it enters Delhi. However, once it hits Delhi, the river dies environmentally. Because of excessive pollution and low dissolved oxygen levels in the river, vital elements of aquatic life are being killed.

The river receives 850 million gallons of discharge per day (MGD) from about 21 drainage systems, which has an impact on the aquatic species. The aquatic food web in water is known to be supported by phytoplankton, although they have also disappeared. The river's DO content is approximately 1 mg/l, whereas 4 to 5 mg/l is needed.

The coliform bacteria that are forming in the contaminated river are more harmful to aquatic life. While certain aquatic life may be temporarily revived by monsoon flooding, this is not a long-term solution. The government is attempting to develop further STPs in order to clean up the river; as of right now, 14 STPs have been built, and they all purify and function.



### **Government measures for water pollution prevention**

The water quality of the country's various rivers is regulated by several agencies such as

- Central Pollution Control Board (CPCB)
- State Pollution Control Boards (SPCB)
- Pollution Control Committees (PCCs)
- Central Water Commission (CWC)

The Indian government has started a number of initiatives to preserve and safeguard the nation's rivers and other waterways.

- National River Conservation Programme (NRCP)
- National Lake Conservation Programme (NLCP)
- Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
- Smart Cities Mission
- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
- Repair, Renovation and Restoration (RRR) Schemes
- National Green Tribunal
- Jal Jeevan Mission

### **Conclusion**

In summary, there is a ticking time bomb threatening aquatic life and ecosystems, and it is urgent that we pay attention to it and take coordinated action. The delicate aquatic equilibrium of our planet is being threatened by human activities including habitat destruction, overfishing, and pollution. The ramifications of ignoring these problems will be dire, resulting in the extinction of species, the disturbance of ecosystems, and severe effects on human health and way of life. To save the wonder and beauty of aquatic life for future generations, we must act decisively to save our seas and waterways.

### **Reference**

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7121614/>

<https://www.moneylife.in/article/delhis-waste-chokes-yamuna-of-all-aquatic-life/47939.html>

<https://www.clearias.com/water-pollution-prevention/>

<https://blog.ipleaders.in/water-prevention-and-control-of-pollution-act1974/>

