International Journal of Engineering Research & Management Technology ISSN: 2348-4039
November-2016 Volume 3, Issue-6
Email: editor@ijermt.org www.ijermt.org

# PHYSICO-CHEMICAL AND MICROBIOLOGICAL ASSESSMENT OF WATER OF MACHKUND, DHOLPUR (RAJASTHAN)

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**ABSTRACT:** Water quality has always been a major issue in many countries, especially in developing countries. The World Health Organization in its "Guidelines for drinking water quality" publication highlighted at least seventeen different and major genuses of bacteria that may be found in tap water which are capable of seriously affecting human health. The proportion of waterborne disease outbreaks associated with the distribution system failures has been increasing over the years.

**KEYWORDS:** water, bacteria

## INTRODUCTION

The ensuring of good quality drinking water is a basic factor in guaranteeing public health, the protection of the environment and sustainable development (Ranjini et al., 2010). Water of good drinking quality is of basic importance to human physiology and man's continued existence depends very much on its availability (Lemikanra, 1999; FAO, 1997). The provision of portable water to rural and urban population is necessary to prevent health hazards associated with poor drinking water (Nikoladze and Akastal 1989; Lemo, 2002). A significant proportion of the world's population use potable water for drinking, cooking, personal and home hygiene (WHO, 2004). Before water can be described as potable, it has to comply with certain physical, chemical and microbiological standards, which are designed to ensure that the water is potable and safe for drinking (Tebutt, 1983). Potable water is defined as water that is free from disease producing microorganisms and chemical substances deleterious to health (Ihekoronye and Ngoddy, 1985). Water is the most common solvent for many substances and it rarely occurs in its pure nature (Caccio, 1973). Water can be obtained from a number of sources, among which are streams, lakes, rivers, ponds, rain, springs and wells ( Okonko et al., 2008).

A good knowledge of the physico-chemical and microbiological qualities of raw water is necessary so as to guide its suitability for use. There is no report available on physico-chemical and microbiological study of water of Muchkund, Dholpur (Rajasthan). It is therefore present work as been under taken.

## REVIEW OF LITERATURE

Water is abundant in the planet 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 is, undoubtedly the most precious natural resource, vital to life (Karikari and Ansa, 2004). Rivers are open systems, which have come under increasing pressure from human activities, often affecting their ecological integrity over the last century throughout the world (Skoulikidis et al., 2002). The physicochemical impact on water quality of rivers have been indicated by rise in conductivity, pollution of water bodies with nitrate, nitrite and soluble reactive phosphorus, by the appearance of tannin and lignin, and by the steady accumulation of inorganic and organic suspended matter along the river (Whitehead et al., 1997). The role of the river is not primarily to carry industrial waste but their ability to do so is hugely exploited. There has been significant impairment of rivers with pollutants, rendering the water unsuitable for beneficial purposes (Filkersilasie, 2011). Rivers provide a variety of

services for human populations, including water for drinking and irrigation, recreational opportunities, and habitat for economically important fisheries (Leroy et al., 2002). The growing problem of pollution of river ecosystem has necessitated the monitoring of water quality (Ravindra et al., 2003). Regions with dense human populations are the areas at risk. The earliest anthropogenic threats to water resources were often associated with human health, especially disease causing organisms and oxygen-demanding wastes (Meybeck and Helmer, 1996). Rajaram and Ashutosh (2008) opined that industrial wastes were one of the major causes of irreversible degradation occurring in surface water system. Organic pollution caused by oxygen demanding wastes is common amongst surface water (Masson, 1990). The natural processes of chemical oxidation and biological decomposition that occur within water courses, consume dissolved oxygen. Decomposition of materials is a normal process in all aquatic ecosystems and is a function of decomposers such as aerobic bacteria and fungi (Filkersilasie, 2011). Nonetheless, serious consequences to aquatic biota may result if the natural mechanisms that clean the water are overloaded by large influx of pollutants. Severe oxygen depletion can result in the loss of many desirable aquatic biota and also produce an odorous anaerobic system (Zimmerman, 1993). Majority of the inhabitants that live in riverine areas rely on water from the river for domestic and drinking purposes due to the scarcity of portable water supply by the government (Shuaib, 2004). Wu et al. (1999) reported that in China, approximately 700 million people, over half the population, consume water contaminated with different levels of animal and human excreta with total coliform bacteria exceeding maximum permissible levels by as much as 86% in rural areas and 28% in urban areas. Rapu (2003) stated that in South Africa, over 15% of urban dwellers depend on polluted river waters for their domestic needs. Khalil (2005) reported 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 (2004) stated that over 40% of Nigerians depend on either polluted surface waters or wells for their domestic activities. 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 (Shuaib, 2004; Odjugo, 2004; Purnamitta, 2004). Ikpoba River also called the Oken River is a fourth order stream situated within the rainforest belt of Edo State, southern Nigeria. The river is particularly important to the people of Benin City which is the capital and largest city of Edo state, estimated to have a population of 1,086,882 people according to 2006 Census. One of the major dams in the Edo State was constructed across the river in Okhoro Community. Industrial effluents and water from drainage channels are discharged into the river at various points as well. Ikpoba River is subject to pollution from stormwater run-off in the rainy season as it flows through inhabited areas and in particular, through Benin City. Most of the activities around the river in its upper reaches are agricultural such as crop farming and fishing (Atuanya et al. 2012). Nonetheless, industrial effluents, and drainage system are channeled to the river. Government abattoir managed by the Local government where about 50 cows and goats are slaughtered daily is also situated by the river (Atuanya et al. 2012). The aim of this study was to verify if physico-chemical and microbiological parameters of analyzed water are below the regulatory limits to ensure the water quality.'

