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AN OVERVIEW ON WATER POLLUTION

Shakuli Saxena*

*Department of Agricultutal Sciences,
Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, INDIA
Email id: shakuli.agriculture@tmu.ac.in
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ABSTRACT

In the twenty-first century, water quality problems are a significant challenge for mankind. Here, we look at the many types of aquatic pollutants, their impact on human health, and how to protect freshwater resources from contamination. Chemical pollution is emphasized, especially inorganic and organic micro pollutants such as hazardous metals and metalloids, as well as a wide range of synthetic organic compounds. Some elements of waterborne illnesses are also addressed, as well as the urgent need for better sanitation in poor nations. The study looks at recent scientific advancements in dealing with a wide range of contaminants. It's divided into sections based on the many temporal and geographical dimensions of global water pollution. Organic contaminants that are persistent. For more than five decades, gelogenic pollutants, mining operations, and hazardous waste sites have been the most significant sources of long-term regional and local water pollution; during that time, the most relevant sources of long-term regional and local water pollution have been gelogenic pollutants, mining operations, and hazardous waste sites. On a regional to local scale, agricultural chemicals and waste-water sources have a shorter-term impact.

KEYWORDS: *Agriculture, Gelogenic, Micro Pollutants, Mining, Pathogens, Wastes.*

1. INTRODUCTION

Water quantity and/or quality concerns are at the root of many of humanity's main challenges in the twenty-first century. Climate change will exacerbate these issues in the future, resulting in greater water temperatures, glacier melting, and an intensification of the hydrological cycle, possibly leading to more floods and droughts. In terms of human health, the absence of has the most immediate and severe effect. It's also linked to the shortage of clean drinking water, which affects more than a third of the world's population. Exposure to viruses or chemical toxicants via the food chain or during leisure are examples of additional risks. The contamination of freshwater resources, such as lakes, rivers, and groundwater, is the subject of this review. Chemical contamination is getting greater attention these days, thanks to a slew of new studies that examine all elements of waterborne illnesses in depth. More than a third of the world's available renewable freshwater is utilized for agriculture, industry, and household uses. Given that the majority of these operations result in the contamination of natural water with a variety of synthetic and gelogenic natural chemicals, it's no wonder that chemical pollution of natural water has become a significant public issue in virtually every country. Indeed, according to a recent

Gallup survey, drinking water contamination is the most serious environmental issue in the United States(1,2).

1.1 Aquatic Micro pollutants:

The availability of analytical techniques for quantifying the temporal and geographical variability in chemical concentrations, as well as information of the nature and origin of the pollutants, are all required for a thorough evaluation of any chemical contamination of natural water. Present, a thorough knowledge of the mechanisms that determine the chemical's transit and destiny. Mathematical transport and fate models of appropriate complexity for designing optimal sampling strategies and predicting future developments of a given pollution case in the system under consideration, as well as methods for quantifying the adverse effects of chemicals on aquatic life and human health. The same analytical techniques and process expertise are crucial for the design and operation of treatment technologies and in situ remediation methods. The next sections go over some of the most important features of these five parts of a micro pollutant exposure evaluation. Finally, there are many instances when chemical water contamination is suspected, but the kinds and sources of the contaminants are unknown or cannot be thoroughly investigated. There is a "battery" of impact in such situations. Investigators would benefit from regular procedures that enable them to evaluate whether or not action is required. Although there have been several promising instances of effect-oriented approaches described. There is still plenty of potential for future growth(3–5).

