

An Overview on Water Pollution

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ABSTRACT: *Water is necessary for survival. It is not necessary to state how critical it is. Water contamination, on the other hand, is one of the most severe environmental challenges we face today. 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. Water quality suffers as a result of this. Not only would this be disastrous for aquatic ecosystems, but the contaminants will also seep through and reach groundwater, potentially contaminating the water we use in our everyday activities, including drinking. Water pollution may occur in a variety of ways, with municipal sewage and industrial waste discharge being one of the most damaging. Contaminants that reach the water supply via soils or groundwater systems, as well as rain, are examples of indirect causes of water contamination. Human farming activities, as well as illegally disposed of industrial pollutants, are found in soils and groundwater. Organic, inorganic, radioactive, and other types of pollutants exist.*

KEYWORDS: *Ecosystem, Environment, Nutrients, Water, Water Pollution.*

1. INTRODUCTION

Our existence on our planet is dependent on three fundamental resources: water, air, and soil, which are three of nature's most precious gifts to humanity. Water is the most essential component, since it is the primary channel for the emergence of life. Between 1900 and 1995, water demand increased six fold, more than twice the pace of population expansion. The United Nations Conference on the Human Environment, held in Stockholm in June 1972, was the first major attempt to take notice of the environmental problem on a worldwide scale. Following that, environmental, sustainability, and Earth's carrying capacity have been the major themes of policymaking all over the world [1]. When water is contaminated by anthropogenic pollutants, it is referred to as polluted water. It either cannot be used for human purposes, such as drinking water, or it suffers a significant reduction in its capacity to sustain biotic organisms, such as fish, as a result of these pollutants. Volcanoes, algae blooms, hurricanes, and earthquakes are all natural occurrences that produce significant changes in water quality and biological condition [2].

Water contamination is a significant issue all around the world. It necessitates continuous review and modification of water resource policies at all levels (from the world to individual aquifers and wells). Water contamination is thought to be the biggest cause of mortality and illness in the globe. In 2015, 1.8 million people died as a result of water contamination (Staff, 2017). Water pollution, according to the Global Oceanic Environmental Survey (GOES), is one of the most serious environmental issues that may jeopardize life on Earth in the next decades. One of the major problems is water pollution, which kills cardiac phytoplankton, which produces 70% of oxygen and removes a significant portion of carbon dioxide from the atmosphere. The group suggests a variety of solutions to the problem, but they must be implemented within the next ten years to be successful. India and China are two nations with serious water pollution problems[3]. Every day, about 580 persons in India die as a result of water pollution-related illnesses (including waterborne infections). In China's cities, about 90% of the water is contaminated. In 2007, half of China's population lacked access to clean drinking water. Developed nations, in addition to the severe challenges of water contamination in poor countries, continue to face pollution issues.

1.1 Water Pollution Types:

1.1.1 Surface Water Pollution:

Surface water, which makes up approximately 70% of the earth's surface, is what fills our oceans, lakes, rivers, and all the other blue spots on the globe map. More over 60% of the water supplied to American households comes from surface water from freshwater sources (i.e., sources other than the ocean).

However, a large portion of that water is in jeopardy. According to the EPA's most current national water quality assessments, almost half of our rivers and streams, as well as more than a third of our lakes, are contaminated and unsafe for swimming, fishing, or drinking [4]. The most common form of contamination in these freshwater sources is nutrient pollution, which includes nitrates and phosphates. While plants and animals need these minerals to thrive, agricultural waste and fertilizer runoff have made them a significant contaminant. Municipal and industrial waste discharges also contribute a significant amount of pollutants. There's also all the trash that businesses and people throw into rivers.

1.1.2 Marine Pollution:

Marine pollution occurs when chemicals, particles, industrial, agricultural, and residential waste, noise, or the spread of invasive species enter the water and have negative consequences. Land is responsible for 80% of marine pollution. Air pollution contributes to ocean contamination by transporting iron, carbonic acid, nitrogen, silicon, sulfur, pesticides, and dust particles. Marine life and its ecosystems have been shown to be harmed by land and air pollution. Nonpoint sources of pollution, such as agricultural runoff, wind-blown debris, and dust, are common. Physical processes such as the biological impacts of Langmuir circulation may exacerbate pollution in vast bodies of water [5]. Nutrient pollution is a kind of water pollution that occurs when nutrients are added in excess. Excess nutrients, typically nitrates or phosphates, promote algal development, which is a major cause of eutrophication of surface waterways. Many potentially hazardous compounds cling to small particles, which are subsequently consumed by plankton and benthic organisms, the majority of which are deposit or filter feeders. Toxins are concentrated higher within ocean food systems in this manner. Many particles interact chemically in a way that depletes oxygen, producing anoxia in estuaries. When pesticides are introduced to the marine environment, they are rapidly absorbed by the food webs. Once these pesticides enter food webs, they may induce mutations and illnesses that are detrimental to people as well as the whole food chain. Toxic metals may also be introduced into the food webs of marine animals. Tissue matter, biochemistry, behavior, reproduction, and growth in marine life may all be affected.

