

Assessment for Water Quality of Mutha River using Correlation

Tejas Korde¹, Nupur Dumbre¹, Ashwini Abhimane¹, Prof. Swapnil Bijwe²

¹Under Graduate Student, Department of Civil Engineering, ²Assistant Professor,

^{1,2}Dr. DY Patil School of Engineering, Lohgaon, Pune, Maharashtra, India

ABSTRACT

A river is a natural flowing watercourse, usually freshwater, flowing towards an ocean, sea. Mula-Mutha river is one of the major river of Pune city. Mula originates from Mulshi dam and it passes through Poud, Lavasa, Wakad, Balewadi, Baner, Aundh, Khadki, Vishrantwadi, and ends at Sangamwadi. Monitoring of river involves comparison of water quality data between stations, analysis of water quality trends, development of cause-effect relationships between water quality data and environmental data. Present work deals with the analysis of physico-chemical parameters of Mutha river i.e from Khadakwasla Dam to Sangam Bridge. Water samples are collected from four locations. Water quality assessment is carried out by "correlation coefficient (r)" is determined using "correlation matrix" to identify the highly correlated and interrelated water quality parameters. The study involves certain physico-chemical parameters such as dam pH, Turbidity, Electrical Conductivity, Hardness, Alkalinity, BOD, COD, TDS and correlation between them.

KEYWORDS: Pollution, Mula-Mutha, BOD, COD, Correlation

INTRODUCTION

Due to urbanization industrialization has increased during the past decades and this gives rise to many environmental problems. Pune which is situated at the confluence of Mula-Mutha river. Increased industries, river side housing societies has increased the amount of pollution in the river.

The crowding of population in urban area is a major cause of polluting the River Mutha. The urban city accelerate more pollution to the River Mutha due to the inadequate urban waste management, poor sewage water management by industries.

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). Water pollution is one of many types of pollution which results from contaminants being introduced into the natural environment.

Water pollution is often caused by the discharge of inadequately wastewater into natural bodies of water. This can lead to environmental degradation of aquatic ecosystems. The report is dealing with the current worst status of river by various means.

Therefore, in recent years an easier and simpler approach based on statistical correlation, has been developed using mathematical relationship for comparison of physico-chemical parameters. we have assessed the water quality characteristics of River mutha from khadakwasla to sangam

bridge, studied the Physico-Chemical characteristics of mutha river by using correlation.

METHODOLOGY

For assessment of water quality 2 sampling locations were selected for month October and November 2019 i.e Khadakwasla Dam and Sangamwadi Bridge. The 4 sampling stations i.e Khadakwasla Dam, Nanded City, Deccan, Sangam Bridge were selected for month January and February 2020. The samples were collected and stored in plastic bottles, the bottles were rinsed and cleaned before collection, the bottles were labeled properly for identification. The samples were analyzed for 8 physicochemical parameters such as pH, Turbidity, Electrical Conductivity, Hardness, Alkalinity, BOD, COD, Total dissolved solids.

The pH was measured with pH Meter. Turbidity was measured with the help of Nephelometer. The Electrical Conductivity was measured in lab with the help of digital Conductivity Meter; the conductivity was calibrated using 0.1N KCL solution. Hardness was determined by titrating the sample with EDTA solution. Alkalinity is mainly due to bicarbonates, carbonates, hydroxides and alkaline earth metals. It is expressed in terms of Hydroxide Alkalinity, Carbonate Alkalinity, Bicarbonate Alkalinity. The sample is titrated against 0.02 N Sulphuric acid, the indicators used are phenolphthalein and methyl orange. BOD was calculated as the difference between the initial DO and after incubating the sample for 5 days at 20 °C. COD was determined by

How to cite this paper: Tejas Korde | Nupur Dumbre | Ashwini Abhimane | Prof. Swapnil Bijwe "Assessment for Water Quality of Mutha River using Correlation" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.657-960, URL: www.ijtsrd.com/papers/ijtsrd31280.pdf



IJTSRD31280

Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



titrating the samples with 0.1 N ferrous ammonium sulphate using ferrioc indicator. The correlation is found out in Microsoft Excel 2013, the correlation coefficient is found in the same. Comparing all the parameters with each other and finding the correlation matrix in excel. It became very easy for us to solve the matrix due to Excel. Correlation matrix was found out for each sampling station. The correlation study is basically carried out to establish the relationship between the physico-chemical parameters.



