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Water Pollution And Its Effects: A Glimpse

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Abstract:

The quality of water generally refers to the component of water present at the optimum level for suitable growth of plants and animals. Aquatic organisms need a healthy environment to live and adequate nutrients for their growth; the productivity depends on the physico-chemical characteristics of the water body. The maximum productivity can be obtained only when the physical and chemical parameters are present at optimum level. Water for human consumption must be free from organisms and chemical substances and such large concentrations may affect health. In this article, water pollution and its effects has been discussed.

Keywords: Water, Pollution, Effects, Health.

INTRODUCTION:

"According to WHO, water pollution is the inclusion of any foreign material either from natural or other sources into a water body, thereby changing the natural qualities of water and making it unusable for its intended purpose".

Early human used natural resources to satisfy their needs for air, water, food and shelter. These natural resources were readily available in the biosphere. Water is the most important chemical compound for the perpetuation of life on this planet. Nearly 2/3 portion of this planet is occupied by water. It is present in three physical forms i.e. solid, liquid and gaseous. It has many unique properties. It finds extensive use in the field of

agriculture, hydroelectric power generation and air conditioning (Prasad and Patil, 2008).

WATER POLLUTION AND ITS EFFECTS:

Lakes, rivers and streams are the sources of drinking water, irrigation, fishery and energy production (Iscen et al., 2008). Almost all the freshwater bodies are being polluted by expanding human population and in consequence, industrialization, intensive agricultural practices and discharges of massive amount of wastewater which result in deterioration of water quality. The main pollutants that pose to natural water quality problems are organic wastes, bacteria, nutrients and other chemical substances. There is an intricate relationship between the external and internal factors in aquatic environments. The physico -chemical parameters have major influences on biochemical reactions that occur within the water. Sudden changes of these parameters may be indicative of changing conditions in the water.(Iena and Maneemegalai, 2015)

The physical and chemical parameters exert their influence both, individually and collectively and their interaction creates a biotic environment, which ultimately conditions the origin, development and finally succession of the biotic communities (Salaskar and Yeragi, 1997). The pollution of water is increased due to human population, industrialization, the use of fertilizers in agriculture and man-made activity. Parameters such as temperature, turbidity, nutrients, hardness, alkalinity, dissolved oxygen, etc. are some of the important factors that determines the growth of living organisms in the water body. Hence, water quality assessment involves the analysis of physico-chemical, biological and microbiological parameters that reflect the biotic and abiotic status of the ecosystem (Umerfaruq and Solanki,, 2015). The potential cause of degradation of river water quality due to various point and nonpoint sources. Increasing problem of deterioration of river water quality, it is necessary to monitoring of water quality to evaluate the production capacity (Kesharwani et al., 2004)**.**

Nowadays, water pollution is a major global problem. It is an acute problem almost in all major rivers and dams in India. Water pollution is increasing and becoming severe day-by-day and posing the great risk to human health and other living organisms. Water pollution can be defined as 'The **c**ontamination of water bodies by physico - chemical and biological pollutants into the water making it unfit for drinking and use in other purposes'. Point source pollution refers to contaminants that enter a waterway from a single, identifiable source, such as a pipe or ditch while non-point source pollution refers to diffuse contamination that does not originate from a single discrete source. (Mane et al., 2013)

Clear water is very essential to life. The degradation of water quality of one stream can impact all the bodies of water downstreams-rivers, lakes and oceans also. Changes in the water quality may changes the plant invertibrates and fish communities and affect the entire food chain. Pollution in river sediments can harm the future generations in the system. The release of heavy metals such as lead, mercury, silver, chromium etc. are highly toxic to aquatic life. Some heavy metals are stored by fishes and then passed on to human through its consumption. Hence, the study of monitoring seasonal variation in water quality parameter to investigate limiting factors, which could adversely affect the plants and animals including fish production is important. (Gedekar, 2015).