Water is the most fundamental element making life possible on this planet and has a unique position in the renewable sources (Kumar et al., 2005). Water is generating a lot of concern due to its exhaustible nature (Shyamala et al.2008). Prolonged discharge of industrial effluents, domestic sewage and solid waste dump causes the groundwater to become polluted and created health problem (Raja et al, 2002). In recent times it poses a threat to the various sectors of the society due to its overexploitation. The quality of water is also deteriorating due to pollution.

Now-a-days, the ecology of reservoirs is under stressed condition due to the fast pace of development, deforestation, cultural practices and agriculture. These activities trigger the rate of

sedimentation of the reservoir bed which initiates the process of eutrophication at a very early stage (Agarwal and Rajwar, 2010).

Lakes and ponds are dynamic ecosystems and one of the primary resources for water. They act as indicators of variations in climate and biological components. Water quality issues are based on the biological productivity of the lake, water chemistry profile, nutrient concentrations, specific pollutants and historic trends (Saha and Ghugare, 2008).

Water for different purposes has its own requirements for the composition and purity and each body of water has to be analysed on a regular basis to confirm the suitability. Diarrhoea, cholera, dysentery, and various other diseases like Typhoid, Amoebiasis, Jaundice, Enterobacteriaceae, etc. are caused on consumption of contaminated water (Mishra, 2010). Many infectious diseases are transmitted by water through the fecal-oral route. Diseases contacted through drinking water kill about 5 million children annually and make 1/6th of the world population sick (WHO, 2003).

Water of good quality is of basic importance to human existence. Potable water has certain physical, chemical and microbiological standards, which ensure that the water is potable and safe for drinking (Tebutt 1983). Potable water is free from diseases producing microorganisms and chemical substances deleterious to health.

Water can be obtained from a number of sources like streams, lakes, rivers, ponds, rain, springs, hand pump and wells. The provision of potable water to the rural and urban population is necessary to prevent health hazards.

The consequences of waterborne bacteria and virus infection like polio, hepatitis, cholera, typhoid, diarrhea and stomach cramps etc. have been well established but nitrate contamination is just as deadly. Consequent to the realization of the potential health hazards that may result from contaminated drinking water. Contamination of drinking water from any source is therefore of primary importance because of the danger and risk of water born diseases (Edema et al. 2001).

The original source of drinking water is rich is aquatic microbes, some of which could be dangerous if they enter the human body. Accordingly, the treatment of water for drinking involves stages where microbes are removed or destroyed before the water gets into homes. After purification the water is subjected to tests by bacteriologists to ensure the safety for human consumption. A long series of dilutions is not necessary by some sample because most water supplied are low in bacteria content, while others require long series of dilutions.

## PURPOSE OF THE STUDY

About 4 kms from the town of Dholpur is an ancient sacred place called Machkund. IT commands a scenic view. It has a tank surrounded by a series of temples of different dates. The place is named after Raja machchhkund, the twenty fourth king of the suryavanshi dynasty (the solar race is said to have reigned nineteen generations before lord ram. According to legend, raja machchh kund was sleeping here when a demon kaal yamn while pursuing lord Krishna, accidentally woke him up. The demon was burnt to ashes because of a divine blessing to raja machchh kund. It is now a sacred place for pilgrims.

A lot of pilgrims come here mostly on Purnima to have a hold bath in these holy ponds. They usually devote and throw flowers, scent sticks, fruits and sweets etc. into the water. By doing so they are contaminating the water.

Day by day the quality of hold water getting polluted and infectious. No authority takes pain to be aware about the quality of water and the pilgrims are too devoted to their religion that they never consider about it. They have blind faith and never take their faith on reason. The holy water, in which the pilgrims take bath and get purification, may be dangerous to their health.

The study on physico-chemical and microbiological parameters of the holy water of this ponds has not been carried out so far. Hence it has become a need of time to undertake such study in a scientific way which will prove to be milestone.

## CONCLUSION

This study concluded that water quality distributed at Georgetown need more effort in limiting the numbers of microbial organisms released into distribution systems. Water sample as well as biofilm samples collected from both residential sites and GWI sites presented poor quality both in terms of physio chemical and biological parameters. At present the GWI only focuses on the presence of coliforms as an indicator of water quality because of the limited financial resources of the company and country as a whole. It is recommended that effective management and maintenance are required in order to minimize acute problem of water related diseases, which are endemic to the health of man.

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