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Water Quality Analysis & Determination of Max. Polluted Zone in Krishna River of Karad Region

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A B S T R A C T

Krishna River is one of the 14 major rivers of India, which originates from Mahabaleshwar and flows all across southwestern Maharashtra covering several important towns like Wai, Satara, Karad and Sangli. The present study was made in the Krishna River at two sites, mainly Eksar and Wai. The Eksar site is before entering of the river at Wai. The Wai is holy city and comparatively a polluted city due to religious and cultural activities. The purpose of taking Eksar site was mainly for comparison purpose. A total number of 42 species was recorded in the Krishna River belonging to four major classes, Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae. Algal species recorded at Wai are highly tolerant to organic pollution, while the species obtained in the untainted section before water enters in Wai have comparatively several sensitive species. This indicates that the water is non-polluted or relatively less polluted at Eksar.

The Palmer's algal index shows very low organic pollutants at Eksar and probable organic pollution at Wai. Shannon's diversity index reveals that the human activity at Wai has made the river highly polluted, which at a glance looks like of no direct use. Simpson's index is used to assess the dominance of algal species. According to the Simpson's index, species are not evenly distributed in both the sites. Environmental Gini index also shows the Wai as comparatively a polluted siteKrishna River is one of the 14 major rivers of India, which originates from Mahabaleshwar and flows all across southwestern Maharashtra covering several important towns like Wai, Satara, Karad and Sangli. The present study was made in the Krishna River at two sites, mainly Eksar and Wai. The Eksar site is before entering of the river at Wai. The Wai is holy city and comparatively a polluted city due to religious and cultural activities. The purpose of taking Eksar site was mainly for comparison purpose. A total number of 42 species was recorded in the Krishna River belonging to four major classes, Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae.

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Keywords: Krishna, Karad, Water quality analysis.

1. IN TRODUCTION

The rivers are long ecosystems which are known to have diverse stretches due to changing boundary conditions and catchment area. The water characteristics and the associated flora and fauna change from one section to other. Industrial wastes, agricultural runoff and sewage are the main cause of the river pollution (Chetna et al. 1997, Singh & Rai 1999, Ganguly et al. 1999, Goel&Bhosale 2001). Due to the flowing nature of rivers, they usually have higher self purification capacity than other aquatic ecosystems.

The organic matter tends to degrade faster owing to higher reaeration of water due to flowing nature and high turbulence.As rivers are often important source of community water supply and irrigation, their water quality has to be monitored regularly. The quality of water can also be monitored by the types of organisms present in water (Javaid&Pandit 2013). Numbers of algal species are sensitive as well as tolerant to organic pollution. Several workers have used algae as indicators of water quality (Sudhakar et al. 1994, Trivedy 1986, LiLi 2010). Algae are used to assess the water quality because they have very sensitive and have short life cycle. Algae are easily cultured in the laboratory and samplings are easy, inexpensive and create minimal impact on resident biota. Relatively standard methods exist for the evaluation of functional and non-taxonomic structural characteristics of algal communities (Round 1991, Van Dam et al. 1994, McCormick & Cairns 1994, Stevenson & Pan 1999).

Alterations and shifts in the species composition and productivity of algal assemblages in response to anthropogenic stresses should be considered in order to predict the effects on food web interactions and other ecosystem components (McCormick & Cairns 1994). Algae affect the taste and smell of water, and forecasting the movement and growth of algae in river systems is important for operational managers responsible for the distribution and supply of potable water (Whitehead &Hornberger 1984). Krishna River is the major river in Satara district of Maharashtra and has a number of tributaries. It originates from Mahabaleshwer in Western Ghats of Maharashtra and flows towards southern Maharashtra covering several important towns like Wai, Satara, Karad and Sangli. Wai is an ancient and religious city having large number of small and large temples at the bank of the Krishna River.

1.1. THE STUDY REGION

The study region comprises south-western Maharashtra, particularly Krishna river basin. The river Krishna one of the three great rivers of south India take its birth at a internationally famous hill station Mahabaleshwar in Satara district of western Maharashtra. The river flows through Satara and Sangli districts and lastly enters into Karnataka state. The total length of river is nearly 243 kms and also the Krishna is perennial water bearing and the result is that the total course region of river is dotted with dense population and its different activities. The agriculture, industrialization and urbanization are the outcome of river water supplys. Wai, Satara, Karad, and Sangli ate the big urban places in the basin while Karad, KopardeHawali, Wangi and Govare etc. centres are the fragmented industrial estates are important.

