

An Analysis of Water Contamination & Related Issues

Dr. Rajan Jakhu

Assistant Professor, Basic & Applied Sciences, RIMT University, Mandi Gobindgarh, Punjab, India

Correspondence should be addressed to Dr. Rajan Jakhu; rajan@rimt.ac.in

Copyright © 2022 Made Dr. Rajan Jakhu. This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT- Water is essential for existence. It is unnecessary to emphasise how vital it is. Water pollution, on or h&, is among most severe ecological issues confronting us today. Contaminated substances move in bodies of water like ponds, streams, & oceans & are dissolved, float in water, or deposit on bed, causing water pollution. As a result, water quality worsens. This would be devastating not just for aquatic ecosystems, but toxins would also seep through & reach groundwater, possibly polluting water human use in everyday events, together with drinking. Water contamination can occur in variety of methods, severe being municipal dirt & industrialised leftover exoneration. Unintended causes of water contamination comprise contaminants entering water supply through soils or groundwater system, as well as rain.. Human farming activities, as well as illegally disposed of industrial pollutants, are found in soils & groundwater. Organic, inorganic, radioactive, & or types of pollutants exist.

KEYWORDS- Chemicals, contamination, Pollutants, wastewater, Water pollution.

I. INTRODUCTION

Despite fact that water covers 71% of earth's surface, it's among rarest merchandises, particularly in poor nations. Water is one of most in-dem& utilities in both urban & rural areas, & it is essential for man's activities. Water is plentiful across globe, but fresh drinkable it is not accessible at appropriate time or in correct location for humanoid or ecological usage, & water is without a doubt most valuable natural supply essential for life. In addition, water is found in nature in many forms & sources, including oceans, seas, rivers, etc.s. Rivers are amongst world's eldest bodies of water. Surface waterways (rivers, streams, & lakes) have most readily accessible sources of water for household uses in most urban-rural populations in emerging nations, particularly in Sub-Saharan Africa. Water from se sources is polluted with household, agrarian, & industrialised pollutants, & is prone for causing waterborne illnesses[1].

Regeneration, transport, hydro-electric power, & residential, industrialised, & marketable applications are just a few of numerous uses for water. Water is essential for all kinds of life & has an impact on our health, lifestyle, & financial well-being[2-7].

Despite fact water covering more than 3-quarters of Earth's surface, just 2.8 percent of it is suitable for human use. Roughly 1-3rd of world's population now lives in countries having modest to severe water strain, & global fresh-water ingestion increased 6 fold amongst 1900 &

1995, greater than twice rate of populace evolution. As a result, countless world parts are experiencing water insufficiency as a result of limited water resources coinciding with population growth. Although river's primary function is not to transport industrial trash, its potential to do so is heavily utilized. Rivers have significantly contaminated by pollution, making water unfit for useful uses[8].

Rivers offer a range of benefits to humans, including drinking & irrigation water, recreational possibilities, & habitat for commercially significant fisheries. increasing issue of contamination in river ecosystems has required water quality monitoring. Fresh water is limited resource that is necessary for cultivation, manufacturing, & humanoid survival; deprived of sufficient quantities & quality of fresh water, sustainable development would be impossible. Rivers are important in absorption or transport of urban & industrialised wastewater, along with runoff from agricultural l&. former is a continuous polluting non-point source, while latter is a seasonal occurrence. River water contamination with perilous trashes & leftover water has become more frequent due to fast growth in agricultural, mining, urbanization, & industry activities[9].

A. Water Pollution

When water is contaminated by anthropogenic pollutants, it is referred to as polluted water. It eir cannot be used for human purposes, like potable water, or it suffers significant reduction in capacity for sustaining biotic organisms, like fish, as result of se pollutants. Volcanoes, algae blooms, hurricanes, & earthquakes are all natural occurrences that produce significant changes in water quality & biological condition. Water adulteration is noteworthy concern all around globe[10-15]. Water resource policy must be evaluated & revised on a regular basis at all levels . It has claimed water contamination is greatest source of mortality & illness throughout globe. In 2015, water contamination was responsible for deaths of 1.8 million humans. Water contaminationis among major ecological issues that Global Oceanic Environmental Survey (GOES) believes will pose a threat to survival of life on Earth in next decades. One among major problems is water toxic waste, which kills cardiac phytoplankton, which produces 70% oxygen & removes a significant portion of carbon dioxide from atmosphere. group suggests a variety of solutions to problem, but y must be implemented within next ten years to be successful. India & China are two nations with severe water contaminationproblems. Every day, an assessed 580 persons in India die as a result of water pollution-related illnesses (including waterborne infections). In China's cities, about 90% of water is contaminated. In 2007, half

of China's population lacked access to clean drinking water. Developed nations, in addition to severe challenges of water contamination in poor countries, continue to deal with contamination issues [16].

