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A Critical Assessment of Safe Drinking Water of Krishna River in Satara District (Maharashtra), INDIA

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Abstract- River water is one of the most important natural resources for drinking water in the rural area. To find out the quality of water in rural area of Satara Distract(Maharashtra), the study was made by us. River water samples were collected from different sampling stations of Krishna River in Satara Distract of Maharashtra (India) .The river water was analyzed for physic-chemical characteristics of river water. In this study various parameters like pH, DO, BOD, COD, Chloride, Phosphate, Calcium, Magnesium, Hardness and Total dissolved solids were estimated. The results were compared with water quality standards given by WHO. The results revel that some of the samples were having high concentration causing deterioration in quality of drinking water.

Index Terms- Satara District, Krishna River, Physico-chemical characterictics, etc.

1. INTRODUCTION

Water is the important commodity of life, which is spread on all over the earth. But, now a days this vast natural resource has been depleted and turned into scarce commodity with increased usage catering to the needs of ever- expanding population [1]. There is almost a global shortage of pure water and the world's most urgent and first rank problem today is supply and maintenance of clean and suitable for drinking water. The climate change and spells of droughts have even stressed regional water tables [9]. There are strides to fight the grim battle of acute shortages of water. The problems relating to water attract the attention to the urgency for investigating causes and suggest remedies in a bid to prepare future plan of action for maintenance of potable waters and related development issues [3]. The maintenance of a healthy aquatic ecosystem is dependent on the physico-chemical properties of water and the biological diversity. A large number of streams and River in India have been impounded to store the water for multipurpose beneficial uses like industry, irrigation, fisheries, power generation and drinking water supply. Now-a-days, the ecology of water bodies is under stressed condition due to fast pace of development, deforestation and modern agriculture practice [4]. These activities trigger the rate of sedimentation of the mines bed characterized by silt and organic suspended material which initiates different sites with an objective to indicate changes in the quality of waters at the beginning and lower end of the reservoir [5]. The study will be helpful in estimating the impact of extra activities on various physico-chemical and biological parameters of the water, by the residents and others staying on the bank of the river.

2. MATERIALS AND METHODS

2.1. Study of area

The Krishna river originates in the western ghats near Mahabaleshwar at an elevation of about 1,300 metres, in the state of Maharashtra in central India. It is one of the longest rivers in India. The Krishna river is around 1,300 km in length. The Krishna river's source is at Mahabaleswar near the Jor village in the extreme north of Wai Taluka, Satara District, Maharashtra in the west and empties into the Bay of Bengal at Hamasaladeevi (near Koduru) in Andhra Pradesh, on the east coast. It causes heavy soil erosion during the monsoon floods. It flows fast and furious, often reaching depths of over 75 feet (23 m). Longest tributary is the Bhima River, which makes a total run of 861 km (535 mi) and has an equally large drainage area of 70,614 km^2 (27,264 sq mi). There are four rivers that join the Krishna at a confluence known as Preeti Sangam, or Lover's Meeting Point in the Satara District. These are Venna River, Urmodi River, Tarli River and Koyna River. Three tributaries meet Krishna river near Sangli. These places are considered very holy. It is said that Lord Dattatreya spent some of his days at Audumber on the banks of river Krishna. Sangameswaram of Kurnool district in Andhra Pradesh is a famous pilgrim center for Hindus where

Tungabhadra and Bhavanasi rivers join the Krishna river.

2.2 SOURSES OF RIVER WATER POLLUTION

3. EXPERIMENTAL

The water were collected and analyzed from five study sites at monthly intervals during March 2017. All the water samples for the estimation of different parameters were collected in the early hours of morning on a specified date. The samples were pretreated in the field to fix the samples and immediately brought to the laboratory for an on spot physical, chemical and biological analysis of various parameters following the standard methods [2, 15].

OBSERVATION TABLE NO.1

Sr.No.	Parameters	Method Adopted
1	P^H	Potentiometric
2	DO	Azide modification
3	BOD	Azide modification
4	COD	Dichromate reflux
5	Alkalinity	Titrimetric
6	Chloride	Gravimetric
7	Calcium	Titrimetric
8	Magnesium	Titrimetric
9	Phosphate	Spectrophotometer
10	Hardness	Titrimetric
11	Total Dissolved Solids	Gravimetric

