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Assessment Of Some Selected Heavy Metals From Manjara River Water At Biloli In Nanded District, Maharashtra, India

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Abstract-The aim of this research work is to determination of Heavy metals Iron, Zinc, Manganese and Copper with the help of UV-Double Beam Spectrophotometer from Manjara River at Biloli taluka in Nanded District, Maharashtra state of India is to be carried out during the period of January to December in 2013. The heavy metals enter in the ground water form variety of sources and discharge of untreated effluents and indiscriminate use of fertilizers and pesticides in agricultural fields and water get contaminated.
Key Words- Manjara River water, Iron, Zinc, Manganese and Copper, Permissible limits.

I. INTRODUCTION

Water is an important factor in the ecological balance and surface waters pollution with heavy metals is a current problem with serious consequences on health. Heavy metals in small quantities are needed for all vital forms. In the organism cells, metals are presented as cations, but their inclusion is strictly regulated in large quantities because they are toxic. (Mihai Teopent Corcheş, 2010). The overexploitation of ground water resources and discharge of untreated effluents induces degradation of ground water quality. Heavy metals enter in water from variety of sources, it can be natural or anthropogenic, Main anthropogenic sources of heavy metal contamination are partially treated effluents contain toxic metals, mining and disposal of untreated, as well as metal chelates from different industries and indiscriminate use of heavy metal-containing fertilizer and pesticides in agricultural fields Metals enter into river water from mining areas through various ways such as mine discharge, run-off, chemical, soils and weathering of rocks, wet and dry fallout of atmospheric particulate matter (R. Raza & G. singh, 2010; Reza et al., 2011). Usually in unaffected environments the concentration of most of the metals is very low and is mostly determined by the mineralogy and the weathering of that area (Reza et al., 2011). The common sources of heavy metals are from dead and decaying vegetation, animal waste, wet and dry fall outs of atmospheric particulate matters and from aquatic plants and animals and their presence in trace amounts in the aquatic environment are essential. However, at high concentrations, these trace metals become toxic (Shaikh et al, 2012). Bioavailability of a trace metal for aquatic organisms and metal and toxicity are dependent on the physical and chemical forms of the metal The toxicity of metals is dependent on their solubility and this in turn, depends heavily on pH and on the presence of different types of anions and other cations (Sayyed Juned et al, 2011). some metals Cu, Zn and Fe are essential micronutrients, they can be detrimental to the physiology of the living organisms at higher concentrations (Kumar manoj et al 2012). Iron in natural the water remain present in ferric or ferrous form especially in acidic conditions such as associated with degradation of excessive organic matter accumulated in the soil Manganese is a naturally derived metallic pollutant. Rocks and soils commonly contain Manganese bearing minerals. Fuel oil & Fertilizers are also significant sources of Manganese. Water with excessive quantity of decaying organic matter also has significant quantity of Manganese (Aarti S et al, 2014). Low concentration of Manganese and zinc in the river surface water related to contribution of pH, dissolved oxygen and phytoplankton (Mohamed et al 2010). The aim of present study is making an assessment of water quality with reference to heavy metals from Manjara river water.

II. STUDY AREA

The River Manjara is a tributary of the Godavari River. It is flowing through the states of Maharashtra, Karnataka and Andhra Pradesh. It originates from the Balaghat range of hills at an altitude of 823 meters (2,700 ft) and empties into the Godavari River in

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Nanded District. The present study of river water is carried out from the Manjara River at the Biloli Taluka of Nanded district Maharashtra state. This is situated at Southern east of Maharashtra state, India. Biloli is located at 18°46′N 77°44′E18.77°N77.73°E.

III. MATERIALS AND METHODS

The present study work has been done for the systematic study of some trace metals from the Rive Manjara at Biloli. The samples were collected from different sampling sites near the villages such as Sagroli, Yesgi, and Ganjgaon. The sampling sites named as S1, S2 and S3 respectively. The water samples were collected in a clean polyethylene can, these water containers were cleaned properly before use. The Temperature and pH of all the water samples were noted immediately at the time of sampling. The heavy metals were determined as per the standard methods prescribed by APHA and NEERI, with the help of UV-VIS double beam spectrophotometer into laboratory. The samples were preserved with adding preservatives to avoid precipitation. This work carried out for the period of one year.