Pollution of a river first affects its chemical quality and then systematically destroys the community disrupting the delicate food web (Joshi et al., 2009). Thus river water plays a very important role in the state's economy and therefore needs to be monitored scientifically both in terms of quality and quantity, for sustainable development and management. In order to manage water as prime natural resource, a basic human need and a precious national asset and to maintain its wholesomeness by way of planning, development and pollution control, Government of India passed National Water Policy under the auspices of Ministry of Water Resources, Government of India New Delhi in April 2002. In pursuance of a directive contained in the National Water Policy 2002 and recommendations of the Maharashtra Water and Irrigation Commission, the Government announced the Maharashtra State Water Policy in July 2003. This path breaking policy will determine the manner in which the planning, development and management of water resources are going to be carried out during the coming 20 years. The state water policy provides for regularly monitoring of surfaces and ground water quality. Water pollution has not been adequately addressed in any policy in India, both at the central and the State level. In the absence of a specific water pollution policy which would also incorporate prevention of pollution, treatment of polluted water and ecological restoration of polluted water bodies, government efforts in these areas would not get the required emphasis and thrust.(Pandey and Ali, 2013)

The high level of non-metallic ion such as nitrate, chloride, phosphate and fluoride of the potable waters may be traced to dissociation of their metallic compounds, oxidation of other forms of the compounds, high degree organic pollution, and type of minerals in the bedrock, eutrophication, agricultural activities and use of detergents (Goel et al., 1980, Osibanjo and Adie, 2007). The high level of calcium, magnesium, aluminum, potassium and sodium may be attributed to natural processes such as weathering of rocks, erosion, human activities like mining, quarrying, farming, calcium laden dust and leaching of rocks (Akubugwo et al., 2007.,Singh et al., 2008.,Umeham and Elekwa, 2005).

The change water quality also varies due to a change in chemical composition of the underlying sediments and aquifer (Jameel, 2002). About one third of the drinking water requirement of the world is obtained from surface sources like rivers, dams, lakes and canals. In urban areas, the careless disposal of industrial effluents and other wastes in rivers and lakes may contribute greatly to the poor quality of river water (Emongor et al., 2005). Pollution of river in India has now reached to a point of crisis due to unplanned urbanization and rapid growth of industrialization (Saksena et al., 2008). Assessment of water resource quality of any region is an important aspect of developmental activities of the region, because rivers, lakes and manmade reservoirs are used for water supply to domestic, industrial, agricultural and fish culture (Jackher et al., 2003). Good water quality resources depends on large number of physico - chemical parameters and the magnitude and source of any pollution load; and to assess that, monitoring of these parameters is essential (Reddi et al., 1993). Polluted water is the major cause for the spread of many epidemics and some serious diseases like cholera, tuberculosis, typhoid, diarrhea etc. Contamination of drinking water from any source is therefore of primary importance because of the danger and risk of water borne diseases (Edema et al., 2001). According to WHO, 1998, report there were estimated 4 billion cases of diarrhea and 2.2 million deaths annually (Chan et al.,2007). The availability of good quality water is an indispensable feature for preventing disease and improving quality of life (Oluduro et al., 2007). Domestic and industrial wastewater constitute as a constant polluting source, whereas surface runoff is a seasonal phenomenon mainly controlled by climate (Singh et al., 2004). Without adequate quantity and quality of fresh water sustainable development will not be possible (Mahananda et al., 2005). The healthy aquatic ecosystem is depended on the biological diversity and physico-chemical characteristics (Venkateshraju et al., 2010). The physico - chemical properties will also help in the identification of sources of pollution, for conducting further investigations on the eco-biological impacts and also for initiating necessary steps for remedial actions in case of polluted water bodies (Ekwenye et al., 2008). In India, many researchers have worked on physico - chemical and biological characteristics of reservoirs and rivers. Although statistics vary, the World Health Organization (WHO) reports that approximately 36% of urban and 65% of rural Indian's were without access to safe drinking water (WHO, 2009).(Mane et al., 2013)

