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A Study of Physico-Chemical Characteristics of Jayanti Nalla Water along with it's Tributaries with Special Emphasis on Quality of Panchganga River

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Abstract: India has been undergoing industrial revolution in a big way during the last three decades. With the recent liberalization of industrial policy, it has got a further boost. Economic conditions of the common man will improve, prosperity will prevail. This is all provability 'one side of the coin' the other side of coin is not very bright. The industries spend solid, liquid and gaseous substances in to the environment. Unless such substances are effectively managed, our environment may get damaged irreparably. The scientific and technological advancements and mismanagement of natural resources have given rise to numerous environmental problems such as pollution of water, soil, air radiation and noise, with consequent adverse effects flora, fauna, human health and well-being.the environment is under more sustained threat from human activity in the 21st century than at any other time in the history with extensive potential social and health consequences.

The increasing rate of human population and rapid pace of industrialization has created many problems of pollution in the rivers and streams. The domestic wastes and industrial effluents are being indiscriminately discharged in the nearby rivers, reservoirs, lakes and tanks. In Kolhapur city similar situation is observed in Panchganga river where four major nallas viz. Jayanti nalla, line bazaar nalla, dudhali nalla and bapat camp nalla, directly release effluents into the river. As the pollutants are discharged in the river through these nallas, the intensity of river pollution is increasing highly. Tremendous increase in population, industrialization, agriculture run off is adding to the pollution of available water resources. So it is worthwhile to assess the quality of the jayanti nalla water and the small streams connecting to it, to study its possible environmental impacts.
Keywords: Jayanti nalla, Panchganga river, industrial effluents, environmental impacts, pollutants

I. INTRODUCTION

In this document A case study is done of Jayanti nalla out of above mentioned four major nallas that carries almost 70 to 75 percent of total effluent generated in Kolhapur. The marked effects are change in physical, chemical and biological properties of streams. The rising contamination sources in urban systems results in chemical pressures often manifested as elevated pollution load, which in turn have damaging impacts on human health.

The study of River water pollution, an environmental crisis a case study of Panchaganga river of Kolhapur city has been done by D. H. Pawar et.al. The conclusions drawn out were that a considerable BOD and COD, low PH, high organic matter, highest dissolved solids indicate water polluted generally by effluents from agro-based industry, leather tanneries, domestic sewage etc. [1]

A Study on the Physico-Chemical Characteristics of Panchaganga River in Kolhapur City, MS, INDIA by Thorvat A.R., et.al is done. In this paper it is found that the physico-chemical and biological parameter features of this river fluctuate from place to place due to discharge of agricultural, municipal as well as industrial wastes into it. Temperature values are ranging from 29^oC to 39^oC. It is observed that the water, temperature is within the desirable limit.The pH values vary from 5.3 to 8.3 [2]

A study on Water Pollution and Public Health Issues in Kolhapur City in Maharashtra is done by Mr. Swapnil Kamble. In this paper, an attempt has been made to understand the problem of water pollution of *Panchaganga* river due to urbanization and industrialization and its impact on public health in Kolhapur city and measures to be taken to deal with this problem effectively. [3]

A research study on Water Quality Analysis And Simulation Of Panchaganga River Using Matlab is done by Mr. Riyaj K. Mulla et.al. The outcome briefly describes how MATLAB programming tool can be used for prediction of water quality in river.Also how MATLAB helps to predict future water quality with present data and save time, manpower and other cost for continuous analysis.[4]

II. PROPOSED METHODOLOGY

The following process was adopted for adopted for proposed work:

1) Sampling of the water from different locations particularly where sewage drains into the stream and nalla during rainy, winter and summer season.

2) The empirical tests and extensive field survey is the core part of this study. Empirical tests include physico-chemical analysis of water through various attributes e.g. ph, DO, TDS, TSS, physical tests like odour, colour, turbidity, etc.

A. Application of Proposed Methodology

The Water Samples were collected from following places in the Morning Hours between 7 to 11am, in Polythene Bottles. Before sampling, all the bottles were washed thoroughly with the detergent, tap water, ethanol and then distilled water and to avoid contamination disposable gloves were worn during water sampling. The water containers were kept in air tight large plastic ice-cold containers. The Water samples were immediately brought in to Laboratory for the Estimation of various Physico -chemical parameters, and pH were recorded at the time of sample collection by using Thermometer.

The locations and sources of water samples are given in Table I.