1.2 Selected Topics of Chemical Water Pollution:

Some well-known classical pop artists. Two international conventions have identified and dealt with them. With the aim of assessing the Pops' worldwide presence and lowering their environmental emissions. They mostly consist of highly chlorinated substances. As well as polycyclic aromatic hydrocarbons (PAHs). These standards, however, allow for the inclusion of additional compounds to the list, since many other high-volume manufacturing chemicals may fall into the POP category. Polybrominated diphenyl ethers are a recent example of such "emerging POPs" that are being considered for inclusion. Flame retardants are widely utilized. As well as a number of perfluoroalkyl compounds. Because of their unique characteristics, they are utilized in a wide range of industrial applications. It's worth noting that many "emerging contaminants," such as certain POPs, may have been present in the environment for decades but went undetected due to analytical constraints. POPs may endanger human and animal health due to a variety of negative consequences, including disruption of the endocrine, reproductive, and immunological systems, as well as the potential to cause behavioral issues, cancer, diabetes, and thyroid disorders. In the case of developing POPs, such as PBDEs, there has been an exponential rise in concentration in human tissues by a factor of approximately 100 with a doubling time of about, which has been seen in different areas of the globe. This is, of course, the consequence of a variety of exposure routes, the majority of which are terrestrial. Marine animals in North America and northern Europe, on the other hand, are showing quite similar patterns(6–8).

1.3 Agriculture and Water Quality:

Agricultural production uses several million tons of pesticides each year to maintain and enhance crop yields by controlling fungus, weeds, insects, and other pests. Pesticides and associated agrochemicals are sold in tens of thousands of distinct commercial products, each of which

contains hundreds of different active chemical components. Because of these chemicals' toxicity to biota and people, as well as their deliberate discharge into the environment, the use of new and existing agrochemical products is strictly regulated: Country-specific registration and risk assessment processes seek to safeguard farmers and consumers as well as soil and water resources/ecosystems(9,10). Pesticide applications in nonagricultural/urban regions cause increased runoff of pesticide-containing rainfall over sealed surfaces, such as roofs and roadways, contaminating drainage and sewage systems. Reduced soil and water pollution from pesticide emissions is a crucial factor in agricultural management techniques to limit ecological changes and preserve biodiversity, according to the total environmental effects of widespread agriculture. Finally, agricultural workers have a significant risk of acute poisoning from chemical exposure. Although, in North America and Europe, the effect of this exposure route is debatable. Accidental pesticide exposure and intentional agrochemical abuse seem to be more common in developing nations. As a result, an estimated 3 million individuals have been poisoned, with as many as.unintentional fatalities each year(4,7,11).

1.4 Gelogenic Contamination Sources:

The primary source of hazardous materials leaking into drinking water supplies in certain parts of the globe is the geological makeup of aquifers. Arsenic, fluoride, selenium, and a few other elements, such as chromium and uranium, are the major sources of concern. Arsenic has produced the most severe health consequences and worldwide concern among all of these gelogenic pollutants. As a result, arsenic is used as a representative example. Arsenic-contaminated groundwater affects between and.million people in Bangladesh alone. In India's West Bengal, around a million people are at danger. Other areas of concern include Cambodia's and Vietnam's densely populated river deltas. Arsenic poisoning has been a problem in many areas during the last decade as a consequence of attempts to provide clean drinking water. Until then, take care. The majority of people in these rural regions drank untreated water from rivers and ponds, which is often contaminated with dangerous illnesses. The high mortality rate, which may reach up to. In Bangladesh alone, the number of children per year prompted large-scale initiatives to construct groundwater wells to supply clean drinking water. High weathering rates of arsenic-rich source rocks in mountain ranges, deposition of organic-rich deposits in river floodplains, and a flat and humid terrain with long water residence times in the aquifer, leading to anoxic conditions where adsorbed arsenic is released into the water, are all factors that contribute to arsenic contamination. In dry regions like the Midwest of the United States, eastern Australia, and central Asia, a second route of arsenic mobilization exists. Where high-pH conditions mobilize arsenic in oxygen-rich groundwater, the danger of arsenic contamination in groundwater has been predicted at a global scale since the chemical variables controlling arsenic mobilization are well known(12–15).

