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The Analysis of Factors Affecting Water Pollution

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ABSTRACT- Water is life without pollution, but death when it is polluted. Water pollution is very important problem of 21st century. More than 70% of the fresh water in liquid form of our country is converted into being unfit for consumption. Not only India, but other countries are also suffering from the same problem. Water is a natural resource which is considered as a superb solvent and a critical component that make the processes of life possible. It is used in many ways from drinking to industrial and agricultural purposes. Due to water pollution pure water is becoming less scare day by day. The objective of this study is to conduct a literature review of factors affecting water pollution. Suitability of water for various uses depends on biological and physico-chemical properties of water (pH, alkalinity, TDS, DO, BOD, salinity, turbidity, heavy metals, anions measurements etc.), which are used to quantify the quality of water. The biggest cause of water pollution is industrialization and increase in population. By drinking polluted water people becoming more and more ill. Water is said to be polluted when it contains micro-organisms of human or animal origin, poisonous chemical substances, industrial or domestic sewage, agricultural chemicals, organic and inorganic substances etc.

Keywords - Consumption, Critical, Scare, Turbidity, Physico-Chemical.

INTRODUCTION

Our survival on Earth depends on three basic resources – water, air and soil, nature's three valuable gifts to mankind. Among which water is the most important component as it forms the basic medium for origin of life. Life on earth was established and has been sustained due to one very essential resource, water. Water plays a considerable role in every aspect of our lives-from being the integral part of our bodies to having colossal importance in many operations. Water is the most important natural and vital source for the survival of life on the earth. Water occupies about 71% of the earth's surface and yet it is one of the scarcest commodities especially in the developing countries of the world (Karikari and Ansa, 2006). It is a well-known fact that fresh water is an important necessity for our health. Rivers provide a variety of services for human populations, including water for drinking and irrigation, recreational opportunities, and habitat for economically important fisheries (Leroy, 2002). The growing problem of pollution of river ecosystem has necessitated the monitoring of water quality (Ravindra, 2003). Fresh water is a finite resource, essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible (Kumar, 2007).

Fresh water is a resource that has many uses, including drinking, irrigation recreation, transportation, hydroelectric power and domestic, industrial, commercial uses, and habitat for economically important animals. Water is said to be pure when it is colorless, free from turbidity and abnormal taste and smell. Water

is said to be polluted when it contains micro-organisms of human or animal origin, poisonous chemical substances, industrial or domestic sewage, organic and inorganic substances. Water pollution is the contamination of natural water bodies (like lakes, rivers, oceans, and groundwater) by chemical, physical, radioactive or pathogenic microbial substances that change in the quality of water that has a harmful effect on any living thing that drinks or uses or lives (in) it. Rivers play a major role in assimilation or carrying off of municipal and industrial wastewater and runoff from agricultural land, the former constitutes of constant polluting non- point sources whereas the later is a seasonal phenomenon (Muduli and Panda, 2010). With the rapid development in agriculture, mining, urbanization, and industrialization activities, the river water contamination with hazardous wastes and wastewater is becoming a common phenomenon (Ali, 2012). They also stated that water is one of the most demanded of all urban and rural amenities and it is indispensable for man's activities.