B. Categories of water contamination

1) Surface Water Pollution

Surface water, which accounts for over 70% of earth's surface, is what fills oceans, lakes, rivers, & all or blue dots on world map. More than 60% of water provided to American households originates from freshwater surface water sources (i.e., sources other than ocean). A major chunk of that water, though, is in peril. According to the most current national water quality assessments undertaken by the United States Environmental Protection Agency, more than 50% of our rivers and streams, and more than one-third of our lakes, are filthy and unsafe for swimming, fishery, or ingesting. The most common kind of contamination in fresh water is nutrient degradation, which contains nitrates and phosphates. While these minerals are necessary for plants & animals to survive, agricultural waste & fertilizer runoff have made them a serious pollutant. Pollutants are also contributed by municipal & industrial waste discharges. There's also all the trash that businesses & people throw straight into rivers & streams [17].

2) Marine Pollution

Oceanic contamination occurs when particles, chemicals, industrialised, agrarian, & residential waste, noise, or spread of invasive species enter water & have negative consequences. Land is responsible for 80% of marine pollution. Air contamination contributes to the problem by dumping iron, carbonic acid, & dust particles into the ocean. Marine life & its ecosystems have shown to be harmed by land & air pollution. Nonpoint sources of pollution, like agrarian runoff, wind-blown debris, & dust, are common. Physical processes like biological impacts of Langmuir circulation may exacerbate contamination in vast bodies of water. Nutrient contamination is a kind of water contamination that occurs when nutrients are added in excess. Excess nutrients, typically nitrates or phosphates, promote algal development, which is a major root behind eutrophication of surface waterways. Many potentially hazardous compounds cling to small particles, which are subsequently consumed by plankton & benthic organisms, majority of which are deposit or strainer feeders. Venoms are concentrated higher within ocean food systems in this manner. Many particulates engage chemically in estuary, depleting oxygen and causing them to become cathodic. Pesticides are quickly converted by marine biota when released into the marine ecosystem. [18–20][21].

3) Groundwater Pollution

Groundwater & surface water interactions are complicated. As a result, ground-water pollution, also known as ground-water contamination, is more difficult to classify than surface water pollution. Ground-water aquifers are vulnerable to contamination from sources that do not immediately impact surface water bodies by their very nature. In certain cases, the difference between point & non-point sources may be unimportant. The type of pollutants, as well as soil properties & site geology, hydrogeology, & hydrology, may be used to analyze groundwater pollution. Natural (geogenic), on-site sanitation systems, sewage,

fertilizers, & pesticides, commercial & industrial leaks, hydraulic fracturing, & landfill leachate are all sources of groundwater contamination.

C. Sources of Water pollution

1) Point Source

Infection from a single supplier is referred to as point source toxicity. Fouling from spilling septic systems, chemical and oil spills, and improper disposal are illustrations of waste-water discharged lawfully or illegally by producer, refineries, or waste-water treatment facility, as are fouling from spilling septic systems, chemical and oil spills, and improper disposal. While point source contamination starts in a single location, it has the potential to pollute kilometers of rivers & ocean [22].

2) Nonpoint source

It denotes to contamination that comes from many distinct sources rather than a single source. This kind of contamination is often the result of tiny quantities of pollutants accumulating over a wide region. Leaching of nitrogen molecules from fertilized agricultural fields is a typical example. Non-point source contamination is sometimes mentioned as nutrient runoff in storm water from "sheet flow" across an agricultural area or a forest. Urban runoff, or contaminated storm water washed off of parking lots, roadways, & highways, is often included in the category of non-point sources. Because it is usually directed through storm drain systems & released via pipes to nearby surface waterways, this runoff constitutes a point source.

