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Assessment of Fluoride Concentration and water quality of Khadakpurna Reservoir of Buldana District, Maharashtra, India

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Abstract: ***The aim of this research was to investigate the Fluoride concentration and Water quality of Khadakpurna Reservoir situated at Buldana District,Maharashtra. In this present study the Water quality with respect to Fluoride Concentration has been determined by collecting water sample of Khadakpurna Reservoir and subjecting it to a comprehensive physiochemical analysis. For assessing water quality pH, Alkalinity, chloride, nitrate, sulphate, turbidity, total dissolved solids, total hardness, iron, and fluorides have been considered. The higher values have been found to be mainly for Nitrate, Total hardness, Total dissolved solids and Turbidity. The analysis reveals that the water of the Reservoir needs some degree of treatment before consumption. The higher values of nitrate content indicates that it is badly affected by overuse of chemical fertilizers that contaminate the water and enhance the nitrate concentration in water. From the results it is clear that fluoride Concentration was found to be well within the permissible levels.***
Keywords: Groundwater, water quality, Khadakpurna Reservoir, Fluoride Concentration, Fluorosis, Buldana District.

I. INTRODUCTION

Water is one of the essential requirement to sustain life and environment.Hence to know the impurities, which are harmful to human life is prime importance. Ground water is a good source of fresh water available on the earth. It is the important renewable resource having several inherent advantages over surface water [1]. Hence it is very important to assess the ground water quality not only for its present use but also from the view point of a potential source of water for future consumption [2]. Water sources available for drinking and other domestic purpose must possess high degree of purity, free from chemical contamination and micro-organism [3]. Water is also one of the most important factors for every living organism on this planet. The quality of water is getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards environment, which has also led to scarcity of potable water affecting the human health [4]. The main source of fluoride in ground water is fluoride-bearing rocks such as fluorspar, fluorite, cryolite, fluorapatite and hydroxylapatite [5]. Fluorine is the most electronegative of all element and is therefore, never encountered in nature in the atomic form. It is seventeenth in the order of frequency of occurrence of the elements and represent about 0.6 to 0.09% of the earth curst [6].

Fluoride is an essential ion for all living being from the health point of view. It helps in the normal mineralisation of bones and formation of dental enamel. Fluoride when consumed in inadequate quantities (less than 0.5 ppm) causes health problem like dental carries, lack of formation of dental enamel and deficiency of mineralisation of bones, especially among the children [7].On the contrary, if fluoride is consumed or used up in excess (More than 1.0 ppm); it can cause different kinds of health problem which equally affect both young and old [7-9]. Fluoride is almost present in air, water and food, the most common way it enters the food chain is via drinking water. At concentration above 1.5 mg/l (79 ìmole/l) however, fluoride is dangerous to human health, leading to dental and skeletal Fluorosis disease that can cause mottling of the teeth, calcification of ligaments, crippling bone deformities and many other physiological disorders that can, ultimately, lead to death [10].

II. MATERIALS AND METHODS

A. Water Sample Collection

Water sample from Khadakpurna Reservoir was collected during pre-monsoon period. For water sample collection pre cleaned polythene bottle having capacity of one liter was used. It was filled without disturbing the substratum to avoid the loose sediments in sample. Sample was collected from surface (1-5 cm). After collection of sample, it was labeled and brought to the laboratory as

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earlier as possible.

B. Water Sample Analysis

Collected water sample was analyzed for 10 parameters such as pH, Alkalinity, chloride, nitrate, sulphate, turbidity, total dissolved solids, total hardness, iron, and fluorides,using standard physiochemical analysis procedures recommended by SPHLP (Manual for drinkingWater quality monitoring and assessment).

III. RESULTS AND DISCUSSION

The analysis reveals that in our study, pH value of water sample is 7.8, which is found to be well within the permissible levels. The permissible total hardness is 300mg/l, from the analysis it is found that it has total hardness value above the permissible level. High values of TDS in reservoir water are generally not harmful to human beings but high concentration of these may affect persons, who are suffering from kidney and heart diseases. Water containing high solids may cause laxative or constipation effects (Dean Adams 2001). The chloride content of sample was found to be well within the permissible levels.and having value 170mg/l. It is clear from result that nitrate content in reservoir water is above the maximum permissible value due to overuse of fertilizers, improper manure management practices, and improper operation and maintenance of septic systems. High nitrate may cause methemoglobinemia (infant cyanosis or "blue baby disease") in infants who drink water. The fluoride content in sample under studied is found to be well within the permissible levels.So there is no need to achieve the treatment of water regarding fluoride Concentration in reservoir water. Iron is not detected in our studied water sample. TDS content of reservoir water is observed exceeding the permissible level of 500mg/l, it shown very high TDS conc. about 1075 mg/L in reservoir water showing unsuitability of water for drinking purposes and possibility of pollution by the various human activities. The reservoir water has shown that higher values of nitrate, total dissolved solids,total hardness and turbidity well above the maximum permissible values.

Many of the ions present in lake water are of geologic origin and some of them are reaches to ground water by anthropogenic sources (J. J. Schoeman and A. Steyn, 2001**)**. Though many ions are very essential for the growth of human, but when present in excess, have an adverse effect on human body. And this necessitates the proper treatment of water for making it suitable for human use.