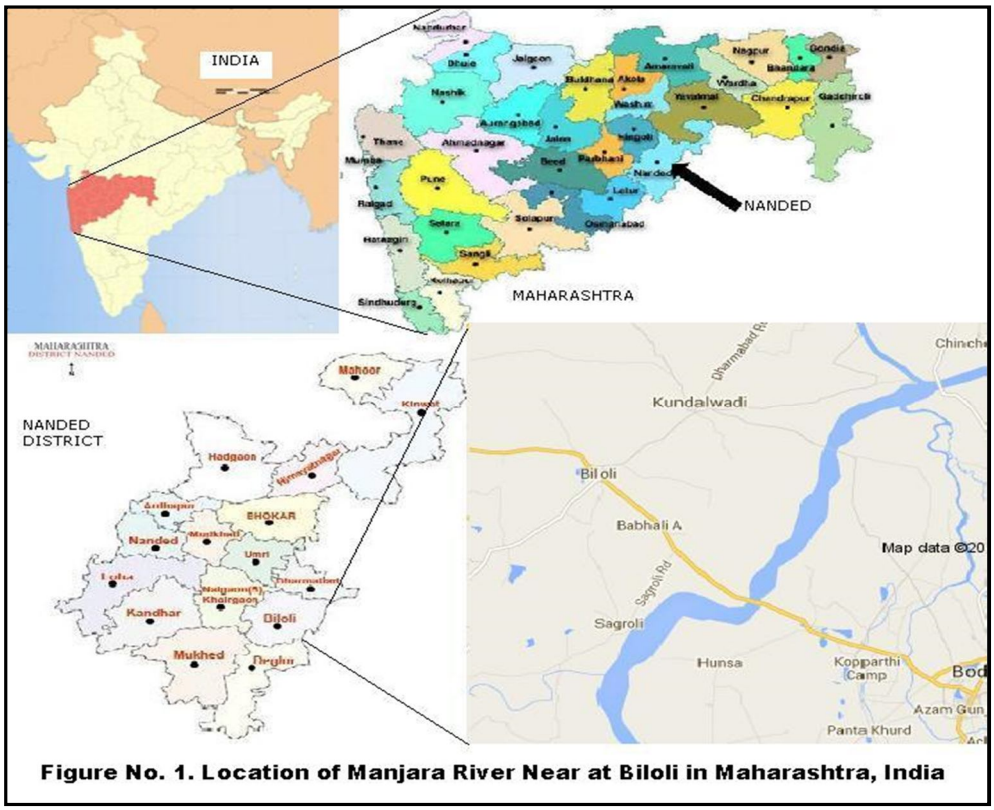

Fig. 1. Location of study area

IV. RESULTS AND DISCUSSION

Table No. 1: Monthly Variations of Heavy metal from Manjara River during Jan –Dec 2013

Month	pH			Temperature			Iron		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
January	7.2	7.3	7.2	24.3	24.5	24.4	0.34	0.34	0.32
February	7.5	7.5	7.4	24.7	24.7	24.6	0.41	0.37	0.39
March	7.9	8.0	8.1	25.6	25.5	25.3	0.39	0.41	0.43
April	8.1	8.2	8.0	26.7	26.6	26.5	0.48	0.46	0.47

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May	8.3	8.2	8.3	27.9	28.0	28.1	0.51	0.50	0.52
June	7.7	7.7	7.9	27.6	27.5	27.5	0.52	0.50	0.50
July	7.3	7.2	7.4	27.1	27.3	27.6	0.41	0.39	0.39
August	7.4	7.5	7.4	25.9	26.1	26.0	0.30	0.31	0.28
September	7.4	7.4	7.4	26.4	26.6	26.7	0.23	0.21	0.22
October	7.3	7.4	7.3	27.3	27.6	27.3	0.31	0.29	0.28
November	7.4	7.5	7.6	26.8	26.5	26.6	0.29	0.31	0.29
December	7.3	7.2	7.2	25.9	25.7	25.8	0.33	0.31	0.32

Table No. 2: Monthly Variations of Heavy metal from Manjara River during Jan –Dec 2013