The most common source of drinking water for the rural people is groundwater **7**. Groundwater gets polluted as a result of human activities including extensive use of pesticides, herbicides, fertilizers, leaking fuel, chemical tanks, industrial chemical spills, drainage of house hold chemicals and badly managed landfills etc. About 1.2 billion people in the world do not have safe, potable and affordable water for their domestic use. Diseases: cholera, diarrhea, dysentery, hepatitis A, etc. are directly linked to the unhygienic and contaminated potable water. It is estimated that each year more than 8,42,000 people die from diarrhea globally. . Oketola, Adekolurejo and Osibanjo (2010) noted that water is abundant on the planet Earth as a whole, but fresh potable water is not always available at the right time or the right place for human or ecosystem use and water is undoubtedly the most precious natural resource vital to life. Furthermore, they opined that water is distributed in nature as surface and ground water in different forms and sources which are oceans, seas, rivers, streams, lakes, ponds, wells, boreholes and springs. Rivers are among the oldest water bodies in the world (Higler, 2012). He also noted that in most urban-rural communities in the developing countries especially the Sub- Saharan Africa, surface waters (rivers, streams, and lakes) have been the most available sources of water used for domestic purposes. The water from these sources is contaminated with domestic, agricultural, and industrial wastes and is likely to cause water related diseases (Ojekunle, 2012; Ayeni, 2014). Deaths and diseases are caused worldwide due to water pollution and approximately 14000 people die every day due to water pollution. Both developed as well as developing countries are facing water pollution problems. Water quality is influenced by many factors like precipitation, climate, soil type, vegetation, geology, flow conditions, ground water and human activities. The greatest threat to water quality is posed by point sources of industries and municipalities. Activities like mining, Urban development and Agriculture also effect water quality. Non-point source pollution also includes nutrients, sediments and toxic contaminants. Due to industrialization and urbanization, it is becoming more polluted and risk of this polluted water consumption and its sanitation problem is increasing day to day in most of the developing countries. This growing problem of water scarcity has significant negative influence on economic development, human livelihoods, and environmental quality throughout the world. Hence it has become an essential need for today's environment to protect water from getting polluted or to develop cost effective remedial method for its protection. Contaminated water causes problems to health and leads to waterborne diseases. Rapu (2003) reported that in South Africa, over 15% of rural dwellers depend on polluted river waters for their domestic needs. Khalil (2005) claimed that over 70% of people in Sudan get their water supply from surface waters, which in most cases are polluted by agricultural chemicals and industrial effluents. Shuaib (2007) was of the opinion that over 40% of Nigerians depend on either polluted surface waters or wells for their domestic activities. He also argued that the constant use of heavily polluted water for a long time usually results in health problems. Researchers in different parts of the world have reported health problems associated with prolong time use of polluted river water, which range

from dysentery, diarrhea, abortion, premature birth, viral hepatitis and gastric and duodenal ulcers amongst others (Oguzie and Okhagbuzo, 2010; Purnamitta, 2011). Demand of water rose six-fold between 1900 and 1995, more than double the rate of population growth (Postel, 1997). The first serious effort to take note of the environmental issue at the global level was at U.N. Conference held at Stockholm in June 1972, which was projected towards human environment. Thereafter the concepts like environment, sustainability and carrying capacity of Earth have become the central theme of policy making round the globe (Gupta, 2001).

Pollutants- It is a substance which when introduced into environment causes undesirable effects or spoils resources. Biodegradable pollutants only cause short term damage. Some pollutants like DDT again produce pollutants upon degradation like DDD and DDE. Pollutants may be of different types and having different properties like Stock pollutants which include non-biodegradable plastics, synthetic chemical and heavy metals have no or very little absorptive capacity. These pollutants accumulate in environment with the passage of time. Their damage increases as their quantity increases. For future generations stock pollutants are burdens. Similarly Fund pollutants have some absorptive property in environment. They only cause problem when their quantity increases beyond environment absorbance capacity. E.g., Carbon dioxide only causes problem when its amount increases. These pollutants can only be diluted to reduce their toxicity or recycled into non harmful substances.

Point Source Pollution- When source of water pollution is known or pollutants that are entering into water are from identifiable source like ditch, pipe industry, storm drain and sewage treatment plants etc. pollution is known as point source pollution. It can be distinguished from other pollution sources.

Non-Point Source Pollution- When source of water pollution is not known or pollution does not come from single discrete source pollution is known as non-point source pollution. It is very difficult to control and may come from different sources like pesticides, fertilizers industrial wastes etc. Non-point source pollution is the main and leading cause of water pollution in USA.

Ground Water Pollution- Presently the annual requirement of water globally is around 6000 to 7000 Km^3. When pollutants which are present on ground enter the water bodies under earth they cause ground water pollution. When fecal water containing pathogens reaches under earth it makes it unfit for drinking. Pathogen polluted ground water may contain viruses, protozoa and bacteria and rarely in some cases helminth eggs. Consumption of this water causes diseases like diarrhoea and cholera. Similarly nitrates also causes ground water pollution causing disease in children called blue baby syndrome in rural population of Bulgaria and Romania. It is observed that when nitrates concentration exceeds above 10 mg/L (10 ppm) in ground water chances of blue baby syndrome increases. Excessive use of nitrate fertilizers can also cause water pollution because very small amount of nitrates is utilized by plants most of it accumulates in soil which later on reaches to ground water by leaching and contaminate it. Ground water polluted with high levels of fluoride causes dental and skeletal problems. Thus, it becomes the need to use the water in much planned way and also, recycling of the water must also be considered.