1.1.3 Ground water Pollution:

Groundwater-surface water interactions are complicated. As a result, groundwater pollution, also known as groundwater contamination, is more difficult to categorize than surface water pollution. Groundwater aquifers are vulnerable to pollution from sources that do not immediately impact surface water bodies by their very nature. In certain cases, the difference between point and non-point sources may be unimportant[6]. The type of the pollutants, as well as soil properties and site geology, hydrogeology, and hydrology, may be used to analyze groundwater pollution. Natural (geogenic), on-site sanitation systems, sewage, fertilizers and pesticides, commercial and industrial leaks, hydraulic fracturing, and landfill leachate are all sources of groundwater contamination.

1.2 Categories of Water Pollution:

1.2.1 Point Source:

Point source pollution occurs when contamination comes from a single source. Contamination from leaking septic systems, chemical and oil spills, and illegal dumping are examples of wastewater discharged legally or illegally by a manufacturer, oil refinery, or wastewater treatment facility, as well as contamination from leaking septic systems, chemical and oil spills, and illegal dumping. While point source pollution starts in a single location, it has the potential to pollute kilometers of rivers and the ocean.

1.2.2 Non-Point Source:

Nonpoint source pollution refers 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. The leaching of nitrogen molecules from fertilized agricultural fields is a typical example. Non-point source pollution 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, and highways, is often classified as a non-point source. Because it is

usually directed through storm drain systems and released via pipes to nearby surface waterways, this runoff constitutes a point source.

1.3 *Measurement:*

Water contamination may be studied using a variety of approaches, including physical, chemical, and biological. The majority of them include sample collection followed by specialized analytical testing. Temperature, for example, may be measured in real time without the need for sample. To make it easier to compare findings from different testing events, government agencies and 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 the level of precision required and the properties of the pollutant. Many contamination occurrences are time-limited, most often in conjunction with rain events. As a result, grab samples are often insufficient for properly measuring contamination levels. Auto-sampler systems, which pump increments of water at either time or discharge intervals, are often used by scientists collecting this kind of data.

Plants and animals are collected from the surface water body during sampling for biological testing. The organisms may be recognized for bio surveys (population counts) and returned to the water body, or they may be dissected for bioassays to evaluate toxicity, depending on the kind of evaluation.

Temperature, solids content, and turbidity are all common physical measurements of water. Analytical chemistry concepts may be used to analyze water samples. For both organic and inorganic substances, there are many published test techniques. pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), nutrients (nitrate and phosphate compounds), metals (including copper, zinc, cadmium, lead, and mercury), oil and grease, total petroleum hydrocarbons (TPH), and pesticides are all often used techniques. The use of plant, animal, or microbial indicators to evaluate the health of an aquatic environment is known as biological testing. They're any biological species or collection of species whose function, population, or condition may indicate the state of an ecosystem or the environment. Copepods and other tiny water crustaceans, which are found in many water bodies, are an example of a group of bio-indicators. Changes (biochemical, physiological, or behavioral) in these species may be tracked to see whether they signal a problem in their environment[7].

1.4 *Water Pollution and its effects:*

According to Shieh et al., water chemistry influences fish dispersion in waterbodies (1999). Pritchard investigated the multidimensional effects of pollution on the environment (1985). Stevenson investigated the health effects of bathing water quality (1953). Manawar investigated the impact of pollution on *Euglena* (1972). Guilizzoni (1991) investigated the effects of heavy metals on submerged macrophytes, while Pamela and Stokes investigated the effects of acidification on aquatic species (1986). Heavy metals settle in polluted water sediments. Smith has called attention to pollutant concentrations in sediments (2001). According to several estimates, water contamination is responsible for 80% of all deaths. The presence of heavy metals in cereals, vegetables, fruit, and milk has shown that nothing in our cosmos has stayed pure. Heavy metals, which are linked to a slew of poorly understood illnesses, should be handled with caution.

1.5 Water Pollution Control:

Several Techniques to control water pollution is shown in Figure 1.

