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WASTE WATER MANAGEMENT OF JALGAON CITY

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ABSTRACT

This study presents the physiochemical parameters of municipal waste water of Jalgaon city which are directly dispose off in the river and outlets of the ponds, so the present study is conduct on the municipal waste water i.e. Nallas to analyse the impact assessment and give treatment to municipal waste water which is coming out from Nallas. Waste water samples are collected from different sampling stations between time 8am to 11 am and brought to the laboratory for analysis. In this study different test can be carried out like pH, turbidity, hardness, dissolved oxygen, total dissolved solids, BOD, COD. Different units of waste water treatment plant for municipal corporation Jalgaon city are design mainly raw water tank, screening , grit chamber, primary sedimentation tank, aeration tank ,secondary sedimentation tank etc. also cost analysis of waste water treatment plant is done and feasibility is determined.

KEYWORDS :BOD, COD, pH, nallas.

INTRODUCTION

Water is the basic and primary need of all vital life processes and it is now well established that the life first arose in aquatic environment. Ever since the pre-historic times man has been intimately associated with water. Even today it is the major consideration for all socio-economic cultural, industrial and technological developments. Besides drinking, water is also used for fish and

aquaculture, irrigation hydropower generation etc. but these days water is the elixir of life is becoming more and more unfit and dearer to mankind due to unwise use, neglect and mismanagement. The rapid growth of human population ,rapid industrialization ,indiscriminate use of natural resources ,our quest for material comfort and new life style demanding a variety of products and amenities ,have led to the environmental pollution which has become a global phenomenon.

The key challenges to better management of the water quality in India are temporal and spatial variation of rainfall, improper management of surface runoff, uneven geographic distribution of surface water resources, persistent draughts, overuse of ground water and contamination and treated waste water from urban settlements, industrial establishment and runoff. The disposal of waste water into surface water bodies leads to serious problems and affect the people in the health aspects. Especially in the urban areas the pollution of domestic effluent discharges into the nearby surface bodies created problems for the public. There are many ways of safe disposal of waste water. But improper management of waste water generation in urban areas find its own way of getting into the surface water,. Hence the effluent discharge affects the surface water bodies.

Today water resources have been the most exploited natural systems. Pollution of water bodies is increasing steadily due to rapid population growth, industrial proliferation, urbanization, increasing living standard and wide sphere human activities. The pace of development of waste disposal schemes could not match the rapid rate of urbanization in these urban centers during the last few decades. As a result the waste not properly disposed reaches the water sources and therefore our water sources like river, lakes and reservoirs that are in close proximity of these urban centers are highly polluted. Most of our cities developed without proper development plan. Therefore wastes of homes and industries, municipal waste mixed with the river water by the fault sewage system.

MATERIAL AND METHODS:

Study Area: The present study is carried on Jalgaon city which has approximate population of 5 lacs (according to the 2011 census data). The municipal waste water outlet of Jalgaon city presently from 3 nallas and these 3 nallas travel 15 km in entire Jalgaon city and carry city drainage of town Jalgaon in which about 25 MLD municipal waste water are being discharged daily. After travelling a distance of 5 km through Jalgaon city, out of these 3 nallas, one is enters in girna river which is one of the major source of drinking water for Bambhori village and nearby area.

Sampling Procedure: Municipal wastewater was collected during August 2015 to April 2016 from 15 sampling stations of 3 nallas, which cover entire Jalgaon city. The surface water quality changes from season to season and is easily polluted. For this purpose, samples were collected from 3 nallas throughout the year. Samples were collected between 7.30 am to 10.00 am in clean plastic bottles of 5 litters, labelled properly and brought to the laboratory for analysis.

Methods of Sampling: Municipal wastewater sample is collected from about 40-50 cm below the surface, to avoid the collection of surface impurities, oils etc. Before sampling, 5L polythene bottles were rinsed with 0.1N chromic acid, than washed twice with distilled water. A separate sample was collected in bottle to measure the Dissolved oxygen (DO).

Parameters: The following 7 water quality parameters were analysed: pH, Turbidity, Total dissolved solids, Total hardness, Dissolved oxygen, Biological oxygen demand, and Chemical Oxygen Demand. To analyze these parameters dilution technique is used.

RESULTS AND DISCUSSION:

The values listed for various parameters are the average values obtained for 12 months

collected from 15 sampling stations.

pH: Municipal wastewater was alkaline in nature with pH values ranging between 7 to 9 and the permissible limits of pH is 6.5 to 8.5

Turbidity: The turbidity ranging from 7 to 12 NTU. These values indicate that this municipal wastewater is more turbid, higher than the recommended values of 10 NTU for drinking and irrigation water. Furthermore, the months of July to October, gave higher turbidity values. Higher turbidity in monsoon is probably due to the more water volume flow in the rainy season and also mixing of colloidal and suspended matter through the run off sewage.