Diverse uses of the rivers are seriously impaired due to pollution and even the polluters like industry suffer due to increased pollution of the rivers. River pollution has several dimensions and effective monitoring and control of river pollution requires the expertise from various disciplines (Trivedi et al., 1990). Pollution of river is a global problem. In India it is reported that about 70% of the available water is polluted. The chief source of pollution is identified as sewage constituting 84 to 92 percent of the waste water. Industrial waste water comprised 8 to 16 percent. The indiscriminate and large scale

deforestation and over grazing in the watershed areas of river basins have caused soil erosion resulting in considerable silting of dams and shrinkage of river flows. This leads to the flooding of the rivers at the time of excessive rains (Goel, 2006).

The domestic sewage discharged from a population of about 2 millions gives rise to numerous water-borne diseases like typhoid, cholera, dysentery, poliomyelitis and cysticercosis, thereby affecting the human health and deterioration of the water quality (Sharma et al., 1996, Joshi et al., 2009).

Universally, requirement for freshwater will continue to rise significantly over the coming decades to meet the needs of increasing populations, growing economy, changing lifestyles and evolving consumption patterns. This will greatly amplify the pressure on limited natural resources and ecosystems. Unsafe water and sanitation account for almost one tenth of the global burden of disease (Fewtrell et al., 2007). Total 768 million and 2.5 billion people in the world are living without access to clean water and proper sanitation, respectively (WHO, 2002; WHO and UNICEF, 2013a).

According to the World Commission on water for the 21st century, more than half of the world's major rivers are depleted and contaminated to the extent that they threaten human health and poison the surrounding ecosystems (Interpress,1999). Contaminated drinking water can cause various diseases such as typhoid fever, dysentery, cholera and other intestinal diseases (Udoh, 1987; Adeyemi, 2004; Dixit and Shanker, 2009).

In developing countries, about 1.8 million people, mostly children, die every year as a result of water related diseases (Onda et al, 2012, Wolf et al., 2013, WHO, 2006, WHO, 2011, WHO/UNICEF, 2013a). Anthropogenic activities have resulted in a significant decrease in surface water quality of aquatic systems in watersheds (Anhar et al., 1988, May et al., 2006). In India, rivers are an important source of water, as many Indian cities are situated on the banks of the rivers. Untreated discharge of pollutants into a river from domestic sewers, storm water discharges, industrial wastewaters, agricultural runoff and other sources can have short-term as well as long-term effects on the water quality of a river system (Verghese et al., 2011, Rai et al., 2012, Giri and Singh, 2014). Total 80% of the water in India has become polluted due to the discharge of untreated domestic sewage and partially-treated industrial effluents into the natural water source (Ensink et al., 2010, CPCB 2007a). High levels of pollutant input in river water systems cause an increase in biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS), metals such as Cd, Cr, Ni and Pb, and fecal coliforms (Sangodoyin, 1991, Chatterjee et al., 2000, Adekunle and Eniola, 2008, Shrivastava et al., 2015).

Water is an incredibly important aspect of our daily life. Every day we drink water, cook with water, bath in water and participate in many activities involving water. It is essential for all dimensions of life. Water is one of the abundantly available substances in nature. It is an important and life sustaining drinks to human and is essential for the survival of all the organisms. Living organisms require large quantities of water for their sustenance. (Choudhari et al., 2014)

Fresh water is finite resource, essential for agriculture, industry and even human existence, without fresh water of adequate quantity, sustainable development will not possible. (Kumar , 1997). Since water quality and human health are closely related, water analysis before usage is of prime importance. Certain physical, chemical and microbiological standards, which are designed to ensure that the water is palatable and safe for drinking before it can be described as potable. (Tebutt , 1983).

