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## **Environmental Issues and Awareness: Teaching the Next Generation**

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### **Abstract**

This paper analyses environmental contaminants and their occurrence in the state of Mississippi. It provides crucial insights into the increase in water pollution in the United States. Toxic contaminants such as salts, bleach, nitrogen, metals, and toxins and their effects on the waterways are also discussed in the report. Additionally, the role played by human activities and especially the introduction of drugs and bacteria associated with the production of the contaminants are also articulated in the paper. A discussion on the most viable preventative measures followed by a recommendation on contemporary safety measures is highlighted in the paper.

### **Introduction**

Water pollution is a widespread problem that has affected many people across the world. The levels of water pollution include industrial, domestic, and individual wastes. When the river systems are considered, there is a myriad of causes that lead to water pollution. In the United States, plastic and other solid debris that get to the rivers such as the Mississippi River are among the leading pollution causes troubling the country's rivers (UNEP, 2021). The industrial and domestic pollutants are implicated in the overall high levels of water pollution that are noted in the river systems in the country.

If the right measures are not adopted, the water pollution is expected to increase exponentially. Industrialization is among the leading factors of water pollution. As more industries mushroom across the country, the level of water pollution can easily increase. Therefore, there is a critical need to increase the rate of testing and monitoring of water purity levels. Furthermore, the cleanliness of water released into rivers mark an important aspect of ensuring rivers within the country and the Mississippi River, in particular, remains clean. Efforts such as policies dictated in the Clean Water Act of 1972 have helped The Mississippi River's water quality improve (Baurick, 2021). However, there still is much that can be done to improve the river's waters to safety standards for the aquatic life and users downstream.

### **Problem Statement**

There is a need to understand the level and causes of water pollution in the United States and especially in the Mississippi River. Once the gravity of the pollution is understood effective measures can be developed to protect the river from pollution. The current research explores ways that can help alleviate both industrial and domestic refuse emissions into the river and in other water masses in general.

## Literature Review

Any form of a biological, radiological, physical, or chemical substance in water is considered a contaminant (Richardson & Kimura, 2017). Kessler et al. (2019) warn that emerging contaminants in water that are not well monitored and regulated could pose great dangers to the welfare of the current and future generations. The wide-ranged nature of the problem of dealing with contaminants makes it hard to clean contaminated water, once the elements are in the water. Yadav et al. (2012) indicate that it is hard to detect some of the contaminants in water, and this makes such water dangerous for human and animal consumption.

The broad scope of water contamination sheds light on the ambiguity of the issue at hand and the complexity of eliminating contaminants in water. According to the Safe Drinking Water Act, several elements fit into the universal contaminant candidate lists. Physical contaminants affect water's outward appearance with sediments, organic materials, and soil fitting into this category (Types of Drinking Water Contaminants, 2016).

Chemical contaminants include human and animal drugs, nitrogen, salts, bleach, or toxins. Industrial waste from various processing plants can end up in rivers. Such water is contaminated with residues of chemical elements. Boelee et al. (2019) note that poor waste disposal habits among the industries are a key cause of contamination from the industries and farms that use various chemicals. Current farming methods such as the use of pesticides, fertilizers, and other chemicals used to enhance farm production are often washed downstream to rivers (Kumari & Mishra, 2021). Such farms are also a huge contributor to chemical pollution in rivers such as Mississippi. There are also radiological contaminants in the water such as cesium, plutonium, and uranium (Types of Drinking Water Contaminants, 2016). These contaminants are mainly found in rivers that are located near mining areas, or where the radioactive elements are rampant in the soil.

Bacteria viruses, protozoa, and other microbes fit into the biological contaminant category. Demeter et al. (2021) note that Combined Sewer Overflows (CSOs) are one of the leading causes of microbial water pollution. This could be a problem for rivers that pass through urban areas. The issue of sewage management is critical and quite often sewage leaks into the rivers untreated. Huge rivers such as The Mississippi River can easily get affected by leaked sewage or the CSOs that lead to biological contamination.