Fig1. KHADAKWASLA DAM



Fig2. NANDED CITY



Fig3. DECCAN



Fig4. SANAGMWADI BRIDGE

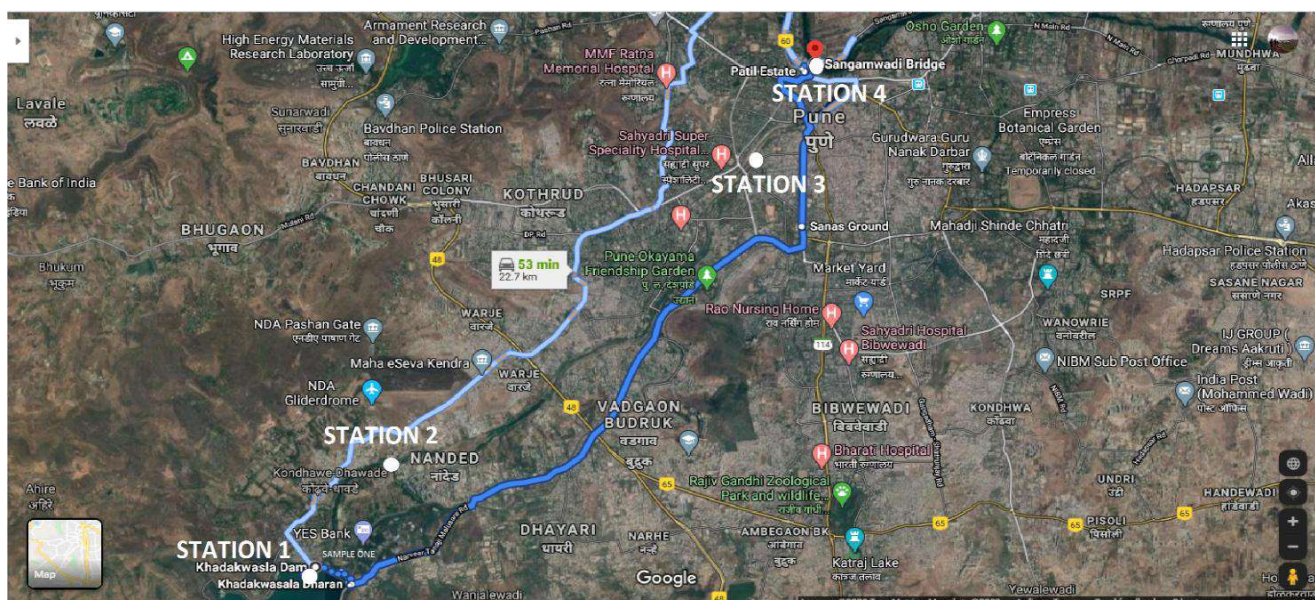


Fig.5 SATELLITE IMAGE OF SAMPLING STATIONS

OBSERVATION:**OBSERVATION AT STATION ONE: Khadakwasla Dam**

PARAMETERS	OCTOBER	NOVEMBER	JANUARY	FEBRUARY	PERMISSIBLE LIMIT
pH	8.4	8.1	7.9	7.8	8.5
Turbidity	3 NTU	4.6 NTU	3.5 NTU	3 NTU	5 NTU
EC	37 μ mho/cm	40 μ mho/cm	41 μ mho/cm	49 μ mho/cm	300 μ mho/cm
Hardness	75 mg/L	69 mg/L	78mg/L	81 mg/L	300 mg/L
Alkalinity	95ppm CaCo ₃	92ppm CaCo ₃	92ppm CaCo ₃	94ppm CaCo ₃	200ppm CaCo ₃
BOD	20.2 ppm	20 ppm	21.2 ppm	24 ppm	100 ppm
COD	65 mg/L	63.5mg/L	62 mg/L	65 mg/L	100 mg/L
TDS	80 mg/L	84 mg/L	85 mg/L	92 mg/L	500 mg/L