The chemical analyses of the water and the Indian Standards (BIS Standards) and WHO are summarized in table given below

Parameters	IS	WHO	Khadakpurna Reservoir
pH	6.5-8.5	7.0-8.0	7.8
Alkalinity as $CaCO_3$	------	------	420
Chloride	250	250	170
Nitrate	45	50	62.83
Sulphate	200	250	81.92
Turbidity	1	------	2.03
TDS	500	NG	1075
Total Hardness	300	------	390
Iron	0.3	1	ND
Fluoride	1	1	0.78

Note: All units except pH and turbidity are in mg/l, turbidity is in NTU, ND: Not Detected , N G: No Guidelines.

IV. CONCLUSION

From the above study it can be concluded that Overall water scenario of Khadakpurna Reservoir is not bright with related to nitrate content, total dissolved solid, total hardness and turbidity .It was found above the permissible levels than required. Hence there is threat to the public health of rural people and needs some degree of treatment before consumption. The solution to rural people is to avoid the over use of chemical fertilizers that contaminate the water and enhance the nitrate concentration in water. and also they need to achieve the local treatment of unsafe water and to be protected from the perils of contamination.

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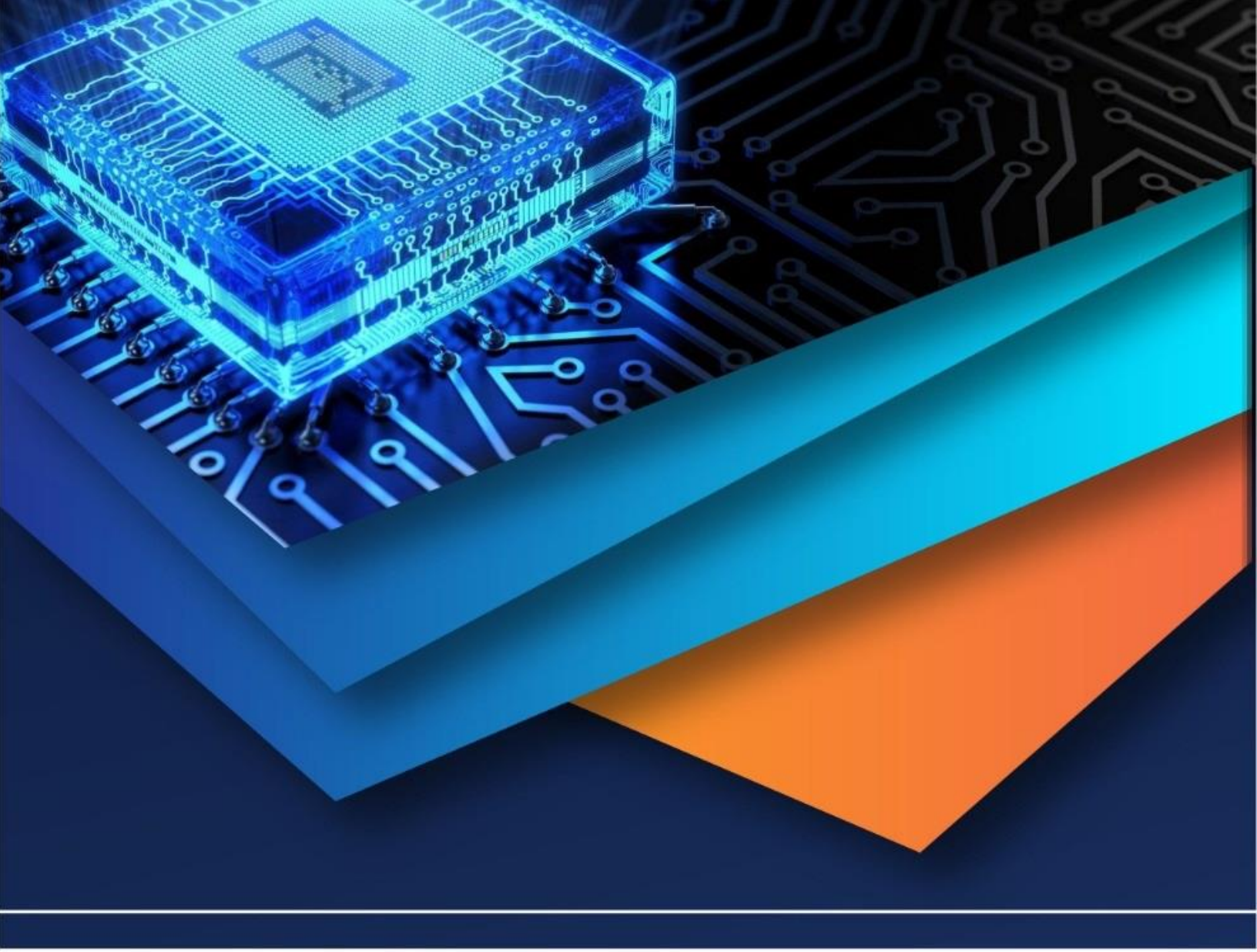

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