Study of Water Quality of Mula-Mutha River

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Abstract- *Over the past few decades due to the increasing population in Pune city and the need to meet the demand of domestic as well as industrial consumption the water resources of the city are getting polluted. Mula mutha rivers in Pune are highly contaminated causing unsanitary and unhealthy conditions due to disposal of untreated sewage and industrial effluents. The main objective of this project is to study the physical, chemical and biological characteristics i.e. pH, DO , BOD, COD, turbidity of water. The approach to minimize the water pollution is possible by providing methods to prevent the plastic waste entering the river and create awareness among people regarding the pollution of rivers*

I. INTRODUCTION

As India is rich in water resources, the water source starting from the Himalayas and ending into the ocean, as the water is abundantly available, the water is not being utilized properly as a result there is a huge problem of river pollution, due to urbanization the pollution level is rising day by day. The industrial, municipal, human and other activities have adversely affected the pollution of water bodies throughout the country.

Mula river is considered the lifeline of Pune City, this water is used for various purposes i.e. drinking, agriculture, bathing, industrial. The river starts from Mulshi dam & is passes through Paud, Lavasa ,Wakad , Baner , Balewadi, Khadki, Aundh, Vishrantwadi and ends at Sangamwadi.

Mutha river starts from Panshet and it first dam construct in Panshet. Then next dam is Temghar , and Khadakwasala and it passes through Warje , Mhatre bridge , Shaniwarpeth , Shanwarwada , RTO and it ends at Sangamawadi.

Mula-Mutha river is formed by the confluence of Mula & Mutha after meeting at Sangamwadi& its flow throughout the Pune the city. And later meets the Bhima river .

While flowing through the city the river gets polluted through various mediums such as Industrial chemical waste water , Human waste water , Domestic waste , untreated sewage waste water by Pune Muncipal Cor. , the Maharashtra Control

II. LITERATURE REVIEW

We have studied various research papers.

1. Reclaim the river, Pune, Maharashtra, India
By: Abhinav Gaurav
Technology Goteborg , Sweden , 2010

In this study thesis focuses on the banks of the river Mutha , where the urban pattern from different time periods come together close to the historic center , the lack of install capacity for sewage treatment plant , & illegal dumping of unprocessed industrial waste into the river and rivulets results in a smelly ,dirty and dying river landscape unused by the citizen of the city.How can this river be recapture in the collective consciousness of the people of pune ? What steps and measures need to be taken ? Thesis is an attempt to answer this question.the rivers in Pune (mula mutha, pavana, indrayani) are polluted at large scale. The reason behind the pollution is due to untreated of sewage water. In 1964 the number of fish species where around 110.But in 1995 the number of species got reduced to 83 and the number goes on reducing to 65 in the year 2002.

2. An Assessment of land use change impacts on the water resources of the Mula-Mutha rivers catchment upstream of pune , India
By : P. D. Wagner , S. Kumar & K. Schneider
Hydrogeography & climatology research group , Institute of geography University of Cologne , Cologne , Germany

The study aims to analyze past land use changes between 1989 & 2009. The area of semi natural vegetation decreased from 79.8% in the year 1989/1990 to 74.7% in the year 2000/2001 and 70% in the year 2009/2010. There is also increasement of agricultural from 9.7% to 13.5% in the years 1989/1990 to 2009/2010. The crop land is decreased by 11% between the years 1988/1989 to 2007/2008. An increased demand for food due to population growth and a decreased supply of food due to decreased cropland will be negative consequence of this development .