CORRELATION MATRIX

	pH	Turbidity	EC	Hardness	Alkalinity	BOD	COD	TDS
pH	1							
Turbidity	0.4733	1						
EC	0.6350	0.7026	1					
Hardness	0.6409	0.6838	0.9994	1				
Alkalinity	0.6691	0.6954	0.9989	0.9991	1			
BOD	0.6334	0.6927	0.9999	0.9997	0.9989	1		
COD	0.6769	0.6828	0.9970	0.9966	0.9985	0.9971	1	
TDS	0.6440	0.7072	0.9999	0.9994	0.9993	0.9997	0.9970	1

OBSERVATION AT STATION TWO: Nanded City

PARAMETERS	JANUARY	FEBRUARY	PERMISSIBLE LIMIT
pH	6.2	6.5	8.5
Turbidity	15 NTU	18 NTU	5 NTU
EC	351 μ mho/cm	362 μ mho/cm	300 μ mho/cm
Hardness	175 mg/L	181 mg/L	300 mg/L
Alkalinity	71 ppm CaCo ₃	72ppm CaCo ₃	200ppm CaCo ₃
BOD	225 ppm	226 ppm	100 ppm
COD	390 mg/L	405 mg/L	100 mg/L
TDS	418 mg/L	425 mg/L	500 mg/L

CORRELATION MATRIX

	pH	Turbidity	EC	Hardness	Alkalinity	BOD	COD	TDS
pH	1							
Turbidity	-0.9419	1						
EC	-0.9590	0.9985	1					
Hardness	0.9970	-0.9652	-0.9781	1				
Alkalinity	0.9936	-0.9739	-0.9849	0.9994	1			
BOD	-0.9919	0.9769	0.9872	-0.9988	-0.9999	1		
COD	-0.9866	0.9841	0.9924	-0.9963	-0.9987	0.9993	1	
TDS	0.9991	-0.9556	-0.9704	0.9994	0.9975	-0.9965	-0.9927	1

OBSERVATION AT STATION THREE: Deccan

PARAMETERS	JANUARY	FEBRUARY	PERMISSIBLE LIMIT
pH	6.9	7.2	8.5
Turbidity	3 NTU	3.5 NTU	5 NTU
EC	164 μ mho/cm	188 μ mho/cm	300 μ mho/cm
Hardness	120 mg/L	132 mg/L	300 mg/L
Alkalinity	89 ppm CaCo ₃	91 ppm CaCo ₃	200 ppm CaCo ₃
BOD	22.1 ppm	26 ppm	100 ppm
COD	71 mg/L	68 mg/L	100 mg/L
TDS	158 mg/L	170 mg/L	500 mg/L

CORRELATION MATRIX

	pH	Turbidity	EC	Hardness	Alkalinity	BOD	COD	TDS
pH	1							
Turbidity	0.9979	1						
EC	0.9999	0.9971	1					
Hardness	0.9931	0.9833	0.9943	1				
Alkalinity	0.9870	0.9744	0.9887	0.9990	1			
BOD	0.9912	0.9804	0.9926	0.9999	0.9996	1		
COD	0.9658	0.9468	0.9687	0.9896	0.9949	0.9916	1	
TDS	0.9893	0.9777	0.9909	0.9996	0.9999	0.9999	0.9933	1

OBSERVATION AT STATION FOUR: Sangamwadi Bridge

PARAMETERS	OCTOBER	NOVEMBER	JANUARY	FEBRUARY	PERMISSIBLE LIMIT
pH	6.9	6.5	6.6	6.8	8.5
Turbidity	16 NTU	19 NTU	15.5NTU	17 NTU	5 NTU
EC	190 μ mho/cm	208 μ mho/cm	220 μ mho/cm	252 μ mho/cm	300 μ mho/cm
Hardness	150 mg/L	122 mg/L	135 mg/L	150 mg/L	300 mg/L
Alkalinity	75 ppm	70 ppm	73 ppm	77 ppm	200 ppm
BOD	220 ppm CaCo ₃	212 ppm CaCo ₃	221 ppm CaCo ₃	119 ppm CaCo ₃	100 ppm CaCo ₃
COD	405 mg/L	401 mg/L	389 mg/L	392 mg/L	100 mg/L
TDS	346 mg/L	350 mg/L	336 mg/L	332 mg/L	500 mg/L