TABLE I

(Sample No.)	Name Of Stations	Type of Water
1	Kalamba Lake	Jayanti Nalla Wastewater
2	Near Kalamba Jail	Jayanti Nalla Wastewater
3	Ramanand Nagar	Jayanti Nalla Wastewater
4	Shenda Park	Jayanti Nalla Wastewater
5	Aadhar Hospital	Jayanti Nalla Wastewater
6	Gokhale College	Jayanti Nalla Wastewater
7	Near Titan Showroom	Jayanti Nalla Wastewater
8	Jayanti Bandhara	Jayanti Nalla Wastewater
9	Shingnapur	Panhchganga River Water (Upstream)
10	Kasaba Bawada Bandhara	Panhchganga River Water (Down Stream)

Now based on the results of experiments conducted the conclusions were drawn out.

III. RESULTS AND DISCUSSIONS

A. Season Wise Test Results

1) Rainy Season

TABLE II

Sample	Name of Stations	PH	DO	BOD	COD	TDS	CC	Oil& Grease
1	Kalamba Lake	7.0	3.2	75	112	88	30.81	0.1
2	Near Kalamba Jail	7.3	3.0	80	120	93	106.5	0.38
3	Ramanand Nagar	7.2	2.8	82	124	89	84.47	0.37
4	Shenda Park	7.6	3.1	91	136	99	92.3	0.34
5	Aadhar Hospital	7.1	3	97	146	103	80.94	0.29
6	Gokhale College	6.9	2.8	95	142	120	71	0.31
7	Titan Showroom	6.8	1.9	100	150	134	81.79	0.15
8	Jayanti Bandhara	7.3	1.5	103	154	128	75.26	0.31

Table III.: Wastewater Analysis Result

Sample	Name Of Stations	PH	DO	BOD	COD	TDS	CC	Hardness mg/lit	Turbidity NTU
9	Shingnapur	7.1	4.5	2.6	12	69.5	24.94	80	1.5
10	Kasaba Bawada	7.1	3.5	4.7	16	72.4	35.99	85	1.7

2) *Winter Season*

TABLE IV

Sample	Name of Stations	PH	DO	BOD	COD	TDS	CC	Oil & Grease	
1	Kalamba Lake	6.8	1.9	90	222	239	36.92	0.17	
2	Near Kalamba Jail	7.59	1.6	109	312	454	91.7	0.96	
3	Ramanand Nagar	7.68	0	107	366	478	88.78	1.9	
4	Shenda Park	7.35	0	103	316	465	99.8	2.2	
5	Aadhar Hospital	7.32	1.3	115	374	353	93.4	2.4	
6	Gokhale College	7.6	1.0	108	308	342	85.1	1.9	
7	Titan Showroom	7.39	1.3	121	326	449	86.1	2.7	
8	Jayanti Bandhara	7.47	0.09	116	340	463	101.77	2.19	
Sample	Name Of Stations	PH	DO	BOD	COD	TDS	CC	Hardness mg/lit	Turbidity NTU
9	Shingnapur	7.36	4.5	3.2	16	140	42	85	1.9
10	Kasaba Bawada	7.90	3.2	3.4	22	181	45	90	2.2

3) *Summer Season*

TABLE V

Sample	Name of Stations	PH	DO	BOD	COD	TDS	CC	Oil & Grease	
1	Kalamba Lake	7.9	3.1	140	208	350	45	0.2	
2	Near Kalamba Jail	8.1	2.5	149	222	356	49	0.34	
3	Ramanand Nagar	7.5	2.4	146	248	378	57	0.37	
4	Shenda Park	7.2	2.8	178	298	415	54	0.33	
5	Aadhar Hospital	8.3	2.1	201	336	427	78	0.36	
6	Gokhale College	7.9	1.7	197	354	418	92	0.41	
7	Titan Showroom	7.7	1.8	193	286	471	89	0.43	
8	Jayanti Bandhara	8.2	1.3	210	314	480	102	0.44	
Sample	Name Of Stations	PH	DO	BOD	COD	TDS	CC	Hardness mg/lit	Turbidity NTU
9	Shingnapur	7.5	4	3.5	18	185	49	88	2.1
10	Kasaba Bawada Bandhara	7.8	2.7	3.9	54	24	196	110	2.9