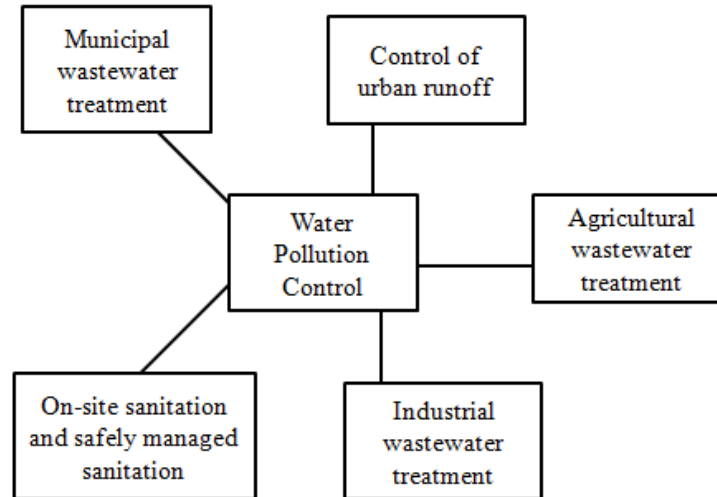


Figure 1: Illustrates some techniques to control water pollution

2. LITERATURE REVIEW

Rene P. Schwarzenbach et al. discussed about Global Water Pollution[8]. 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 micropollutants 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. For more than five decades, persistent organic pollutants (POPs) have had an impact on global water systems; throughout that period, geogenic pollutants, mining activities, and hazardous waste sites were the most significant causes of lengthy local and regional water pollution. On a regional to local scale, agro - chemicals as well as waste-water sources have a shorter-term impact.

Igwe, P.U. et al. discussed a review on the effects of water Pollution[9]. Water is life when it is not contaminated, but death when it is. The goal of this research is to perform a review of the literature on the environmental consequences of surface water contamination. A survey of scholarly journal articles, online resources, textbooks, bulletins, conference papers, project reports, and publically accessible information on the environmental impacts of surface water contamination was utilized for this research. In terms of both chemical and physical water pollutants, all previous authors whose works were reviewed agreed that anthropogenic activities contributed significantly more to surface water pollution and spatial variation of physicochemical parameters over time and location than other options in terms of both physical and chemical water pollutants that indicated elevated values of major chemical parameters (lead, cadmium, chromium, copper, and some anions) than other sources in terms of both physical and chemical water contaminants that indicated increased values of major chemical parameters (lead, They were also unanimous in their belief that the criteria had negative consequences for humans, plants, and the aquatic and physical environment. Based on the findings of earlier research, this study finds that most surface waters throughout the world are contaminated and must be cleaned before being used for both household and industrial reasons to prevent the spread of diseases that may kill humans, the most valuable of all animals.

Anil K Dwivedi discussed a review on Water Pollution researches[10]. More than 70% of our country's pure water in liquid form has been rendered unsuitable for human use. Other nations, in addition to India, are dealing with the same issue. This has been well described in this article with the aid of a large number of sources. Various pollution sources, such as sewage discharge, industrial effluents, and agricultural runoff, have all been examined extensively. Various specified criteria for various types of inland water have been discussed. The possibility and extent of different components that contaminate the water are also discussed in the article. Finally, the impact of water contamination has been summarized.

3. DISCUSSION

Our existence on our planet is dependent on three fundamental resources: water, air, and soil, which are three of nature's most precious gifts to humanity. Water is very important to every living being. But 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. Water quality suffers as a result of this. This paper discussed about Water pollution, categories and types of water pollution, Measurement and Control of Water Pollution. Reduce your usage of plastic and reuse or recycle it wherever possible, Keep chemical cleansers, oils, and non-biodegradable materials out of the drain by properly disposing of them, Maintain your vehicle to avoid oil, antifreeze, or coolant leaks, Consider landscaping that minimizes runoff and avoid using pesticides and herbicides if you have a yard, Pick up your dog's feces if you have one are some of the things that people can do to help in reducing Water pollution.

4. CONCLUSION

When hazardous chemicals infiltrate a stream, river, lake, ocean, aquifer, or other body of water, the water quality deteriorates and the water becomes toxic to people or the environment. Water contamination is caused by two types of sources: point sources as well as non-point sources. Factories, wastewater treatment plants, septic systems, and other sources that discharge contaminants into water sources are considered point sources. Because they 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, and mines, which includes silt, fertilizer, pesticides, and animal feces. If chemicals leak from landfills into water sources, they may be a non-point source of pollution. Water pollution depletes vital food supplies and contaminates drinking water with pollutants that may damage human health in the short and long term. Aquatic ecosystems are often harmed by water pollution. These high quantities of harmful substances are subsequently ingested by creatures that feed on these aquatic animals.

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