D. Contaminants

A broad range of chemicals, & physical changes like augmented temperature & bruising are among particular pollutants that cause water pollution. While many of regulated chemicals & compounds are naturally happening (calcium, salt, iron, & so on), concentration generally defines what is natural constituent of water & what is noxious waste. Natural-occurring chemicals in high quantities may have detrimental effects on aquatic vegetation & wildlife. Natural elements like plant matter (e.g. leaves & grass) & man-made compounds may both deplete oxygen levels. Turbidity (cloudiness) is caused by a variety of natural & human chemicals that block light, impair plant development, & clog gills of certain fish species. Acidity (pH change), electrical conductivity, temperature, & eutrophication are all examples of physical chemistry changes in water. Eutrophication occurs when concentration of chemical nutrients in the network rises to point ecosystem's primary production rises. Negative environmental impacts like anoxia (oxygen depletion) & significant decreases in water quality might occur, harming fish & or animal populations, depending on the degree of eutrophication.

1) Pathogens

Microorganisms that cause disease are known as pathogens. Waterborne illnesses may be spread by pathogens in both human & animal hosts. Coliform bacteria are frequently employed as a bacterial indicator of water contamination, despite the fact that they are not a source of illness. Or bacteria that have caused human health issues that have been discovered in polluted surface waters include

Burkholderia pseudomallei, etc. On-site sanitation systems (septic tanks, pit latrines) or poorly treated sewage discharges may result in high quantities of microorganisms. Sewage collecting systems (pipes, pumps, valves) in older cities with aging infrastructure may be leaky, resulting in sanitary sewer overflows. In certain places, combined sewers may release untreated sewage during rainstorms. Water bodies are also polluted by silt (sediment) from sewage discharges. Poorly managed livestock operations may also result in pathogen releases.

Organic, Inorganic & Macroscopic Contaminants:

Organic & inorganic contaminants are both possible contaminants. Many of chemical compounds are poisonous. Organic contaminants in water include: Detergents, Disinfection by-products, like chloroform, detected in chemically cleaned drinking water, Food processing waste, like oxygen-demanding chemicals, lipids, & grease, Insecticides & herbicides, as well as a vast array of organohalides & or chemical substances, Petroleum hydrocarbons from storm water runoff, including fuels & lubricants (motor oil), as well as fuel combustion byproducts, Improper storage of volatile organic chemicals, like industrial solvents, Chlorinated solvents, which are thick non-aqueous phase liquids that do not mix well with water & are denser (e.g., polychlorinated biphenyl (PCBs) & trichloroethylene), may settle to bottom of reservoirs, Perchlorate, perchlorate, perchlorate, Chemical compounds present in personal hygiene & cosmetic goods, & drug contamination including prescription medications & their metabolites, like antidepressants & hormonal medicines like contraceptive pills. These compounds may be tiny & difficult to remove without costly improvements in treatment facilities.

These compounds may be tiny & difficult to remove without costly improvements in treatment facilities. Acidity from industrial discharges (particularly sulfur dioxide from power plants), ammonia from food processing waste, & or inorganic pollutants are examples of inorganic water pollutants. Chemical waste as a by-product of industry, Nutrient-containing fertilizers, like nitrates & phosphates, which are present in agricultural, commercial, & residential storm water discharge, Heavy metals from automobiles (through urban storm water runoff) & acid mine drainage, Creosote preservative secretion into aquatic ecosystems, & Silt (sediment) in runoff from building sites, logging, slash & burn operations, or land clearance site.

Heavy metals from automobiles (through urban storm water runoff) & acid mine drainage, Creosote preservative secretion into aquatic ecosystems, & Silt (sediment) in runoff from building sites, logging, slash & burn operations, or land clearance sites Macroscopic pollution, or big visible objects contaminating water, is referred to as floatables in urban storm water & marine debris in open waters, & may include items like: Trash or garbage (e.g., paper, plastic, or food waste) thrown on ground, as well as unintentional or deliberate disposal of trash, is washed into storm drains & ultimately released into surface waterways by rainfall, Nurdles, which are tiny watery plastic pellets, Shipwrecks, huge derelict ship.

2) Temperature Change

Thermal contamination is defined as rise or fall in temperature of water body created by human activities. Thermal pollution, as opposed to chemical pollution, alters physical properties of water. Thermal contamination is frequently caused by power stations & industrial businesses using water as a coolant. Augmented water temperatures reduce oxygen levels, that could finish fish & alter composition of food chains, reduce species biodiversity, & stimulate invasion of new thermophilic species. Temperatures in surface streams may rise due to urban runoff. Thermal contamination may also be caused by release of extremely cold water from reservoir bases into warmer rivers.