Various workers have carried out extensive studies in their particular area, some of the recent contributor are Barde et al., (2015) has done the comparative study of physico-chemical analysis of Narmada river water at Barwani and Khalghat, MP, India. Iena and Maneemegalai, (2015) has determined the water pollution status of Varahanadhi river water by physico-chemical analysis at Tamilnadu, India. Shrivastava et al., (2015) has done the water quality management plan for Patalganga river for drinking purpose and human health safety. Kolhe and Shinde, (2014) studied some physico-chemical parameters of Godavari river water at Ramkund, Nashik with reference to correlation study. Kulkarni and Sangpal, (2014) have assessed the surface water quality index of Ujjani reservoir, Solapur District. Gedekar ,(2015) have studied on ecological study of river Wainganga near the region of ancient Markandadeo temple, district Gadchiroli, Maharashtra.

Unsafe drinking water contributed to numerous health problems in developing countries such as the one billion or more incidents of diarrhoea that occur annually (Mark et al., 2002). Concentration of DO is one of the most important parameters to indicate water purity and to determine the distribution and abundance of various algal groups (Bhatt et al., 1999). High level of TDS in water used for drinking purposes leads to many diseases which are not water-borne but due to excess salts (Sabata and Nayar, 1995). Physico-chemical property like pH for water should be in the range of 6.5 to 8.5 for drinking and domestic purposes (WHO , 1993).

In India, while there are some very large rivers, there are many others which have only a meager flow. Even in the case of River Wainganga, because of extraction of water for irrigation purposes, the flow is considerably reduced. This is particularly true during low flow season and when the demand of water for agriculture is high (Pandey et al., 2013).

Further, water quality planning also has to take into account the fact that for a large fraction of rural population living on the banks of the river, the river water is the only source for domestic water requirements (Black, 1952).

The utilization of assimilative capacity of a river for waste disposal is therefore not considered a viable approach in setting discharge limits. Under the Environment Pollution Control Act 1986, effluent standards have been set for different industries uniformly throughout the country. Only in cases when the effluent is disposed in the sea or estuary, location specific discharge limits may be allowed. Most of the pollution of rivers in the country can be attributed to the discharge of untreated municipal wastes. The Government of India (National River Conservation Directorate, Ministry of Environment & Forests) co-ordinates the pollution control program identified under the action plan. In the case of municipalities, the Government also gives subsidy to create necessary infrastructure for pollution control measures. Maharashtra State Pollution Control Board is to take action against the industries, which do not meet their waste discharge standards.(Pandey et al., 2013).

CONCLUSION:

Population growth have increased the demand for food and water. This exerts a pressure on natural resources and degrades the environment. Most of the rivers of India are facing acute water pollution. Detergent inputs in freshwater of India have reached a point of serious concern. Pollution of rivers like Ganga, Tungbhadra, Yamuna, etc. is on a peak today. Government of India has passed " The Water Pollution Control and Prevention Act" in 1974 to safeguard our water resources. In order to manage water as a basic human need and a precious national asset and to control the pollution, Government of India passed National Water Policy under the auspices of Ministry of Water Resources, Government of India, New Delhi in April 2002.

REFERENCES:

Avvannavar S.M. and Shrihari S., (2008), Evaluation of water quality index for drinking purposes for river Netravathi, Mangalore, South India. Environ. Monit. Assess. 143, 279–290.

Badge U.S. and Verma A.K., (1985), Limnological studies of J.N.U. lake., New Delhi. Proc. Nat. Symp. Pure and Applied Limnology (Ed. Adoni A. D.), Bull. Bot. Soc. Sagar. 32, 16-23.

Cude C., (2001), Oregon water quality index: A tool for evaluating water quality management effectiveness. Journal of the American Water Resources Association, 37, 125–137.

Dahegaonkar N.R., (2008), Studies on water quality and biodiversity of loticecosystems near Chandrapur. PhD Thesis, submitted to RTM Nagpur University, Nagpur.

Esa R., (1983), Drilled wells and groundwater in the Precambrian crystalline bedrock of Finland. Water Research Institute, Helsinki, Finland, (52), 57.