Total Solids (dissolved solid): Total dissolved solids influence the qualities of drinking water and is most important parameter in irrigation water. The TDS varies from 500 to 800 mg/l. The upper limit of TDS recommended for drinking water is 200mg/lit. So this water is not safe for drinking purpose.

Hardness: Water hardness is caused by the presence of calcium and magnesium salts. In present study hardness is varies from 560 to 3800 mg/l. Furthermore, the results suggest that the hardness is more due to the presence of calcium than magnesium. Generally the water can be said to be hard and therefore unsuitable for both domestic and industrial use. The permissible limits of hardness is 300mg/lit.

Dissolved Oxygen (DO): The presence of free oxygen in water is an indication of the ability of that water to support biological life. In the present study we got 5.12 to 7.48 value of dissolved oxygen in the sample. This may be due to mixing of untreated industrial effluents and dumping of municipal solid waste into sewage water. The permissible limit of dissolved oxygen is 4 to 8 mg/lit.

Biochemical Oxygen Demand (BOD): It is an indication of the organic load of municipal wastewater. According to result BOD varied from 60 mg/l to 400 mg/l. The high value of BOD may be due to extensive use of organic nutrients. The permissible value of BOD for domestic water is 300 mg/lit.

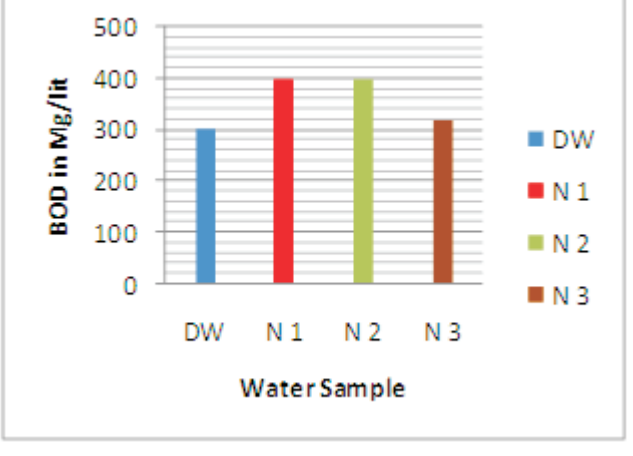

Fig. 1 Graphical representation of BOD

Chemical Oxygen Demand (COD): The COD is measured by dichromate reflux method. The COD

is another parameter used to characterized the organic strength of municipal wastewater. According to result COD varied from 780 mg/l to 1120 mg/lit. The permissible value of COD for domestic water is 225 mg/lit.

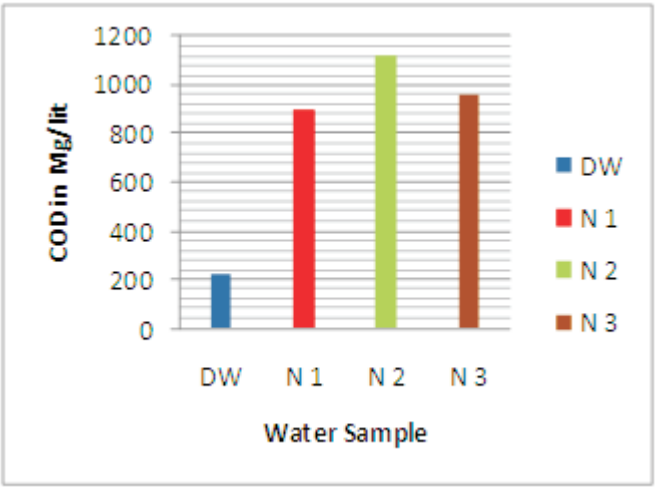

Fig. 2 Graphical representation of COD

N1 N2 N3 are nallas 1, 2, 3 respectively. And DW is Domestic water.