E. Measurement of water contamination

Water contamination might be studied using a variety of approaches, including physical, chemical, & biological. Majority of them include sample collection followed by specialized analytical testing. Temperature, for example, may be measured in real time without need for sample. To make it easier to compare findings from different testing events, government agencies & research groups have released standardized, verified analytical test procedures. Water sampling for physical or chemical testing may be done in a variety of ways, depending on level of precision required & properties of pollutant. Many contamination occurrences are severely time-limited, most frequently in conjunction with rain events. As a result, samples are often insufficient for properly measuring contamination levels. Auto-sampler systems, which pump increments of water at a set time or discharge intervals, are often used by scientists collecting this kind of data. Biological testing necessitates rearing of plants & animals from a surface water body. Organisms may be recognized for biosurveys (population counts) & returned to water body, or they may be dissected for bioassays to evaluate contamination, depending on kind of evaluation.

F. Control of Water Pollution

Water contamination can be controlled using a variety of techniques, including:

- Municipal wastewater treatment
- On-site sanitation and safely managed sanitation
- Industrial wastewater treatment
- Agricultural wastewater treatment
- Erosion and sediment control from construction sites
- Urban runoff control (storm water).

II. LITERATURE REVIEW

Chaudhry FN et al. discussed Factors Affecting Water Contamination in which they explained how Water Contamination has now become a worldwide issue, & continuous review of water resource policy is required to address it. Water contamination causes deaths & illnesses all over globe, & about 14000 people die every day as a result of it. Water contamination is a concern in both rich & developing nations. Precipitation, climate, & human activities all have an impact on water quality. Point sources from industry & municipalities represent biggest danger to water quality. Mining, urban growth, & agriculture all have an impact on water quality. Nutrients, sediments, &

hazardous contaminants are all examples of non-point source pollution[23].

Chukwudi et al. discussed Ecological affect of Surface Water Contamination in which y explained how water is life in absence of contamination, but death in presence of pollution. goal of research is to perform evaluation of literature on ecological consequences of surface water contamination. A survey of educational journal articles, online resources, textbooks, , & publically accessible information on environmental impacts of surface water contamination was utilized to conduct this research. In aspects from both physical and chemical water toxicants that demonstrated raised value systems of large chemical parameters (lead, cadmium, chromium, copper, & some anions), all previous researchers whose writings were evaluated consented that anthropogenic made an enormous contribution more to surface water contamination& spatial heterogeneity of physico - chemical parameters over time & placement than or source materials. They were also unanimous in ir belief that parameters had negative impacts on humans, plants, & aquatic & physical environment. Based on findings of previous studies, It determines that majorly surface waters around world are contaminated & be cured before being used for household or industrialised purposes to prevent binge of epidemics that can result in deaths of humans, most valuable of creatures[24].

Thomas B. Hofstetter et al. discussed Global Water Contamination& Human Health in which y discussed how Water quality matters are key concern for humanity 21 century. Here, paper focuses on sorts of aquatic contaminants, ir effects on human fitness, & ways to keep fresh-water resources clean. Chemical contamiuation, particularly inorganic & organic micropollutants like contaminated metals & metalloids, along with a wide spectrum of syntic chemical compounds, is highlighted. Some aspects of waterborne infections are also discussed, along with critical need for improved sanitation in developing countries. research focuses at current scientific advances in coping with a variety of pollutants. It is organised into parts depending on many chronological & geographical elements of global water pollution.[25].

III. DISCUSSION

Sewage & or waste, industrialised overflows, agrarian discharge, & industrialised waste from chemical companies, fossil fuel facilities, & nuclear power plants are main sources of water contamination. y contribute to a broader issue of water pollution, making water unfit for drinking, agriculture, & aquatic life. Greater than 2.6 billion human, or 40% of world's populace, lack access to basic cleanliness, & over one billion people still consume contaminated water. Thous&s of children die every day as a consequence of diarrhoea & or water, sanitation, & hygiene-related illnesses, & more agonize & are debilitated by sickness. Human activities, like industrialization & agricultural practices, have contributed significantly to environmental deterioration & pollution, which has a negative impact on water bodies (rivers & oceans), which are essential for life. This article attempts to define water contamination& to address causes, effects, control, & overall management of water pollution.

