iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** IV **Month of publication:** April 2019

DOI: https://doi.org/10.22214/ijraset.2019.4459

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

Assessment of Water Quality of Musi River at its Origin, in Hyderabad and at Valigonda: A Comparative Study

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Abstract: Musi is a tributary of River Krishna. It runs through Hyderabad and is highly polluted. This is a comparative study of the physico-chemical properties of the waters of the river at its origin in Vikarabad, at Hyderabad and at Valigonda in Nizamabad. There is a marked degradation of the water quality at Hyderabad and Valigonda.

I. INTRODUCTION

Water is one of the most primary resources to sustain living organisms. The undue use of this resource and irrational methods of disposing of effluents can take a toll on fresh water bodies. Hyderabad is one of the fastest growing urban centres with a huge amount of domestic sewage being generated on a daily basis. Coupled with this the city also has massive establishments of industries which have an impact on water quality due to irresponsible wastewater disposal. [3] The city has no outlet for sewage and wastewater disposal other than Musi, which is the only source of discharge. Thus, Musi River in the city has changed into a sewage canal, presents very grave river ecology, and is a source of contamination for even the ground waters around the areas of Musi.

Musi River is a tributary of the Krishna River. It has its origin in the Ananthagiri Hills located in Vikarabad District of Telangana. The natural spring emerges from the ground and finds its way to the temple tank of Sri Bugga Ramalingeshwaram.

In this study, the quality of water in the temple tank fed by the natural spring water is being assessed for its water quality. Even the water samples collected from Hyderabad city near Salarjung Museum and the Musi canal located at Akkampally at Valigonda.

Musi River has a good discharge and a good quality of water upstream. But as it reaches Hyderabad city this river transforms into a sewerage drain. This sorry state of affairs is primarily due to lack of any other waste disposal mechanism.

The Hyderabad city discharges about 600 million litres per day of untreated sewerage into the Musi River. These waters seep into the deeper layers of the earth and contaminate the ground water channels around the area. The people of low economic strata, who generally depend on ground water for drinking purposes and use it for irrigation, are facing lots of health problems. The pathogenic bacteria, viruses and other parasites, which are present in the contaminated waters, are causing several infections to the population residing in these areas. Hookworm infections are more common in agricultural workers who go barefoot in wastewater-irrigated fields. [8]In the present study a comparison of three areas of the Musi- the origin at Vikarabad, the river in the heart of Hyderabad city and the canal of the Musi River in Valigonda, where these waters are extensively used for irrigation and other purposes- is being done.

II. METHODOLOGY

The water samples were collected from three locations and physical and chemical properties were analysed by using standard methodologies for water quality assessment. The physical parameters such as $_pH$, E. C. Microsiemens and Turbidity were observed. The chemical parameters such as Total dissolved solids, Total dissolved hardness as $CaCO_3$, Total alkalinity as $CaCO_3$, Non-carbonate hardness as $CaCO_3$, Calcium, Magnesium, Sodium, Chloride, Sulphate, Silica, Iron, Nitrate, Fluoride and Potassium contents were assessed in the water samples.

III. RESULTS

A. $_pH$

The $_pH$ of the samples studied was in the range of 6.3 to 7.3. The waters in Vikarabad exhibited more acidic $_pH$ when compared to the other two samples.

B. Total Dissolved solids

Total dissolved solids were least in Vikarabad's water samples, recording 136. The highest value of 1040 was seen in Hyderabad and the Valigonda sample showed 838.

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C. Turbidity

Turbidity of the sample from Vikarabad was around 5, which is the maximum permissible level; while turbidity at Hyderabad was the highest, as compared to Valigonda's sample.

D. Alkalinity

Alkalinity levels of the waters of Hyderabad and Valigonda were beyond permissible limits while the Vikarabad water sample showed alkalinity within the permissible limits.

E. Total Hardness

The total hardness of the samples was from 70 to 381, Vikarabad reporting the lowest and Hyderabad recording the highest at 381.

F. Chlorides

Chloride levels in the study areas were in a range of 17 to 255.

G. Sulphates

Sulphates in Hyderabad were maximum, followed by Valigonda. The least amount of sulphates was seen in the Vikarabad sample. Calcium, Magnesium, Potassium, Silica and Iron contents were higher in Hyderabad sample while Fluoride, Iron and Nitrate contents were higher in The Valigonda sample.

Table 1: Physico-chemical parameters of Musi River at Vikarabad, Hyderabad and Valigonda.

S. No	Parameters	Requirement as per IS : 10500-2012		Results		
		Acceptable Limit	Permissible limits in the absence of alternate source	Vikarabad	Hyderabad	Valigonda
I	PHYSICAL					
1	pH	6.5 – 8.5	No relaxation	6.3	7.3	7.02
2	Turbidity (NTU)	1 max	5 max	5	15	10
II	CHEMICAL					
1	Total dissolved solids, mg/l	500 max	2000 max	136	1040	838
2	Total hardness as CaCO3 , mg/l	300 max	600 max	70	381	291
3	Total alkalinity as CaCO3 , mg/l	200 max	600 max	92	335	355
4	Non-carbonate hardness as CaCO3 , mg/l		_ _ _	Nil	46	Nil
5	Calcium as Ca, mg/l	75 max	200 max	20	84	80
6	Magnesium as Mg, mg/l	30 max	100 max	5	41	22
7	Sodium as Na, mg/l		---	28	195	16
8	Chlorine as Cl, mg/l	250 max	1000 max	17	255	175
9	Sulphate as SO4 , mg/l	200 max	400 max	24	105	48
10	Silica as SiO2 , mg/l		---	10	32	30
11	Iron as Fe, mg/l	0.30 max	No relaxations	0.05	0.4	0.5
12	Nitrate as NO3 , mg/l	45 max	No relaxations	8	28	30
13	Fluoride as F, mg/l	1.00 max	1.5 max	0.15	0.5	0.6
14	Potassium as K, mg/l		---	1.0	8.0	7.0