Sampling Station	Month	Parameter						
		Temperature (°C)	pH	EC (□mhos/cm)	BOD (mg/l)	COD (mg/l)	DO (mg/l)	Hardness (mg/l)
Khadakwasla Downstream	Jan	23.5	7.6	40	25	66	6.9	40
	Feb	24.2	7.5	55	20	58	6.2	50
	Mar	25.2	7.6	72	22	52	6.5	42
	Apr	25.6	7.2	65	20	62	6.7	55
	May	26.5	7.4	70	24	60	6.5	45
	June	26.2	7.6	68	18	71	6.8	48
Vitthalwadi	Jan	25.6	6.8	250	120	342	0.2	140
	Feb	24.0	7.2	285	110	365	0.9	160
	Mar	25.4	7.5	210	180	480	0.1	122
	Apr	25.0	7.8	216	105	360	0.2	165
	May	26.8	7.6	254	107	372	0.2	138
	June	26.7	7.5	264	115	418	0.4	160
MES	Jan	25.0	6.5	310	176	510	0.0	110
	Feb	24.2	6.8	352	140	480	0.0	140
	Mar	25.0	6.6	332	190	505	0.0	136
	Apr	25.2	6.9	310	183	560	0.0	178
	May	26.4	7.0	287	177	515	0.1	162
	June	26.8	7.2	318	168	527	0.2	170
Gandharv	Jan	24.0	6.5	290	140	480	0.0	122
	Feb	25.1	6.8	344	190	585	0.0	180
	Mar	24.2	6.6	310	212	510	0.0	165
	Apr	25.2	6.9	360	210	596	0.0	168
	May	25.8	7.2	367	183	543	0.0	154
	June	26.2	7.4	324	218	567	0.2	146
Sangam Bridge	Jan	24.0	6.9	352	240	655	0.1	125
	Feb	24.2	6.5	338	212	672	0.0	170
	Mar	24.6	6.5	320	262	690	0.0	158
	Apr	25.2	6.2	380	272	680	0.2	140
	May	26.0	6.8	355	247	588	0.0	138
	June	26.4	6.8	317	215	618	0.0	152
Mean		25.00	7.0	295.9	149.9	427.1	1.4	129.25

3. Study of Water Quality Parameters of Mula-Mutta River at Pune, Maharashtra (India)

By: H. D Jadhav M.H Jadhav

The following study implies analysis of the river water quality at different station on the basis of pollution and a detailed study of different parameters of mula mutha river situated at Pune Maharashtra. To examine the water from the Mula-Mutha river samples were taken in a clean polythene bottle with 1 litre water. This water was tested with Temperature,

PH,DO,BOD,COD, chloride, nitrate, sulphur, calcium and hardness. The river water PH was observed between 5.76 and 7.76. This concluded that the water is acidic in nature. The range of DO was between 2.8 mg/l to 4.9 mg/l which concluded the DO level is below the Indian standards value. Where the BOD level is within the Indian standard value and COD shows that there is increase in the pollution level. Hardness of water is in the range of 29.00 mg/l to 153 mg/l which show that there is mixing of sewage in the river water. For domestic and other use this water may not be used. For reducing the pollution level mixing of sewage water should be stopped to enter the river.

Parameters	Sampling Station 1	Sampling Station 2	Sampling Station 3	Sampling Station 4	Sampling Station 5	Sampling Station 6	Sampling Station 7
pH	6.8	7.1	6.24	6.62	5.76	6.71	7.76
DO	3.6	4.9	4.8	3.1	3.4	3	2.8
BOD	9.5	131	136	128	168	173	166
COD	12.48	386	298	281	388	391	403
Chloride	32	168	264	258	271	283	291
Nitrate	13	24	30	31	34	39	41
Sulphate	6	8	11.3	10.3	11.3	12.8	12.4
Calcium	7	32	41	47	49	53	48
Magnesium	2	5	9	12	11	16	18
Harness	29	113	123	141	148	153	152

4. Physiochemical analysis of Mula Mutha river Pune

By:Pali Sahu, Sonali KArad, Sagar Chavan and Saurabh Khandelwal

The Study focuses on analysing the current pollution level of river, finding out the most polluted area, inspecting the various means of pollution and suggesting remidial measures for the same. To decrease the contamination and avoid health risk preventing measures and public awareness is necessary. The above study in a detailed discussion of this points. There is only one sewage plant in pune city which have capacity of 90MLD (million liters per day).Due to development of pune city the population is also increasing in the river. Samples are collected in three season i.e pre monsoon, monsoon & post monsoon.The result show that there is increase of pollution in mula mutha river.There is a need of treatment of waste water and need to regulate the flow.