IV. CONCLUSION

When hazardous chemicals infiltrate a stream, river, lake, ocean, aquifer, or or body of water, water quality degrades & water becomes contaminated to people or environment. Water is one of most in-dem& utilities in both urban & rural areas, & it is essential for man's activities. Water is plentiful across globe, but fresh drinkable it is not accessible at appropriate time or in correct location for humanoid or ecological usage, & water is without a doubt most valuable natural supply essential for life. In addition, water is found in nature in many forms & sources, including oceans, seas, rivers, etc.s. Rivers are amongst world's eldest bodies of water. Because y can't be traced back to a specific place, non-point sources are more difficult to detect. Non-point sources include runoff from farms, fields, construction sites, & mines, which includes silt, fertilizer, pesticides, & animal feces. If chemicals leak from l&fill into water sources, l&fills may be a non-point source of pollution.

REFERENCES

- [1] Mateo-Sagasta J, Zadeh SM, Turrall H. Water contaminationfrom agriculture: A global review. Exec Summ. 2017;
- [2] Bassem SM. Water contaminationand aquatic biodiversity. Biodivers Int J Rev. 2020;
- [3] Ji M, Liu Z, Sun K, Li Z, Fan X, Li Q. Bacteriophages in water contaminationcontrol: Advantages and limitations. Front Environ Sci Eng. 2021;
- [4] Afroz R, Masud MM, Akhtar R, Duasa JB. Water pollution: Challenges and future direction for water resource management policies in malaysia. Environ Urban ASIA. 2014;
- [5] Wang Q, Yang Z. Industrial water pollution, water environment treatment, and health risks in China. Environ Pollut. 2016;
- [6] Meng X, Xu C, Liu X, Bai J, Zheng W, Chang H, et al. An ontology-underpinned emergency response system for water contaminationaccidents. Sustain. 2018;
- [7] Xiao L, Liu J, Ge J. Dynamic game in agriculture and industry cross-sectoral water contaminationgovernance in developing countries. Agric Water Manag. 2021;
- [8] Pandey S. Water contaminationand health. Kathmandu University Medical Journal. 2006.
- [9] Singh Mann U, Dhingra A, Singh J. Water Pollution: Causes, Effects and Remedies. Int J Adv Technol Eng Sci www.ijates.com. 2014;
- [10] Dwivedi S, Shikha D. Water pollution: Causes, effects and control. Biochem Cell Arch. 2016;
- [11] Han D, Currell MJ, Cao G. Deep challenges for China's war on water pollution. Environmental Pollution. 2016.
- [12] Ridzuan S. Inequality and water contaminationin India. Water Policy. 2021;
- [13] Hasan MK, Shahriar A, Jim KU. Water contaminationin Bangladesh and its impact on public health. Heliyon. 2019;
- [14] Quesada HB, Baptista ATA, Cusioli LF, Seibert D, de Oliveira Bezerra C, Bergamasco R. Surface water contaminationby pharmaceuticals and an alternative of removal by low-cost adsorbents: A review. Chemosphere. 2019.
- [15] Li H, Cao Y, Su L. Multi-dimensional dynamic fuzzy monitoring model for the effect of water contaminationtreatment. Environ Monit Assess. 2019;
- [16] Bowen HJM. Water pollution. EDUCHEM. 1975;
- [17] Maulin P S. Waste Water Pollution. J Appl Biotechnol Bioeng. 2017;

- [18] Wang Y, Wei H, Wang Y, Peng C, Dai J. Chinese industrial water contamination and the prevention trends: An assessment based on environmental complaint reporting system (ECRS). Alexandria Eng J. 2021;
- [19] Bashar T, Fung IWH. Water contamination in a densely populated megapolis, Dhaka. Water (Switzerland). 2020;
- [20] Hossain M, Patra PK. Water contamination index – A new integrated approach to rank water quality. Ecol Indic. 2020;
- [21] Pawari MJ, Gawande S. Ground Water Contamination & Its Consequences. Int J Eng Res Gen Sci. 2015;
- [22] Owa FD. Water pollution: Sources, effects, control and management. Mediterr J Soc Sci. 2013;
- [23] FN C, MF M. Factors Affecting Water Pollution: A Review. J Ecosyst Ecography. 2017;07(01):1–3.
- [24] P.U. I, C.C. C, F.C. I, I.F. F, C.A. O. A Review of Environmental Effects of Surface Water Pollution. Int J Adv Eng Res Sci. 2017;4(12):128–37.
- [25] Schwarzenbach RP, Egli T, Hofstetter TB, Von Gunten U, Wehrli B. Global water contamination and human health. Annu Rev Environ Resour. 2010;35:109–36.