Month	Zinc			Manganese			Cupper		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
January	0.76	0.71	0.72	0.039	0.037	0.037	0.022	0.020	0.021
February	0.71	0.67	0.69	0.035	0.033	0.033	0.020	0.019	0.020
March	0.77	0.74	0.73	0.038	0.039	0.038	0.023	0.022	0.022
April	0.83	0.82	0.80	0.045	0.043	0.043	0.024	0.025	0.025
May	0.87	0.84	0.83	0.049	0.048	0.051	0.028	0.029	0.027
June	0.80	0.79	0.75	0.042	0.040	0.042	0.027	0.027	0.026
July	0.68	0.66	0.65	0.034	0.034	0.032	0.020	0.021	0.021
August	0.61	0.59	0.60	0.030	0.030	0.029	0.016	0.016	0.017
September	0.54	0.54	0.53	0.024	0.023	0.024	0.011	0.011	0.012
October	0.59	0.58	0.60	0.029	0.029	0.028	0.017	0.018	0.018
November	0.67	0.66	0.68	0.036	0.036	0.037	0.022	0.022	0.021
December	0.72	0.69	0.72	0.033	0.034	0.031	0.020	0.021	0.020

All the values are expressed in mg/L except pH and Temperature

Table No. 3: Statistical presentation of selected analyzed Manjara River water parameters during Jan-Dec 2013.

Statistic	pH			Temperature			Iron		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
Minimum	7.2	7.2	7.2	24.3	24.5	24.4	0.23	0.21	0.22
Maximum	8.3	8.2	8.3	27.9	28.0	28.1	0.52	0.50	0.52
Mean	7.567	7.592	7.600	26.350	26.383	26.367	0.377	0.367	0.368
S.D.	0.355	0.358	0.377	1.114	1.128	1.185	0.093	0.089	0.097
Variance	0.126	0.128	0.142	1.241	1.272	1.404	0.009	0.008	0.009

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Table No. 4: Statistical presentation of selected analyzed Manjara River water parameters during Jan-Dec 2013.

Statistic	zinc			Manganese			Cupper		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
Minimum	0.540	0.540	0.530	0.024	0.023	0.024	0.011	0.011	0.012
Maximum	0.870	0.840	0.830	0.049	0.048	0.051	0.028	0.029	0.027
Mean	0.713	0.691	0.692	0.036	0.036	0.035	0.021	0.021	0.021
S.D.	0.100011	0.094912	0.086427	0.007017	0.006654	0.007501	0.004707	0.004833	0.004108
Variance	0.010002	0.009008	0.007470	0.000049	0.000044	0.000056	0.000022	0.000023	0.000017

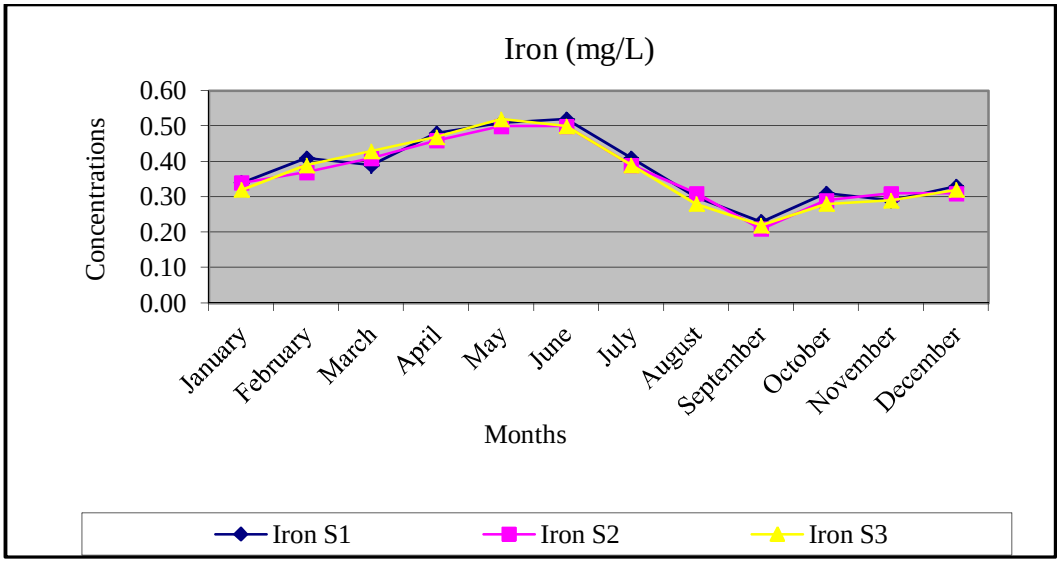

Figure 2: Monthly values of Iron from Manjara river during the year Jan-Dec. 2013.