Fataei E., Seyyedsharifi A. S., Seiiedsafaviyan T. S. and Nasrollahzadeh S., (2013), Water Quality Assessment Based on WQI and CWQI Indexes in Balikhlou River, Iran, J. Basic. Appl. Sci. Res., 3, (3), 263-269.

Gyannath G., Shewadikar S.V. and Samiuddin S., (2000), Water quality analysis of River Godavari during "Holimela" at Nanded. Poll.Res. 19(4), 673674.

Handa B.K., (1974), Methods of collection and analysis of water sample and interpretation of water analysis. Central ground water board, Ministry of agriculture. Tech.Manual.No.1.

Iskandar M. B., (2010), The effectiveness of biofilter as a treatment for domestic wastewater, University Malaysia Pahang (thesis).

Jackher G.R., and Rawat M, (2003), India. J. Aqua. Biol., 18, 79-83.

Kushwah R. K., Malik S. and S. A.,(2012), Water Quality Assessment of Raw Sewage and Final Treated Water with Special Reference to Waste Water Treatment Plant Bhopal, MP, India, Res.J.Recent Sci.,1 (ISC-2011), 185-190.

Lansdown K., Trimmer M., Heppell C.M., Sgouridis F., Ullah S., Heathwaite A.L., Binley A., Zhang H., (2012), Characterization of the key pathways of dissimilatory nitrate reduction and their response to complex organic substrates in hyporheic sediments. Limnology and Oceanography, 57(2), 387-400.

Mutlak S.M., Salih B.M. and Tawfiq S.J., (1980), Quality of Tigris River passing through Baghdad for Irrigation, Water, Air and Soil Pollution, 13(1), 9-16.

Nagarnaik P.B., Patil P.N., (2012), Analysis of Ground Water of Rural Area of Wardha city using Physico-chemical and Biological parameters, International Journal of Engineering Research and Applications (IJERA)2(3), 803-807.

Osibanjo O, Adie GU., (2007), Impact of effluent from Bodija Abattoir on the physicochemical parameters of Oshunkaya stream in Ibadan city, Nigeria. African Journal of Biotechnology 6, 1806 – 1811.

Pande K.S. and Sharma S.D., (1998), Natural purification capacity of Ramganga river at Moradabad (U.P.). Poll. Res. 17, (4),409-415.

Quadri M.Y. and Shah G.M., (1984), Hydrobiological features of Hoassar. A typical wetland of Kashmir-I, Biotope, Ind. J. Ecol., 2(2),203-206.

Radha Krishnan R., Dharmaraj K. and Ranjitha Kumari B. D.,(2007), A comparative study on the physicochemical and bacterial analysis of drinking, borewell and sewage water in the three different places of Sivakasi, Journal of Environmental Biology, 28(1), 105-108.

Sullivan A.B.,Snyder D.M., Rounds S.A., (2010), Controls on biochemical oxygen demand in the upper klamath river, oregon. Chemical Geology, 269(1-2), 12-21.

Tali, Pir I.Z., Sharma S., Mudgal L.K. and Siddique A., (2012), Evalutaion of water quality: Physico-chemical characteristics of river Narmada at Madhya Pradesh, India. Researcher, 4(5),63-67.

Wolf J., Bonjour S., Prüss-Ustün A., (2013). An exploration of multilevel modeling for estimating access to drinking water and sanitation. Journal of Water and Health, 11(1), 64-77.

Yongxiang Zhang, (2018), Analysis of Hydrochemical Characteristics of Rivers Polluted by Heavy Metal Cadmium, Chemical Engineering Transactions, 71, 1111-1116.

Zafar Javeed S., (1991), Comparative study of ecological pollution of reservoirs and lakes in the vicinity of Aurangabad and Godavari River at Paithan, Maharashtra State. Ph.D.Thesis, Marathwada University, Aurangabad.