IV. DISCUSSION

Musi is a rain fed river. The water in this river, though limited, is the lifeline for many villages in the Ranagareddy, Vikarabad, Hyderabad, Yadadri, Bhongir and Nalgonda Districts of Telangana. The severe apathy by all the stakeholders has left a completely ruined river ecology. Due to rapid development during the last two decades in Hyderabad, large quantities of wastewater are being produced in the city, which is drained into Musi as there are no other outlets for the disposal of wastewater.

The conscientious implementation of wastewater treatment plants, and effluent treatment plants, and efforts to improve solid waste management can help in improving the water quality of this river.

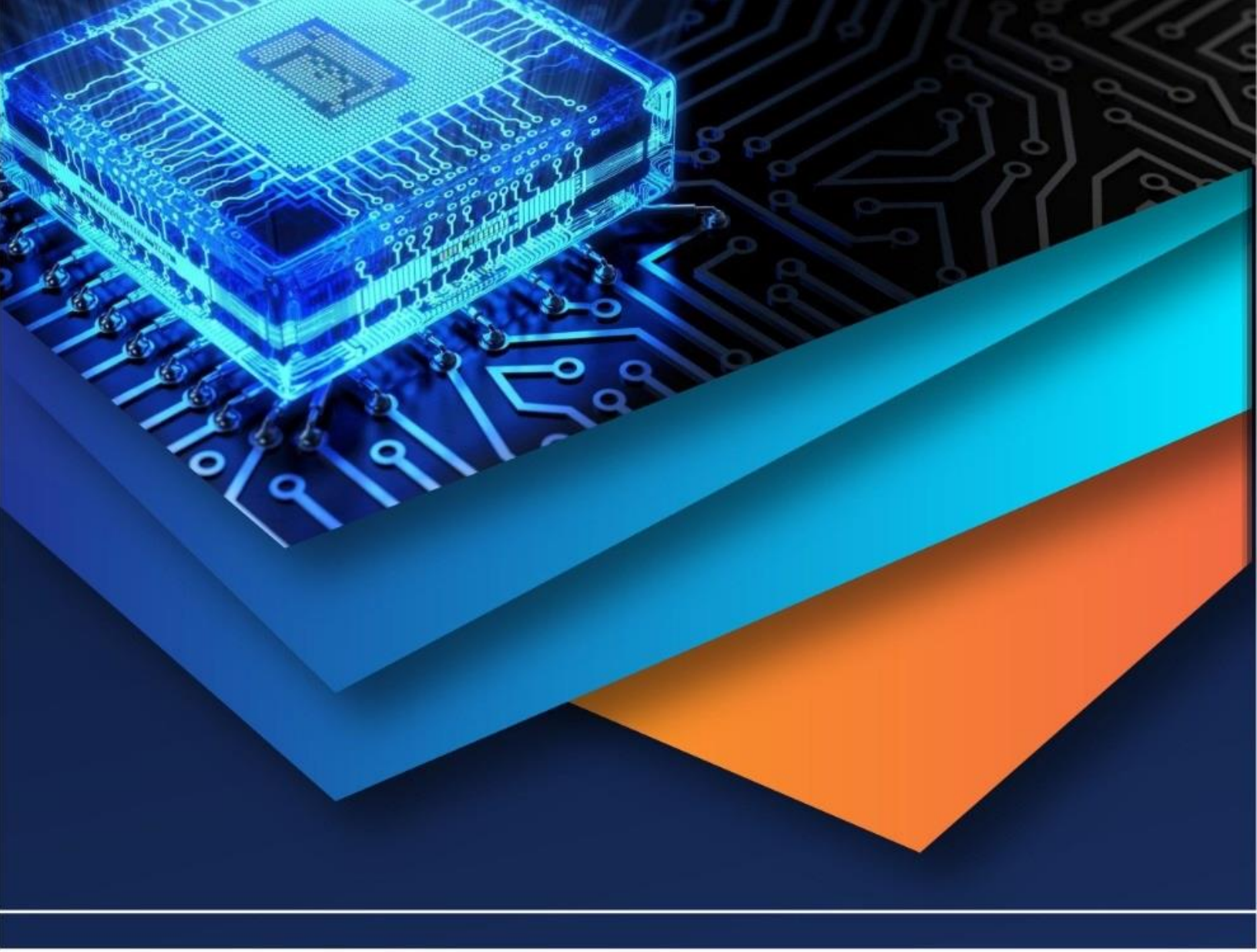
Hope in the coming years more efforts will be taken for sustainable development to mitigate water pollution.

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