Urban Storm Water Runoff- It is due to highly populated cities. It comes from homes and office places. In suburban and urban areas pavement and buildings covers much of land surface so whenever there is snow melt or rain the water does not soak into ground. This storm water carries much type of pollutants like dirt, oil, lawn fertilizers and chemicals directly to rivers and streams where they cause water pollution. In the case of natural landscape these pollutants are trapped into pores soil and water is filtered but in cities as water is not able to soak into ground so it wash away all of these pollutant's into water bodies thus polluting them. Moreover this storm water has high speed of flowing which erodes more sediment from embankments of water bodies thus causing water pollution.

Agricultural Pollutants- As in rural areas population is less so it mostly contains fertilizers, pesticides and eroded soil and these pollutants reach to water bodies through runoff after rain and flood. Agricultural runoff cases fresh water body's eutrophication. Half of lakes in US are eutrophic. Phosphate is the main contributor to eutrophication its high concentration promotes Cyanobacteria and Algae growth which ultimately reduces dissolved oxygen in water. Harmful toxins which accumulate in food chain are produced by cyanobacterial blooms. Nitrogen rich fertilizer compounds causes dissolved oxygen deficiency in rivers, lakes and coastal zones which have devastating effects on oceanic fauna. In America and Northwest Europe nitrogen fertilizer use is controlled from 2006. Nitrogen fertilizers have high water solubility and increased runoff and leaching rate which results in ground water pollution. Similarly pesticides are used to control pests these pesticides leaches to ground water thus polluting ground water. Water soluble pesticides leach more. Sandy soil also favours leaching . Selenium (Se) is a heavy metal that occurs naturally in soil but due
to irrigation practices it accumulates in the soil. This accumulated selenium reaches to water reservoirs and is very toxic for animals and humans.

Atmospheric Pollutants- It is due to small particles which are present in air which it reaches to water bodies through rain. It includes carbon dioxide which produced by burning of fossil fuels its quantity is increasing which it combines with water molecules its forms sulphuric acid. Sulphur dioxide produced from volcanoes and industries also combines with water molecules to form sulphuric acid. Sulphur dioxide is also produced by combustion of coal and petroleum products. Similarly Nitrogen dioxide also combines with water to form nitric acid. Particulates also play very important role in effecting water pollution these particulates reach to water bodies through rain.

River Water Pollution- Most of the Indian rivers and their tributaries viz., Ganges, Yamuna, Godavari, Krishna, Sone, Cauvery Damodar and Brahmaputra are reported to be grossly polluted due to discharge of untreated sewage disposal and industrial effluents directly into the rivers. These wastes usually contain a wide variety of organic and inorganic pollutants including solvents, oils, grease, plastics, plasticizers, phenols, heavy metals, pesticides and suspended solids. The indiscriminate dumping and release of wastes containing the above mentioned hazardous substances into rivers might lead to environmental disturbance which could be considered as a potential source of stress to biotic community. As for example, River Ganges alone receives sewage of 29 Class I cities situated on its banks and the industrial effluents of about 300 small, medium, and big industrial units throughout its whole course of approximately 2525 km. Identically Yamuna is another major river, has also been threatened with pollution in Delhi and Ghaziabad area. Approximately 515,000 kilolitres of sewage waste water is reported to be discharged in the river Yamuna daily. In addition, there arc about 1,500 medium and small Industrial units which also contribute huge amounts of untreated or partially treated effluent to the river Yamuna every day. Similarly many other rivers were surveyed during past two decades with respect to their pollutional status. In addition to domestic and industrial discharge into the rivers, there were continued surface run off of agricultural areas, mines and even from cremation on the river banks. According to a report, over 32 thousand dead bodies were cremated at the major burning Ghats per year in Varanasi alone in the year 1984.