1.2 OBJECTIVES

- . To study the Krishna basin and its annual flow of water.
- To make survey of pollution factors along the Krishna river course.
- To find out the sources of degradation along the Krishna and its tributaries.
- To access the pollution gravity and its effects.
- To suggest environment friendly strategy for river resources.

1.3 SIGNIFICANCE OF THE STUDY

Global health is most important and should keep on the first priority for consideration. The environmental degradation is a global phenomenon. The degradation in water bodies and water driven bodies become an very serious matter because water is supposed a life for everyone. The drinking water source in the study region is only surface water flow through various rivers. The recent report from the Indian River Water Assessment Commission shows that all the surface water comes through rivers and tributaries has become contaminated by forcing bodies. The river environment is degradated by nature and man and the result of this degradation is to be studies in various angles. So that some remedial planning can be suggested. The degradatted water bank affects not only personal health but the social and national health is also suffered. Such type of study can be conducted all over the region so certain policy for rescue operation can laid down. This becomes path finder to parallel studies.

2. LITERATURE REVIEW

TITLE- Status of the River Krishna: Water quality and river in environment in relation to fisheries.

The River Krishna, the second largest peninsular river of India, was investigated during premonsoon,monsoon, and post-monsoon seasons to improve the understanding of its ecology through analysis of physical and chemical parameters of water and sediment. Important tributaries of the river were also studied simultaneously to understand their influence on the main stream of the River Krishna. In addition to 25 sampling sites along the main stream of the River Krishna, sampling was also done in 13 important tributaries at sites upstream of the confluence point. Dams, barrages and anicuts have visibleimpacts on all of the observed physical and chemical properties of water and soil. Statistical analysis revealed that water parameters have a strong

association with sediment parameters. However, the studywas unable to find any relation between primary production and water quality parameters. Fish speciesdistribution was strongly influenced by temperature and water depth, as well as specific conductivity, asobserved through Canonical Correspondence Analysis. **A. K. Das, R. K. Manna, D. S. K. Rao, B. C. Jha, M. Naskar& A. P. Sharma(2017), 20:1-2, 160-174.**

TITLE- Water quality evaluation and water quality index of Krishna River near KaradTahsil, DistSatara, (M S India).

River water pollution is one of the most important environmental issues faced by the villagers situated on the bank of Krishna River. Krishna River is the largest river in the Satara District of Maharashtra. On the bank of river small scale industries as well as sugar factories are located. The waste from the industries as well as surroundings localities is directly discarded into the river body. To evaluate the water quality of the river, sevensampling stations were selected and the analysis was done for the parameters like pH, DO, BOD, COD, Calcium, Magnesium, hardness, Chloride, Sulphate and Nitrate etc. The pollution status was investigated on the basis of obtained results of physical and chemical parameters of the water. During the analysis it is observed that, the variation in the results is due to human activity, discharge of waste water and agricultural runoff into the water body is the main sources responsible for the river water pollution .**Mr.S.D.Jadhav&M.S.Jadhav ,January 2016International Journal of Chemical Sciences 4(5):94-97.**

TITLE- Heavy Metal Distribution in Sediments of Krishna River Basin, India.

Suspended and bed sediments collected from the entire region of the Krishna River and to major tributaries were analyzed for heavy metals (V. Cr, Mn Fe Co Ni Cu Zn, and Pb) by the thin-fim energy dispersive x-ray fucrescence technique There is considerable variation in the con centration of elements towards downstream, which may be due to the variation in the subbasin geology and various de grees of human impact Suspended particles are enriched in heavy metals throughout the basin relative to bed sediments The heavy metals are enriched in coarse size fractions (10-00 μm) throughout the Krishna River except to tributary Bhima, where finer fractions (2 pm) dominate Transition elementscorroate very well with each other There is a striking similarity between the bed sediments of Krishna River and the Indian average When the annual heavy metal flux carried by the Krishna Fiber was estimated, and viewed in relation to the other major riverine transport the Krishna is seen to be a minor contributor of heavy metals to the Bay of Bengal. **R. Ramesh ,V.S.Ubramanian, Environ.Geol.water Sci.Vol-15 No.3,207-216.**

TITLE - Study of Waste Water Characteristics and its pollution for the stretch of Krishna Riverfrom Karad to KopardeHavale .