OBSERVATION TABLE NO.2

Sr. No.	Parameters	1	2	3	4	5
1	P^H	7.2	8.7	8.9	8.1	8.4
2	DO(mg/L)	6.8	7.5	4.4	8.2	6.8
3	BOD(mg/L)	4.3	5	4 3.8	7.9	8.9
4	COD(mg/L)	6.5	7.6	23.6	25.6	6.5
5	Alkalinity(	59.5	89.2	83.1	90.1	59.5

	mg/L)					
6	Chloride(mg/L)	49.08	123.33	140.33	45.88	39.08
7	Calcium(mg/L)	350.77	452.66	610.77	90.33	350.77
8	Magnesium (mg/L)	354.88	476.80	572.80	110.73	354.88
9	Phosphate(mg/L)	0.032	0.062	0.069	0.63	0.032
10	Hardness(mg/L)	141.9	168.7	463.8	170.5	147.9
11	Total Dissolved Solids(mg/L)	380.3	788.1	708.9	698.2	384.3

4. RESULTS AND DISCUSSION

The quality of natural water is generally governed by various physico-chemical parameters. The maximum and minimum values for various parameters during the study period are presented in Table 2.

pH

The pH is affected not only by the reaction of carbon dioxide but also by organic and inorganic solutes present in water. Any alteration in water pH is accompanied by the change in other physicochemical parameters. pH maintenance is one of the most important attributes of any aquatic system since all the biochemical activities depend on pH of the surrounding water. In the present study, the range of pH on the study sites was between 7.2 to 8.9. pH increased during summer months[6]. Maximum values during summer may be due to increased photosynthesis of the algal blooms resulting into the precipitation of carbonates of calcium and magnesium from bicarbonates causing higher alkalinity.

Dissolved oxygen (DO)

DO is a very important parameter of water quality and an index of physical and biological process going on in water. In the present study, the maximum concentration of dissolved oxygen was observed in the range of 4.4 to 8.2 which favors solubility of oxygen among the study sites. The highest concentration (8.2 mg/l) was recorded on site 4 but the range was not narrow for other sites. A definite trend in DO concentration was observed on all the sites. DO is of great importance to all living organisms. It may be present in water due to direct diffusion from air and photosynthetic activity of autotrophs[8]. 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.

Chemical Oxygen Demand (COD)

COD is a measure of pollution in aquatic ecosystems. It estimates carbonaceous factor of organic matter. The range of values of COD in the present study was 6.5 to 25.6 mg/l. The maximum values of COD at sites 3 and 4 indicated the higher degree of pollution compared to that of site 1. Higher concentration of COD in summer months may be due to high temperature and higher concentration of suspended and dissolved solids [7].

Biochemical Oxygen Demand (BOD)

BOD is the amount of oxygen required by the living organisms engaged in the utilization and ultimate destruction or stabilization of organic water. It is a very important indicator of the pollution status of a water body [11]. The values of BOD clearly showed higher concentration during most of the summer and rainy months and comparatively low during winter months. Many workers showed higher BOD during summer due to low level at river discharge. This is supported by the results of present study (4.3 to 8.9 mg/l) as the river had low flow during the winter season.

Alkalinity

Alkalinity of water is a measure of weak acid present in it and of the cations balanced against them. Alkalinity plays an important role in controlling enzyme activities. Maximum and minimum values of alkalinity on different sites of the present study showed variations in different sampling sites [10].

Chloride

Chloride is one of the important indicators of pollution. Chlorides are present in sewage, effluents and farm drainage. The value of chloride concentration in the present study was highest on site 3 (140.33 mg/l) and site 5 (39.08 mg/l). These values are usually in the lower range of values for different rivers of India [12, 17]. The low value in the present study may be attributed to the absence of major pollutants.

Calcium

Calcium is essential for all organisms and regulates various physiological functions. The calcium ions contribute to the hardness of water[13]. The concentration of calcium was highest in the month of March on sites 3.

Magnesium

Magnesium occur in all kind of natural water but its concentration is lower than calcium .the minimum value of magnesium is 110.73 and maximum value is 572.80 of the site 3.

Phosphates

Phosphorus is a nutrient for plant growth and a fundamental element in the metabolic reaction of plants and animals. It controls algal growth and primary productivity. In most natural waters, phosphorus ranges from 0.005 to 0.020 mg/L. Algae require only small amounts of phosphorus. Excess amounts of phosphorus can cause eutrophication leading to excessive algal growth called algal blooms [14].

Hardness

The water hardness on all study sites of river water was higher during summer months which might have caused increased concentration of salts by excessive evaporation as also observed[16,18]. The hardness of water increases in the polluted waters by the deposition of calcium and magnesium salts.

5. CONCLUSION

The present study deals with following conclusion,
The present study shows detailed physic-chemical characteristics and quality of Krishna river water. The various sampling stations show fluctuations in various physic-chemical parameters. The water of this river is useful for irrigation as well as for agricultural practice. To improve the quality of water there should be continuous monitoring of pollution level.

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