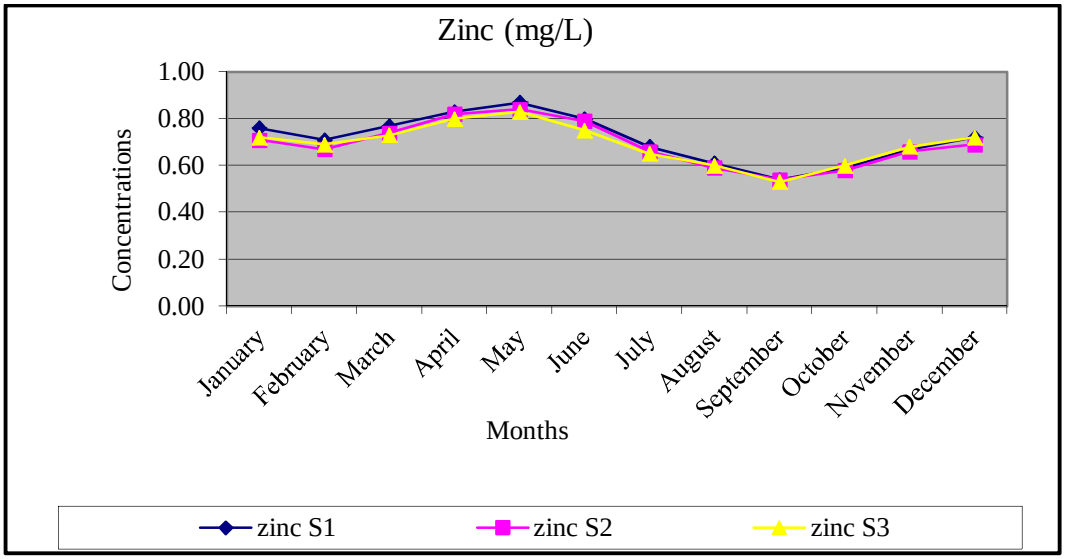

Figure 3: Monthly values of Zinc from Manjara river during the year Jan-Dec. 2013.

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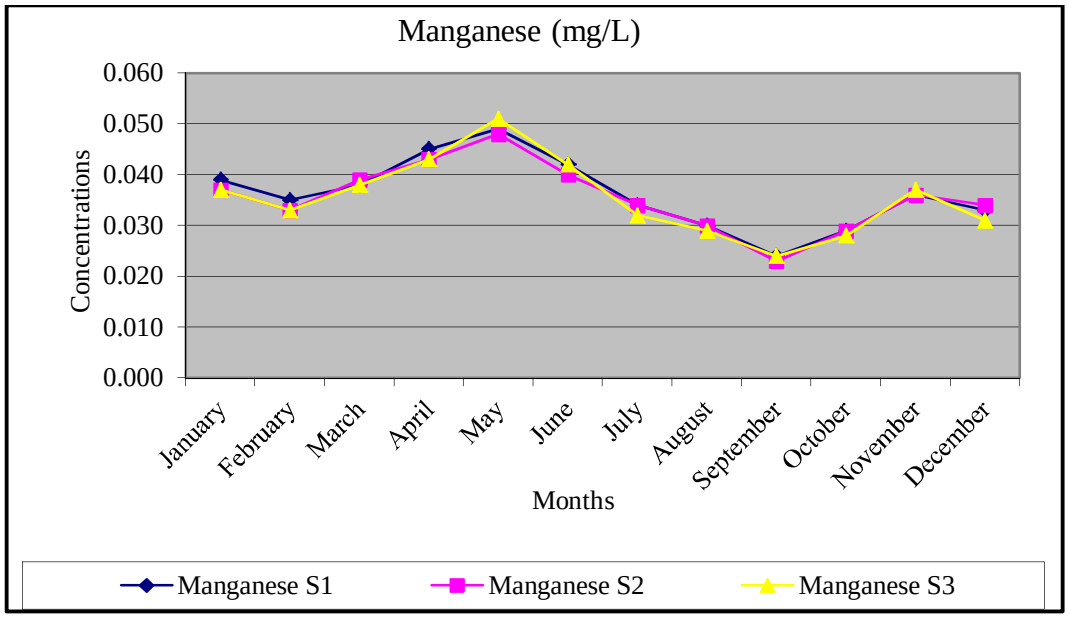

Figure 4: Monthly values of Manganese from Manjara river during the year Jan-Dec. 2013.