The Karad city is located at southern part of Maharashtra state in India. The Krishna River enters Karad city from the northern part and is the main source of water for the domestic, industrial and agriculture purpose of Karad city. Nearly 55 MLD of water is consumed by the people of karad from the Krishna River. Approximately 48 MLD of waste water is generated from Karad City. The sewerage system as well as treatment facilities provided by municipal authorities have become inadequate due to heavy growth of population. The current sewerage system accounts only for 40-50 % of requirement. The waste water from uncovered sewerage area mixes in natural nallas, which are end into Krishna River. In summer the rate of river water flow is low while the flow of sewage from the nallas in to the river is more which almost results into a sewage drain. The present study is an attempt to study the waste water characteristics and its analysis for the stretch of the Krishna River from Karad to Koparde. **International Journal of Science and Research (IJSR) WaghC.H,Kamat R.S,ISSN (Online): 2319-7064 Impact Factor (2012): 3.358 Volume 3 Issue 7, July 2014**

3. METHODOLOGY

3.1. Survey of Krishna River

- 1ST We visited Ptitisangam ghat for inspection of pollution in Krishna river.
- Then we prepared a survey formsin which we included questionaries' related Krishna river in which following questions where included
- What is present condition of Krishna river ?
- Are the measures taken by KMC are satisfactory?
- Should NGO take interest which helps to reduce pollution Krishna river?
- Has growth of neighborhood affected the condition of Krishna river?
- Is there a need for legal strong restrictions for activities that take place in Krishna river?

From above questionaries' we came to know about the drainage outlets on bank of river of particular zone , past and present conditions of Krishna river.Also from satellite topographic maps, KMC Reports we came to know another drainage outlets which discharge waste water in Krishna river.

Table No 1-Grading table

	Evaluation Parameters	**1**	**2**	**3**	**4**	**5**	**Total no.**	**Avg. Grading**
1	What is present condition of? Krishna river	0	0	0	6	8	13	2.7
2	Are the measures taken by KMC are satisfactory?	6	6	5	0	2	17	3.6
3	Should NGO take interest interest which helps to reduce pollution Krishna river	8	10	5	5	4	31	2.7
4	Has growth of neighborhood affected the condition of Krishna river?	10	8	5	8	10	41	8.2
5	Is there a need for strong legal restrictions?	10	10	10	10	10	50	10

3.2. Selection of sampling points

According to present conditions from satellite topographic maps, we selected 5 sampling points on basis of drainage outlets of nallahs,industrial waste water and activities that take place on the sampling points and to cover maximum area of panchganga river. The selected sampling points are as follows.

Table no 2. -Sampling sites

Sr. No	**Sampling Sites**	**Site Code**	**Site Location**	**Mean Sea Level (MSL) in meter**
1	ChachegaonKoyana River	A1	17°26’54”N, 74º13’.81” E	592
2	Koparde Haveli Krishna River	A2	17º33’32”N, 74º17’58”E	592
3	PritisangamGhat ,Karad.	A3	17º29’63”N, 74º17’79”E	565
4	Krishna River,Govare.	A4	17º28’44”N, 74º20’63”E	574
5	RehareBudruk, Krishna river bridge.	A5	17º17’24”N, 74º21’51”E	592

4. DISCUSSION

- Water quality index is established from important various physicochemical parameters. The results obtained for water quality index is shown in Table.
- The pH of River water found to be 7.88 -7.97 which is favorable for growth of flora and fauna.
- The acidity of water at all points above permissible limit. This can contribute to corrosiveness and influence chemical reaction rate, chemical balance and biological processes.
- The DO is higher all sampling point.
- BOD is under permissible limit at all points.
- COD under permissible limit at all points. Higher the COD value indicate the excessive presence of organic matter which can give higher pollutant load in water.
- Phosphate content is higher at all points which can lead to growth of water hyacinth.

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5. CONCLUSION

The present study is aimed to develop a water quality prediction model for the five different stations at Krishna river, where the water samples are collected and analyzed in the laboratory. To assess the environmental impacts on the river water quality the study is carried out and the results are been discussed in Results. From the results of present investigation it is concluded that:

1. Due to non-availability of the adequate land and full-fledged treatment facilities, large quantity of agricultural, municipal and industrial wastewater enters into river Krishna which deteriorate the quality of river water.

2. There is a decreasing trend in Dissolved Oxygen (DO) level which is mainly due to the presence of oxygen depleting substances that reduces the available DO.

3. There is a gradual increase in the Biochemical Oxygen Demand (BOD) from upstream to downstream.

4. study provides a mean for easier and faster monitoring of water quality at the location and to predict the various water quality parameters.

5. The study also helps in selecting the treatments to minimize contaminants in river water.

6. The variations in various parameters.

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