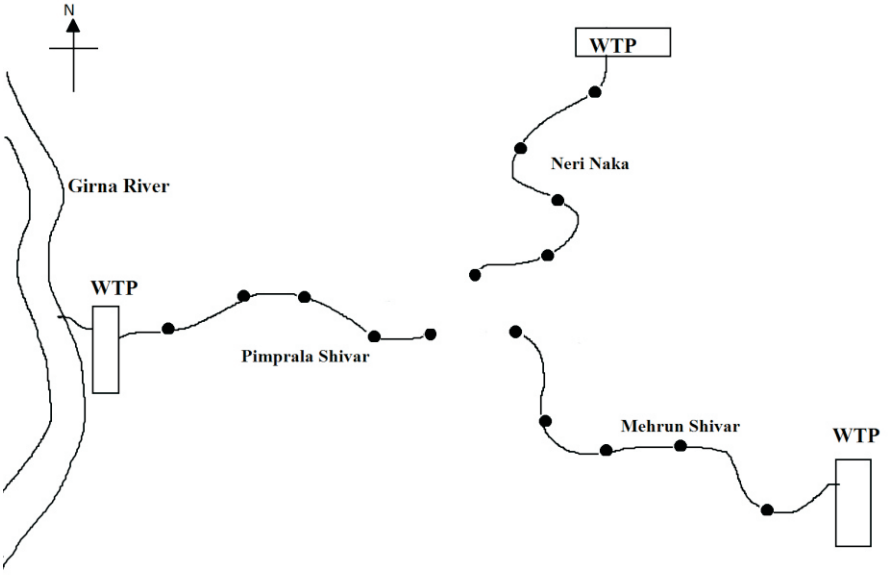

Fig. 3 Schematic Diagram of Nallas

RESULTS:

Table1. pH observation table:

STATION NO.	Ph			METHOD
	NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	
1.	8	9	7	pH Paper
2.	7	8	8	
3.	7	9	7	
4.	8	9	8	
5.	8	9	9	

Permissible Limit:- pH value for domestic water is 6.5 to 8.5

Table2. Turbidity observation table:

STATION NO.	TURBIDITY (NTU)			METHOD
	NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	
1.	8	7	8	Nephelo Turbidity Meter
2.	10	5	11	
3.	9	8	10	
4.	10	6	11	
5.	11	12	12	

Permissible Limit:- Turbidity value for domestic water is 10 NTU

Table3. Hardness observation table:

STATION NO.	HARDNESS(mg/lit)			METHOD
	NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	
1.	1400	600	570	By EDTA Titration
2.	1000	560	640	
3.	3800	580	690	
4.	3000	590	600	
5.	2000	620	720	

Permissible Limit:- Hardness value for domestic water is 300 mg/lit

Table 4. TDS observation table:

STATION NO.	TOTAL DISSOLVED SOLIDS(mg/lit)			METHOD
	NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	
1.	700	600	600	TDS METER
2.	600	800	800	
3.	600	700	700	
4.	600	800	500	
5.	500	700	800	

Permissible Limit:- TDS value for domestic water is 200 mg/lit

Table 5. D.O. observation table:

STATION NO.	DISSOLVED OXYGEN (mg/lit) NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	METHOD
1.	5.12	6.69	6.70	Wrinkler's Method
2.	7.33	7.48	6.99	
3.	7.04	7.09	6.30	
4.	7.20	7.38	6.30	
5.	7.48	7.30	6.90	

Permissible Limit:- DO value for domestic water is 4-8 mg/lit

Table6. BOD observation table:

STATION NO.	Biochemical Oxygen Demand (mg/lit) NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	METHOD
1.	140	261	123	Wrinkler's Method
2.	143	340	108	
3.	74	310	69	
4.	60	221	163	
5.	400	400	316	

Permissible Limit:- Biochemical Oxygen Demand value for domestic water is 300 (mg/lit)

Table7. COD observation table:

STATION NO.	Chemical Oxygen Demand (mg/lit) NALLA 1 (Neri Naka)	NALLA 2 (Pimprala Shivar)	NALLA 3 (Mehrun Shivar)	METHOD
1.	860	940	880	Potassium Dichromate
2.	900	860	780	
3.	900	900	800	
4.	800	1040	860	
5.	840	1120	960	

Permissible Limit:- Chemical Oxygen Demand value for domestic water is 225 mg/lit

Waste Water Treatment of Jalgaon City: In this study we have suggested three treatment plant at the end of each Nalla i.e (out of city). The treatment plant is designed as a conventional treatment plant which does not require any advanced or mechanical techniques to treat the water . The units of treatment plant are raw water collection tank , screening , grit chamber , skimming tank , primary sedimentation tank, areation tank , secondary sedimentation tank

CONCLUSION:

The study on the quality of municipal wastewater reveals that the BOD of all these municipal wastewater are above the IS standards and will cause problems in the long run. Due to continuous application of municipal wastewater, the ground water aquifer gets polluted resulting in increase in salt concentration and BOD.Generally, the average application rate of municipal wastewater per unit area is

in excess of normally permissible application rates in any properly managed irrigation system. Therefore municipal wastewater, if treated properly to reduce BOD, salt load and other properties judiciously, one can provide an alternate source of water for irrigation.

It may be concluded that the municipal wastewater of Jalgaon city is not fit for industrial, domestic and irrigation purpose, without treatment.

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