The presence of these elements in waterways means that the water is contaminated and unfit for human consumption. For example, the Mississippi River is considered the second most polluted water in the United States and hence a vital aspect of research. This line of research will provide insights into water pollution in the United States and offers a crucial platform to develop feasible preventative measures. The Mississippi River is only second to the Ohio River, with 32 million pounds of contaminants in contrast to 12 million pounds in 2010 (Fuzhen, & Bureau, 2017). Most of this toxic waste included arsenic, benzene, and mercury, which are highly dangerous elements posing a high level of health risks to those near the waterway. Environmental groups term the Mississippi river as a polluted paradise and home to more than 100 toxic substances (Newman et al., 2019).

This data is just the tip of the iceberg, given that it is the elimination of the toxic waste and making water from the Mississippi river safe to drink, that is a more daunting task. Reversing the situation will need effort from the federal and national governments and considerable financial support. Franke et al. (2021) discussed the technological milestone that a nation might need to undergo to reverse the contamination in water to realize safe drinking water. Additionally, the river's size is a vital consideration having in mind that it is the second-largest drainage basin in the United States (Newman et al., 2019). It flows into the Gulf of Mexico, which means the contamination affects those along the river and its biodiversity.

Statistics indicate that the world's appetite is threatening the Mississippi River considerably and causing one of the country's largest ecological disasters.

The river is a source of water, food, and jobs for millions of Americans. Therefore, its pollution has ripple effects on the country, people's health, economic stability, and quality of life. One of the biggest contributors to this disaster is the activities in the agricultural industry (Newman, 2016). Farmlands surrounding the river are evergreen and vital supplies of agricultural products at a cheap price. However, there is a cost associated with this product with the fertilizers, manure, and nitrogen finding their way into the river. It chokes marine life and contaminates the water in the Mississippi River, making it unsafe for drinking (Momm, 2017).

Flooding further exacerbates the situation contaminating the river with soil sediments, logs, vegetation, and mud. Despite its source in the forest and highlands being crystal clear, the 81% increase in irrigation over the past two decades has seen the river increase nitrate concentration by 100% (Newman et al., 2019). High nitrate concentration affects the farmers downstream as well as the biodiversity in the Gulf of Mexico.

### **Student Focus**

The Ross Barnett Reservoir serves as a principal drinking source for the city of Jackson, Mississippi. As the state capital and the county seat of Rankins County, Jackson remains the most populous city in the state of Mississippi, hosting roughly one hundred and sixty-four hundred thousand residents within its borders. Teaching the next generation about water pollution is of central importance. This project would employ several volunteers, primarily the student body and staff members of the Jackson Public School District, the second-largest school district in the state, with fifty-seven K-12 educational facilities and roughly twenty-nine thousand constituents. Our initiative would educate the youth about different sources of water pollution that are the most threatening to the target water sources and supply channels that are applied in the residential areas (Evenden, 2019). We would also list ways for the community to control water pollution. At the same time, there is a high need to identify the testing techniques that can be applied to recognize and trace the sources of pollution. The sources of water pollution can be classified as either point source, non-point source, or transboundary. The point source form of water pollution can be traced to a single point of origin; the non-point sources are diffuse, but the transboundary sources are notably spread across borders of different administrative levels (Evenden, 2019). Thus, the future generation would need to first identify these sources and how to test them.

The next expected step is to understand the levels of quality that are needed or are set by the regulatory authorities. It is important to have a standardized method of testing various impurities in water. The research approaches need regular updating to ensure that the involved authorities are aware of the emerging impurities and how they are affecting the safety of water in the river. Moreover, research will reveal how various impurities in water are affecting underlying conditions such as diabetes, high blood pressure, and particularly obesity. The EPA sets the standards for water quality and regulates their overall application in testing. Among the contaminants in the water that is supplied to the public resources include bacterial agents such as E. coli and salmonella (Castellini et al., 2018). Other forms of testing test for the impurities related to industrial and domestic waste sources. Thus, among the first forms of testing that must be learned include the FDOM Monitoring protocols (Kümmerer, et al., 2018). This testing protocol is interested in the overall test for the color aspects of the water sources of interest. Naturally, water sources contain organic matter that would confer color through the absorption of ultraviolet light. Thus, the use of fluorescence and turbidity tests can be applied as a measure of purity.