Pesticides- Pesticide used against insects. They include ovicides and larvicides used against the eggs and larvae of insects respectively. Pesticides are used in agriculture, medicine, industry and the household. The use of Pesticides is believed to be one of the major factors behind the increase in agricultural productivity in the 20th century. Nearly all Pesticides have the potential to significantly alter ecosystems; many are toxic to humans; and others are concentrated in the food chain. Pesticides applied to crops and in urban areas do not degrade immediately but they break down after a certain period of time. Some of these pesticides are very persistent like organochlorines and remain in the environment for long periods (upto several years). Persistence is a good

quality for some pesticides because it means that it remains effective in killing pests for a long time. However, this attribute means that pesticides remain around long enough to enter water sources under some conditions and keep causing toxicity on aquatic organisms for longer durations. Pesticides from the sites of application reach to different water bodies by rainfall and irrigation as they can wash pesticides from areas of application. These pesticides can bioaccumulate in invertebrates and fish species and pass through the food chain to birds, mammals, and finally even to humans.

Herbicides- The extent to which a plant suffers from the effects of a herbicide ranges from extremely little to the plant being highly sensitive, resulting in overall plant death. This range of susceptibility is often referred to as "selectivity". In other words, given herbicides will harm some plant but not others. Some herbicides are referred to as "non-selective" in that they are hazardous to most forms of plant life if applied at dosages recommended for weed control. However, herbicides, work by affecting inherent processes to plants, not mammals or insects. This is the reason for their relatively low order of mammalian toxicity. The persistence of some herbicides can be looked upon as either a detriment or advantage. Obviously, the longer these materials remain active in the soil, the less appealing they are environmentally. Different herbicides vary widely in their potential to enter water supplies. Some herbicides are water soluble enough to enter into solution with rainfall or irrigation water. Their final destination is highly dependent upon the conditions under which they are applied. They can leach downward or move with the erosion of soil particles if applied to a relatively bare soil surface. The extent to which either of these events occurs depends upon several physical and chemical properties of both the soil and the herbicide.

Chemical Pollutant- It comes from waste of harmful chemicals factories it is a material which is left as a by-product during manufacturing process and it also plays a big role in polluting water bodies. Hazardous chemical waste may be in solid, liquid or in gaseous form. The characteristics which make material hazardous are corrosively, Ignitability, toxicity and reactivity. It started with the start of industrial revolution. Industrial waste chemicals can only be treated by using special waste treatment plants they cannot be treated by sewage treatment plants.

Sediment Pollution- Sedimentation due to runoff effects water quality. It decreases the capacity of streams, ditches, navigation channels and rivers. It decreases the penetration of light into water due to which due to under water flora is disturbed. So the fishes and other fauna feeding on that flora are also disturbed and whole food chain is disturbed. Pollutants like pesticides and phosphorus are transported and accumulated due to sedimentation. Sediment particles also attach to fish gills so fishes feel difficulty to respire in this way they causes fish death. Similarly sediments carry dangerous chemicals like pesticides and petroleum products to water bodies thus polluting them.

CONCLUSION

In light of the above study we come to the conclusion that the level of water pollution have reached to the alarming stage. The quality of water in most part of the world has degraded, though the situation in India is more severe. Indian philosophers believe that "thought of a person depends on the type of food and water to which he is fed". Water is a key substance in all natural and human activities. Current misuse of water coupled with growing population size, industrialization, change in climate, and urbanization has increased the shrink in cleaning the water reserve. An access of getting pure water remains a problem especially for people who live in developing countries. Water is polluted by many factors among which industrial wastes are the most important. Beside industrial wastes other factors include herbicides, pesticides and atmospheric pollutants. The whole ecosystem of water bodies is disturbing due to water pollution. The best way to reduce contamination (and the harm it causes) in our environment is for all of us to do our part to use safer, non-chemical pest control

(including weed control) methods. In order to control water pollution by other elements such as sewage or industrial wastes, the effluents should not be allowed to dump into water reservoirs without proper pretreatment. Further, the constant monitoring and analysis of water by appropriate agencies is essential to avoid any kind of water contamination.

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