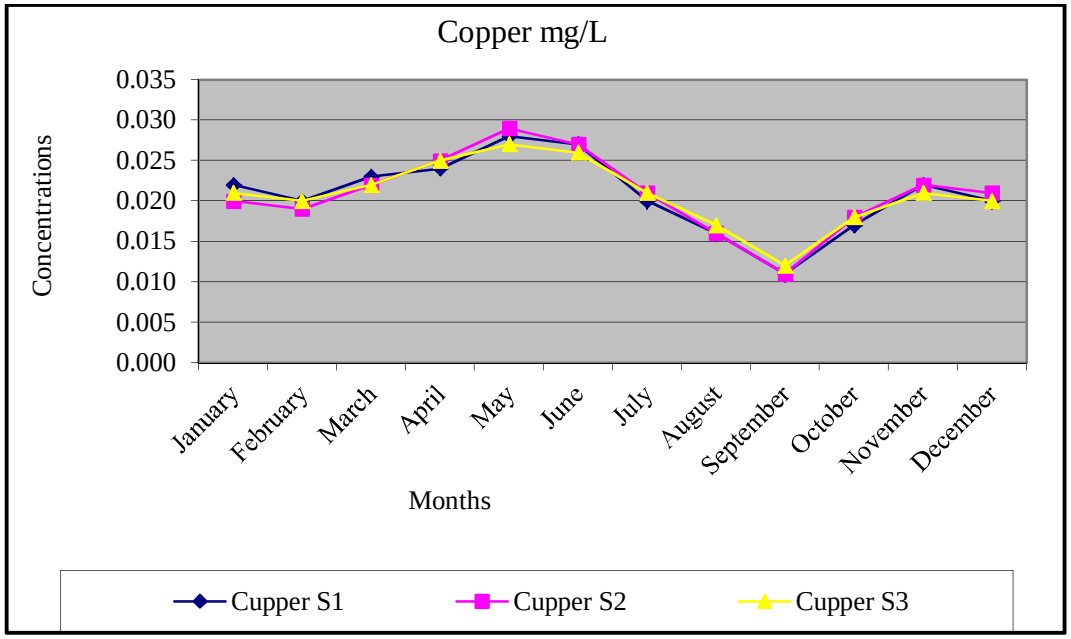

Figure 5: Monthly values of Copper from Manjara River during the year Jan-Dec. 2013.

In the present investigation which is carried out for the investigations of heavy metals which were Fe, Zn, Mn and Cu and the pH and Temperature also be recorded for the water quality of Manjara River at Biloli taluka in Nanded district.

In this present study the recorded pH values from Manjara River were Minimum pH is 7.2 in the month of January and Maximum pH 8.3 in the month of May. The pH was minimum 7.3 in the month of January and Maximum pH 8.2 in the month of April & May. The minimum pH 7.2 in the month of January & December and Maximum pH 8.3 in the month of May were found at site 1, site 2 and site 3 respectively. All the pH values were mostly found well within the permissible limit i.e. 6.5 to 8.5 which prescribed by WHO and IS standards.

The temperature was recorded at site- 1 the highest temperature 27.9^{0}C in the month of May and minimum 24.3^{0}C in January. At

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site-2, the highest temperature was 28.0^{0}C in the month of May and minimum 24.5^{0}C in the month of January and at site-3, the maximum temperature was 28.1^{0}C in the month of May and minimum 24.4^{0}C in the month of January in this present study. Changes in the Temperature are totally depending upon the season, climatic conditions and solar radiation, temperature is co-related with atmospheric temperature (Dhakane, 2012).