CORRELATION MATRIX

	pH	Turbidity	EC	Hardness	Alkalinity	BOD	COD	TDS
pH	1							
Turbidity	-0.9764	1						
EC	0.8339	-0.8218	1					
Hardness	0.9982	-0.9814	0.8598	1				
Alkalinity	0.9878	-0.9747	0.8632	0.9931	1			
BOD	-0.7272	0.6515	-0.9233	-0.7420	-0.7178	1		
COD	-0.9776	0.9725	-0.8713	-0.9859	-0.9983	0.7093	1	
TDS	0.9710	-0.9515	0.8042	0.9734	0.9905	-0.6440	-0.9894	1

CONCLUSION:

From the investigation it is concluded that in the month of October and November the samples from Khadakwasla Dam were within the permissible limits as given in IS 10500 2012. But at Sanagm Bridge Turbidity ,BOD,COD was not in the permissible limits as per the IS Code.The next samples taken in the month of January and February from 4 stations i.e Khadakwasla Dam, Nanded City, Deccan, Sangam Bridge. It is observed that the observations from the sample from Nanded City is more polluted than the sample taken from other sampling stations. Due to Housing Societies more discharge of waste water is observed and due to this the amount of pollutants has increased at the particular location. At the other sampling locations the results were within the permissible limits as given in the IS code. The values differ due to increase in pollution at sangam bridge and Nanded city. As the above correlation matrix gives the value of correlation coefficient .The correlation matrix shows the correlation between the water physico-chemical parameters of water. Every matrix shows the correlation between each parameter which lies in between -1 & 1.

The quality of water is seriously affected by the pollutants in the area Nanded City and Sangamwadi Bridge .The correlation matrix indicates positive and negative with each other.

REFERENCES:

- [1] A. Achegave, P. Bade, S. Rahate (2017): Water Quality Monitoring of Mula-Mutha River In Pune Region, Maharashtra, India.
- [2] Pali Sahu, Sonali Karad, Sagar Chavan and Sourabh Khandelwal (2015): PHYSICOCHEMICAL ANALYSIS OF MULA MUTHA RIVER PUNE.
- [3] V. M. Wagh, V. S. Ghole, P. N. Wavde, V.V. Todkar and K. K. Kokate (2008): Assessment of water quality of mutha river in pune city.
- [4] S. D. Jadhav (2017)-Analysis of water quality using physico-chemical parameters of mula-mutha river.
- [5] Pravin A. Manatkar, Anuj S. Chordia, Roche H. Harry, Sanket S. Sharma, Rajkumar I. Kothari, Akshay A. Arote(2018)-Physico-chemical analysis and curative approach to mutha river pollution.
- [6] Madhulekha, Sunita Arya, Shashi Agarwal (2017) - Study of Correlation Coefficient for Physico-Chemical Parameter to Assess the Water Quality of River Ganga at Kanpur, India.
- [7] Qureshimatva Umerfaruq M, Maurya Rupesh R, Gamit Sandip B and Solanki Hitesh A (2015) - Studies on the Physico-Chemical Parameters and Correlation Coefficient of Sarkhej Roza Lake, District Ahmedabad, Gujarat, India.
- [8] NARENDRA SINGH BHANDARI and KAPIL NAYAL (2008) - Correlation Study on Physico-Chemical Parameters and Quality Assessment of Kosi River Water, Uttarakhand.
- [9] Introduction to Environmental Engineering and Science" by Gilbert M Masters.
- [10] IS 10500 2004.
- [11] IS 3052 (Part 32) for water and waste water.