Average Reading

Parameters /Seasons	Rainy	Winter	Summer
pH	7	7.44	6.60
DO (mg/ltr)	2.6	0.8	2.21
BOD (mg/ltr)	90.37	108.6	176.8
COD (mg/ltr)	135.5	320.5	283.2
Chloride Content (mg/ltr)	77.88	85.4	70.75
Total Dissolved Solids (mg/ltr)	106.8	405.8	411.8
Oil & Grease (mg/ltr)	0.28	1.8	0.36
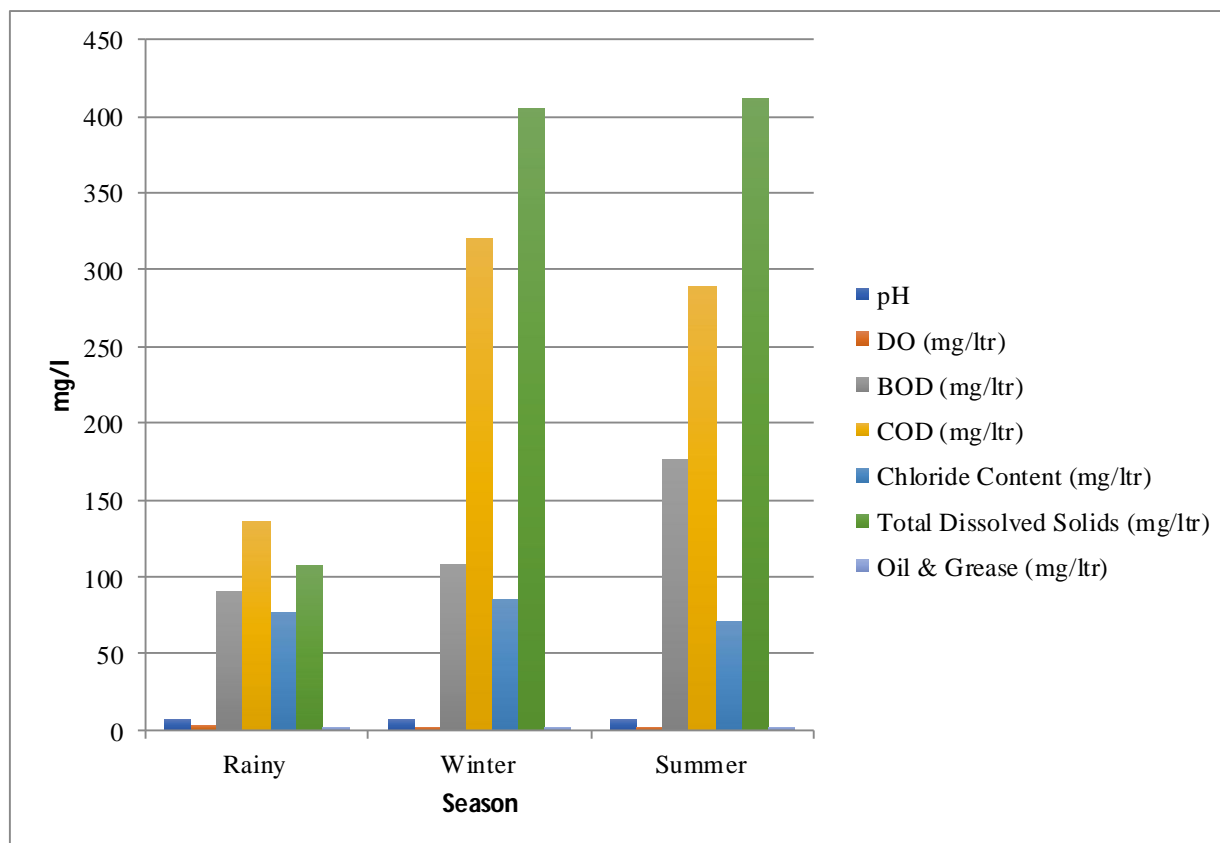
Bar Chart representing the seasonal variation of various parameters

IV. CONCLUSIONS

In this paper study of the physico-chemical characteristics of Jayanti Nalla water along with its tributaries with special emphasis on quality of panchganga river is made by carrying various laboratory tests on the samples collected from various locations.
The following conclusions are drawn on the basis of the research and tests carried out.

A. The wastewater collected during the study was colorless in station 1. Moreover, the wastewater was pale yellow in color in stations 2, 4. Blackish color was observed in stations 5, 7, 8. However, the water was so turbid in stations 3, 6. The turbidity is caused by a wide variety of suspended materials that range in size from colloidal to coarse dispersion. In this study, unpleasant odour was noted in all stations.

B. The amount of TDSs in this study varies from 88 to 480 mg/l, and the TDSs are composed mainly of bicarbonates, chlorides, carbonates, phosphates, and nitrates of calcium, magnesium, sodium, and potassium; manganese; salt; and other particles . The higher values of TDS may be due to the discharge of waste from effluents from various small-scale industries in this town. Reported that increase in the value of TDS indicated pollution by extraneous sources.

C. BOD showed the minimum value of 75 mg/l and the maximum value of 210 mg/l. The registered BOD value was high in the present study.

D. COD showed the minimum value of 112 mg/l and the maximum value of 354 mg/l. Further studies can be made by making use of MATLAB software for prediction of water quality in river and to predict future water quality with present data and save time, manpower and other cost for continuous analysis.

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