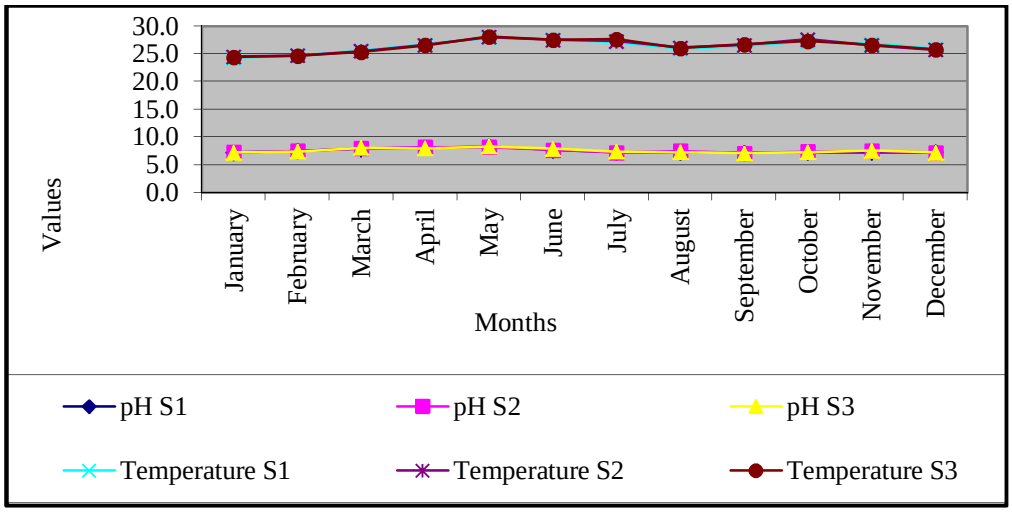

Figure 6: pH and Temperature of the Manjara River water during Jan-Dec. 2013.

The Iron concentration was estimated Minimum 0.23 mg/L in the month of September and maximum 0.52 mg/L in the month of June at site-1. At site -2, the lowest concentration 0.21 mg/L in the month of September and highest concentration 0.50 mg/L in the month of May and at site-3, the lowest concentration 0.22 mg/L in the month of September and highest concentration 0.52 mg/l in the month of May.

The concentration of Zinc was recorded minimum 0.54 mg/L in the month of September and maximum 0.87 mg/L in the month of May at site-1. At the site- 2 the lowest concentration 0.54 mg/L in the month of September and highest 0.84 mg/L in the month of May and at the site-3 the lowest concentration 0.53 mg/L in the month of September and highest 0.83 mg/L in the month of May.

The Manganese concentration was estimated at site-1 the minimum 0.024 mg/L in the month of September and maximum 0.049 mg/L in the month of May. At site-2 the minimum 0.023 mg/L in the month of September and maximum 0.048 mg/L in the month of May and at the sampling site-3 the lowest concentration 0.024 mg/L in the month of September and highest concentration 0.051 mg/L in the month of May were recorded in the present study.

The Copper was estimated at site-1 the highest 0.028 mg/L in the month of May and lowest concentration 0.011 mg/L in the month of September. At the sampling site 2, highest 0.029 mg/L in the month of May and lowest concentration 0.011 mg/L in the month of September and at the site 3, highest 0.029 mg/L in the month of May and lowest concentration 0.012 mg/L in the month of September was recorded in the present study.

The researchers recorded the heavy metals concentration in Mithi River Mumbai the concentration of Iron was found highly in the ranges between 1.12 to 14.72 mg/L and Zinc concentration was recorded minimum 0.10 mg/L and maximum 0.43 mg/L where the Manganese was recorded ranges from 0.19 mg/L to 2.84 mg/L from the four sampling sites at Mumbai, Aarti S et al, 2014. The researchers have done assessment of warri River water in Nigeria they have observed Iron concentration ranged between 0.03mg/L to 5.02 mg/L; Manganese recorded values of between 0.02 mg/L to 0.68 mg/L; Zinc had recorded ranged between 0.0 mg/L to 0.63 mg/L and the concentration of Copper 0.0 mg/L to 0.26 mg/L, Macdonald 2011.

The seasonal variation of heavy metals were recorded the average concentrations of Iron was 0.353-2.345 mg/L, Zinc were 0.042-0.111mg/L, Manganese was recorded 0.085-0.712mg/L and Copper were 0.003-0.008mg/L from Ganga river surface in west Bengal . (Kar et al., 2008) The average Iron concentration was recorded 0.072 mg/l, manganese was found to be 0.069 mg/l and average Zinc concentration was recorded 0.63 mg/l from the Sudha Dam near Bhokar, Maharashtra Mane et al 2013.

The observed values of seasonal variation ranged between ND to 0.87 mg/L and ranged between ND to 0.12 mg/l for Zinc and Copper from the Ganga River respectively, Singh et al (2012)

Kumar manoj *et al* recorded the Iron ranged 0.441-6.654 mg/L, Zinc ranged from 0.014-0.072 mg/L, Copper ranged between 0.010

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-1.445 mg/L and Manganese ranged between 0.050-0.221mg/L from the Suvarnarekha River in West Bengal.

The observed concentration of Iron ranged between <0.01-0.87mg/L, copper were <0.002-0.041mg/L, Zinc was observed between <0.005-0.097 mg/L and Manganese detected ranged from <0.01-0.206 mg/L from the surface river water at Nile Delta in Egypt, Mohamed et al 2010.