Monsoon Season

Parameters	Sampling Station 1	Sampling Station 2	Sampling Station 3	Sampling Station 4
pH	7.82	5.24	5.62	5.76
Turbidity	4	15	11	7
Hardness	13	92.58	75	112.2
DO	3.2	0.5	0.7	1.9
BOD	9	30	42	46
COD	48	40	52	62.5

Pre-Monsoon Season(Summer)

Parameters	Sampling Station 1	Sampling Station 2	Sampling Station 3	Sampling Station 4
pH	8.4	6.71	7.71	6.48
Turbidity	3	21	11	9
Hardness	3.12	83.96	112.64	77.76
DO	2.3	0.8	0.4	0.4
BOD	9.5	28	31	51
COD	44	39	42	58

Post-Monsoon Season(Winter)

Parameters	Sampling Station 1	Sampling Station 2	Sampling Station 3	Sampling Station 4
pH	9.48	8.12	7.37	6.56
Turbidity	6	14	15	9
Hardness	30.16	102.44	104.6	124.04
DO	2.1	0.7	0.6	0.3
BOD	8	42	39	42
COD	40	45	58	73

5. Pollution status of River Mula(Pune City) Maharashtra,India

By:Kshirsagar and V.R Gunale

The presented work deals with the seasonal variation of the physiochecimal parameter of the mula river and the factors thjat affect the pollution of the river.The survey intends to discover the status of polllution at different station considering the seasonal variation and the physiochemical parameters of mulariver.The determination of physico chemical parameters such as DO free from CO2, total alkanlinity,total,harness,BOD, COD,chloride,nitrate and phosphate by using by standard methods descrided by (APHA, 1998).These parameters were compared with water quality standards to indicates pollution status in river.The results show that DO was low in summer and monsoon.Where CO2 was high in summer.The BOD value was high in summer season due to addition of sewage.The pH value shows the water is slightly alkaline.The chloride concentration is maximum in summer and winter.Its shows that due to domestic waste the water quality of river mula is affected.

REFERENCES

[1] Abhinav Gaurav_: " Reclaim The River", Pune , Maharashtra , India http://publications.lib.chalmers.se/records/fulltext/123394.pdf

[2] P. D. Wagner , S. Kumar , K. Schneider : " An Assesment Of Land Use Change Impacts On The Water Resoureces Of The Mula-Mutha Rivers Catchment Up Stream Of Pune , India" https://www.researchgate.net/profile/Paul_Wagner6/publication/258787873_An_assessment_of_land_use_change_impacts_on_the_water_resources_of_the_Mula_and_Mutha_Rivers_catchment_upstream_of_Pune_India/links/54b8df1a0cf28faced625745/An-assessment-of-land-use-change-impacts-on-the-water-resources-of-the-

[3] Pali Sahu ,SonaliKarad , Sagar Chavhan , Sourabh Khandelwal " PhysochemicalAnyalisis Of Mula Mutha River Pune" https://www.airccse.com/civej/papers/2215civej05.pdf

[4] Vinaya V. Fadtare , T. T. Mane "Stides Of Water Pollution Mula-Mutha And Pawana River In Summer Season In The Pune City Region" http://www.neptjournal.com/upload-images/NL-31-26-(26)B-1040.pdf

[5] A.D. Kshirsagar , V.R. Gunale "Pollutin Status Of River Mula" (Pune City, Maharashtra , India) http://www.informaticsjournals.com/index.php/JEOH/article/download/2252/1349

[6] SujayaDasgupta , B. Mhadhukar , S. Zambre , C. Nitin Kulkarni, Arvind D. Shaligram " Real-Time Water Quality Monitaring System For Rivers" http://users.utcluj.ro/~ATN/papers/ATN_2_2019_4.pdf

[7] https://timesofindia.indiatimes.com/city/pune/mula-mutha-pollution-control-proposal-gets-shot-in-the-arm/articleshow/79700064.cms

[8] https://www.hindustantimes.com/india-news/excreta-in-mula-mutha-three-times-above-safe-limit-mpcb/story-f1IOlpTOAtKYJakNIV6LQK.html

[9] https://www.pmc.gov.in/en/riverfront

[10] https://www.thehindu.com/news/cities/mumbai/pune-will-see-clean-mula-mutha-soon-javadekar/article27707358.ece

[11] https://www.hindustantimes.com/india-news/excreta-in-mula-mutha-three-times-above-safe-limit-mpcb/story-f1IOlpTOAtKYJakNIV6LQK.html