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Seasonal Variation in Physico-Chemical Parameters of Krishna River Water of Satara District, Maharashtra, India

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ABSTRACT

In the present investigation the focus was given on the river water quality for all the necessary parameters. As our selected sampling stations were from rural area of Satara District. The river water was studied for Temperature, pH, DO, BOD, COD, Chloride, Nitrates, Phosphates, Calcium, Magnesium and Hardness, etc. Due to increased population people on the bank of river are using the river water for their daily needs. But now days, it is observed that the river water is having some other objectionable parameters in a river body. It may be due to agricultural run-off, domestic wastes and Human unhygienic habits like cattle washing, bathing and washing clothes. For some of the sampling stations river water is objectionable for drinking purposes. Hence, continuous monitoring of river water parameters is required.

KEYWORDS: *Krishna River, Agricultural run-off, Domestic wastes, etc*

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INTRODUCTION

Water is the most important compound in the world as well as most miss usable one. Physical, chemical and biological characters of water determine the quality of water. The water gets polluted due to increased human population, industrialization, use of fertilizers in agriculture and manmade activity. The natural aquatic resources are causing heavy and varied population in aquatic environment leading to poor of water quality and its depletion. Hence, it is necessary that the quality of drinking water should be checked at regular time interval. As per WHO, near about 80% of all the diseases in human are water borne[16]. Rivers are the sources of natural wealth for sustenance of life and for academic researchers now days. The rapid industrialization and aquaculture practices along the river system have brought considerable decline in the water quality[3,4]. This decline in river water quality is not good for the ecological systems as well as for a variety of uses also. Such type of sampling stations are selected to variety of socio-economic drivers, which produces increased pressures and impact which leads to environmental stress. [2] Due to this stress, the subsequent increase in nutrient load produces on ecological impact over biological communities associated monthly with eutrophication processes [5]. The hydrological study is a prerequisite in any aquatic system for the assessment of its potentialities and to understand the realities between its different trophic levels and food webs. Also, the environmental conditions like temperature, oxygen, salinity, water movement; topography etc. determines the composition of its biota. Hence, the nature and distribution of the physical and chemical characteristics of the water body [6,7].

The present study was aimed to analyze the physico-chemical parameters like temperature, pH, DO, BOD, COD, Chloride, Nitrate, Phosphate, Calcium, Magnesium and Hardness of Krishna River during October 2018 to June 2019.

MATERIALS AND METHODS

For this work water samples were collected from river Krishna at Satara District of Maharashtra, between October 2018 to June 2019. Samples were collected in the morning time. For the collection of water samples a pre cleaned polythene bottles of two liters capacity was used and collected water samples were stored in a refrigerator for further use. The collected samples were analyzed for physical and chemical water quality parameters mentioned by APHA, Trivedi R.K. and P.K.Goel [1,14].

OBSERVATION TABLE NO 1

Sampling Station 1

	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	March 2019	April 2019	May 2019	June 2019
Temp.	24	24	26	26	26	27	29	29	28
pH	7.3	7.1	7.4	7.1	6.7	6.8	6.7	6.5	6.3
DO	5.3	6.8	7.6	7.4	9.8	6.8	6.3	5.8	5.1
BOD	7.6	7.5	7.7	7.6	7.9	8.1	8.4	9.8	9.7
COD	7.8	8.1	8.6	9.3	12.3	23.8	26.3	26.9	24.8
Cl	96	109	148	164	251	263	280	291	297
Nitrate	14	12	17	16	18	21	13	16	19
Phosphate	0.042	0.073	0.079	0.083	0.088	0.71	0.83	0.96	0.98
Calcium	180.1	196.3	231.2	233.0	261.0	292.3	252.01	261.31	269.2
Magnesium	18	16	18	21	23	18	17	19	21
Hardness	148	157	161	189	178	169	182	186	190

OBSERVATION TABLE NO 2

Sampling Station 2

	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	March 2019	April 2019	May 2019	June 2019
Temp.	24	25	24	26	26	27	28	29	28
pH	7.1	7.2	7.3	7.00	6.9	6.9	6.5	6.4	6.6
DO	5.4	6.7	7.7	7.6	9.4	6.8	6.9	6.3	5.9
BOD	7.8	7.6	7.9	7.4	9.2	7.9	8.3	8.8	9.4
COD	7.4	8.6	8.7	9.6	11.8	22.5	25.7	27.1	25.3
Cl	98	110	108	136	267	283	278	297	289
Nitrate	16	14	19	21	18	20	18	16	22
Phosphate	0.361	0.452	0.478	0.362	0.848	0.874	0.898	1.321	1.346
Calcium	174	190.	198	241	254	306.1	321.3	342.12	362.14
Magnesium	17	19	13	16	18	17	16	20	19
Hardness	162	158	174	183	193	159	176	189	193

Fig.No. 1 Krishna River Map

Fig.No.2: Krishna River Photo

RESULTS AND DISCUSSION

During the study period temperature of river water varied from month to month depending on the aerial temperature. The water temperature fluctuated from 24^{0}C to 29^{0}C. Temperature of water is one of the important parameter in case of study of physico-chemical parameters of any water body. pH of the water sample was found in the range of 6.3 to 7.4. pH is nothing but negative logarithm of hydrogen ion concentration. Majority of aquatic life tend to be very sensitive to pH[8,9]. pH level in the body decides the body chemistry as well as disease. Here the observed values of pH are within the limit of BIS/WHO. With the help of dissolved oxygen one can get an idea about how much oxygen is available in the water body. Here DO level is in the range from 5.3 to 9.8 mg/l. The useful value for good quality of water is 4 to 6 mg/L of DO, which ensures healthy aquatic life in a water body[11]. Here, at some sampling stations the values are higher; it may be due to some biological changes in the water body. The amount of food available for bacteria in the water body is nothing but biochemical oxygen demand. For the degradation of oxidizable organic matter to take place minimum of 2 to 7 mg/L of DO level is to be maintained at laboratory experimentation[12]. Observed values are in the range of 7.6 to 9.8 mg/l. All the water samples are within the limits of WHO/BIS i.e. 30. COD is an important and quickly measured parameter for steam and industrial waste water analysis and water treatment plant[13]. The observed values are in the range from 7.4 to 27.1 mg/l. These values are within the limits of WHO/BIS i.e. 250.Chlorides are present in water generally as NaCl, $MgCl_2$ and $CaCl_2$ even though chlorides are not considered as harmful as such[15]. The concentrations above 250mg/l impart peculiar taste to the water. Presence of higher concentration of chlorides indicates pollution from domestic source or industrial wastewaters[10]. Here observed values are in the 96 to 297mg/l.

Excessive concentrations of nitrates are objectionable particularly for young aquatic animals. The maximum contaminant level for nitrates is 10 mg/l. Remaining parameters like phosphates, calcium, magnesium and hardness are within permission limits of WHO/ICMR.

CONCLUSION

By studying river water at two sampling stations and for all these parameters for a year, it is observed that the river water is suitable for all the routine activities. Even though at some sampling stations some of the parameters are at objectionable level, which may be due to extra activities by the residents.

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