Other major tests that should be applied in the test for water purity include conductivity of the water, salinity, and overall TDS monitoring. The conduction rate of the water from

different natural sources can be an indicator of the level of purity of the water sources. Ideally, conductivity is related to the overall high level of saline content of the water sources. Thus, the level of salinity can be indicative of the level of industrial refuse that finds its way into the water sources. Therefore, salinity level has to remain within a certain range and degree of purity (Kümmerer et al., 2018).

Further, the water pH is indicative of the level of purity of the water source. Very low levels of pH are indicative of the overall high level of industrial acidic refuse as well as the domestic waste into the water bodies. High pH is indicative of the deposition of industrial alkaline waste products. Thus, the source of the water contamination can be determined by simply extrapolating the results from the pH measurements that are applied in the overall determination of purity.

### ***What can be done to resolve pollution in the river Mississippi?***

The measures that can be implemented to safe river Mississippi among other water reservoirs include:

- Implementation of environmental policies. The policies include industrial assessment before the establishment of the industry to examine its ecological impacts. Other measures include the prohibition of cutting down trees and banning plastics but rather adopting materials that can decompose. Besides, there is a need for policies on waste disposal in urban centers, strict measures on the type of farming advocated near the water sources, and demarcation of riparian land (Inyinbor et al., 2018). Bashir et al. (2020) add that it might be hard to eliminate the emission of wastewaters from farms and industries. However, regulating the level of wastes in waters is a good start. The aquatic ecosystem has been known to have natural ways of cleaning water through natural methods. However, this can only be achieved if the level of contamination in waters is within what nature can sustainably decontaminate.
- The government and other relevant stakeholders could educate the general public of the adverse results of continuously polluting the water sources, as Karataş & Karataş (2016) described. These can be done by utilizing media channels such as radio and television, introducing environmental studies as a compulsory subject in the educational curriculum, and initiating regular campaigns which create awareness on water pollution. An article titled Day of Service: Western Dubuque students take on water pollution along Mississippi River KWWL (2021) sees students take an initiative to clean up the river. Through such voluntary actions, the people in the community will feel challenged by the young ones and even strive to protect the Mississippi River from pollution.
- The government could also finance more research and innovators to motivate and enhance their ambitions in designing techniques that can mitigate water pollution. Most researchers and environmentalists lack the capacity and financial capability to conduct conclusive research on water pollution and initiate awareness and cleaning programs. One such program has seen St. Louis, St. Paul, Minnesota, and Baton Rouge participate in a research project that will help develop policies meant to abate pollution of The Mississippi River (Ahl, 2021). Such programs are also supported by Spencer and Xu (2021) who note that governments have to work with private entities. The collaboration will ensure that practical solutions and initiatives such as
- There is a need for implementation and anchoring severe penalties, for the Mississippi River polluting entities. For instance, jail terms on anyone or any industry or organization proven guilty on the offense of polluting the water. The CWA effected in 1972 has helped improve the condition of the river, as reported by Corbley (2021). These will reduce the number of pollutants injected into the river and other water

resources. This idea, however, does not receive sustainable support from all the states that the river and its tributaries pass. Lack of collaboration among the individual states is a problem reported by Secchi and McDonald (2019). The poor collaboration has seen the river gain minimal benefit in terms of improving the quality and safety of its water.

- The government can set up waste treatment plants all across the major cities. Some waste products, such as sewage, can be isolated and recycled into fresh water, while their products are used to manufacture fertilizers. However, the project requires sufficient budget allocation by the government, as denoted by Inyinbor et al. (2018). The U.S. Clean Water Act that was put in place in 1972, helped reduce the pollutants discharged into water. The policy, as reported by Louisiana State University (2021), indicated that such policies helped normalize the oxygen levels in the water, reduce the bacterial content in water and even reduce the concentration of lead and other metal elements in the water.

## Conclusion

The increased industrialization and human activities are the main contributors to water pollution. Domestic and industrial pollutants have continuously been a threat to the water. This is evidenced by the numerous deaths and diagnoses of diseases associated with unsafe water that are recorded both within the bounds of the Mississippi and across the broader country. The dominant diagnoses include high blood pressure, diabetes, and obesity among others. A case study on the water in the Mississippi River will benefit people who depend on water from the river. Mississippi is a clear illustration of the extent to which water pollution has manifested itself in the United States.

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