1.5 Surface Water Contamination Form Mining Operations:

Globally, mining operations mobilize more than. Metric tons of geological material each year, comparable to the flow of particles carried by rivers from continents to sea. Most mining activities cause major environmental and social issues because they produce huge waste deposits that are exposed to oxidation by air and weathering by precipitation, resulting in water contamination. Coal, lignite, construction materials, and iron mining need the greatest mass movements and produce substantial end products. Rare metal extraction, such as copper, nickel,

or gold, however, generates up to a tons of trash every kilogram of pure metal. Problematic geochemical weathering processes and particular pollutant loads, which are introduced as mining chemicals, accompany these enormous waste streams. Large percentages of sulfide material are found in ores such as coal, iron, and copper; when this material comes into contact with air and water, it oxidizes and produces sulfuric acid in the form of "acid mine drainage." Because sulfur concentrations may reach dangerously high levels. A conservative global estimate puts it at about. Acidic mining runoff has severely harmed the river kilometers bandha of the lake and reservoir region. Mitigation solutions for existing tailings, as well as better processes and safety procedures for continuing operations, are required for more sustainable mining methods. Hazardous compounds like cyanide and mercury should be substituted by less toxic extraction agents like halogens, theorem, or a zero. It is necessary to enforce the emission policy. Clear international rules should be complemented by such technological measures. In the mining sector, there is also corporate social responsibility, which is founded on open information principles. Although international accords and practice standards cannot replace developing nations' better enforcement of environmental laws, they may serve as useful benchmarks for water quality protection(10,14,16,17).

1.6 Pharmaceuticals in Wastewater and Drinking Water:

Municipal wastewater makes a major contribution to the. Fill the container with water and place it in the aquatic habitat. Pharmaceutical chemicals and personal care items are the major sources of concern. Approximately. Painkillers, antibiotics, beta blockers, contraceptives, lipid regulators, antidepressants, and other pharmaceuticals are currently utilized in Europe and the United States. In Germany, to be precise. Every year, new medicines are introduced to the market. In terms of global research and development. Expenditure. On the basis of a global R&D investment of about billion dollars, it may be estimated that on average more than. Every year, new pharmaceutical substances are introduced. The global pharmaceutical market was worth. Billion, with the United States having the greatest per capita sales of. Per capita sales in most European nations range from around (18).

1.7 Global Health Problems Related to Sanitation and Drinking Water:

The issues of sanitation, hygiene, and drinking water in developed and poor nations are fundamentally different. Maintenance and replacement of existing sanitation and water supply infrastructure are the most important jobs in high-income nations in the coming years. Improvements in sanitation and access to clean drinking water are critical in poor nations, where the majority of sewage is discharged without treatment. However, current projections indicate that the majority of the population growth will occur in emerging country cities. In, a large portion of the world's population will still be without access to public sewage systems(15,19,20).

2. DISCUSSION

Despite the fact that they are often unintentional, they are a significant source of water contamination. Oil drilling activities in the water or ships transporting oil are often the source of leaks and accidents. Toxic chemicals enter water bodies such as lakes, rivers, and seas, where they are dissolved, suspended in the water, or deposit on the bed, resulting in water pollution. The discharge of chemicals into bodies of water that render water unfit for human consumption and

disturb aquatic ecosystems lowers the quality of water. Water contamination may be caused by a variety of pollutants, including hazardous waste, pesticides, and fertilizers(21–23).

3. CONCLUSION

Fighting global water pollution requires a diverse mix of policies, technology, and scientific breakthroughs. The legacy of persistent priority pollutants such as PCBs necessitates a worldwide phase-out and regulation effort. Volatile chemicals, such as halogenated compounds or mercury, are not biodegradable and accumulate in the food chain, therefore their usage should be limited to applications in closed systems. Water, as a major commodity for agriculture, requires the same level of protection against chemicals with the potential for bioaccumulation as human food production systems. Furthermore, the precautionary principle must be used in the development of possible replacements for such priority pollutants to ensure that today's solution does not become tomorrow's issue. Global agriculture confronts the problem of increasing crop yields while also protecting the environment and the food supply chain from pollution. Improved water quality in agricultural regions necessitates better integrated farming practices. Precision agriculture is based on local factors such as soil type, terrain, irrigation, and drainage systems, and ensures that the best crop management techniques are used in the right location at the right time, lowering the danger of nutrients and pesticides being released into surface water

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