V. CONCLUSION

In the present study it concluded that the observed values of pH were within the permissible limit 6.5-8.5. The concentration of heavy metals from Manjara River at Biloli exhibiting the order Zn > Fe > Mn > Cu. The seasonal variation also shown in the results of heavy metals the major sources of pollution of heavy metals are agricultural runoff, natural and anthropogenic activities and rocks and soil commonly contain bearing minerals.

VI. ACKNOWLEDGEMENT

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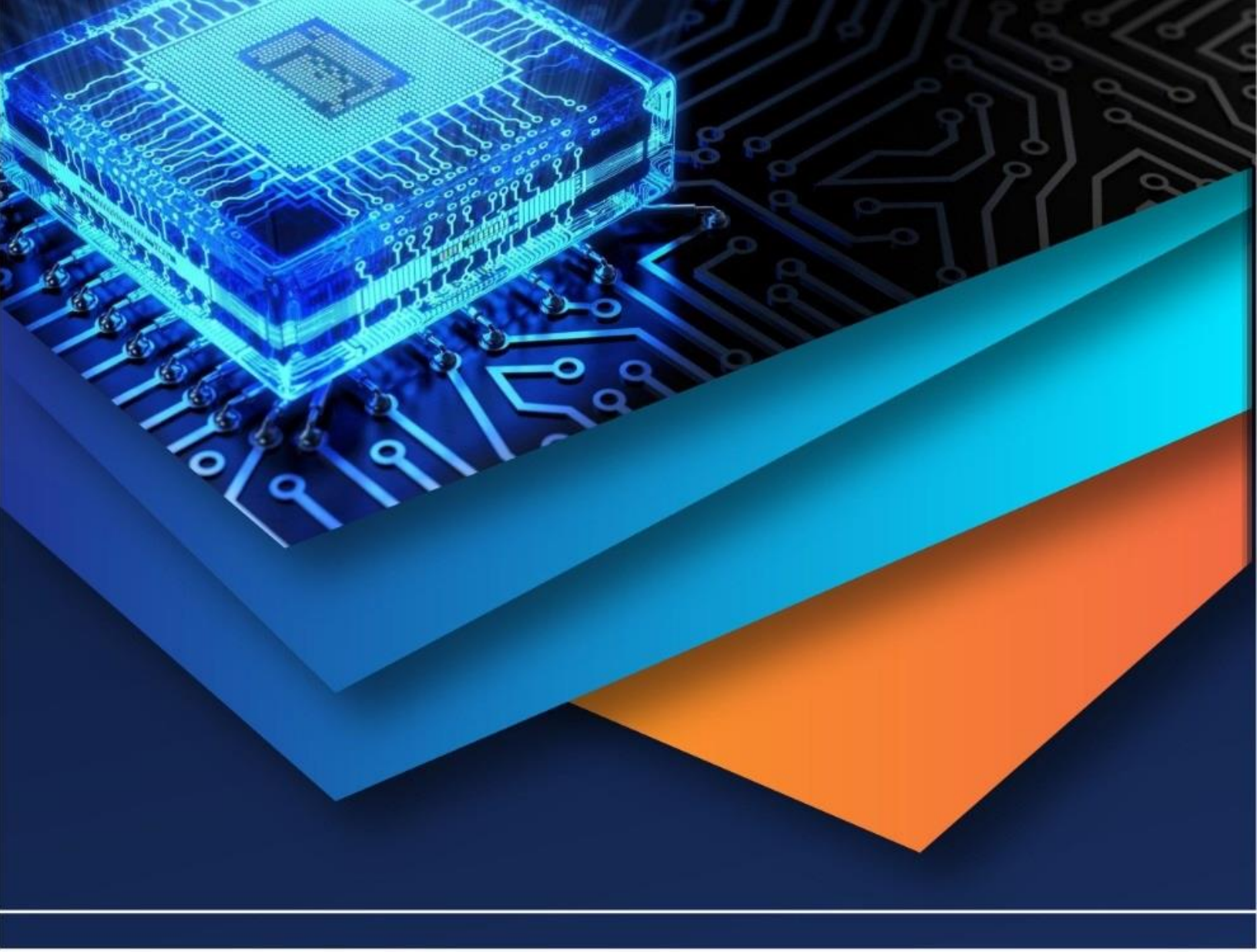

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