

# Studies on Sewage Pollution in Some Residential Areas of Chandrapur City, Maharashtra

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**Abstract**—The present investigation deals with the analysis of physiochemical parameters of wastewater from some residential areas and commercial areas of Chandrapur city, Maharashtra. The samples of wastewater were collected from an eight different open drains flowing through the city and finally join the surface water bodies. The samples were collected in the month of July and August 2012 at morning 7:00 am to 9:00 am. Several working parameters such as PH, conductivity, Total dissolved solids; Alkalinity, DO, COD and BOD were analyzed by using Standard methods recommended by NEERI(1998) and the analyzed result were compare with standard values recommended by CPCB(Central pollution control board,India). As per obtained results the values of BOD were found above the prescribed limit and may be concluded that the quality of wastewater is harmful for direct discharged into surface water.

**Keywords** — BOD, COD, Physiochemical Parameters, Surface water, Wastewater, WHO.

## 1 INTRODUCTION

IN India the fast urbanization is resulting in generation of very huge quantity of waste in liquid and solid form. Every year approximately 50,000 millions liters of wastewater, both industrial and domestic is generated in urban areas<sup>(1)</sup>, and their disposal is becoming a major issue. Municipal wastewater is a dilute mixture of various waste from residential, commercial, industrial and other public places. The wastewater contains about 99% water and 1% of solids out of all solids, about 70% are organic and 30% are inorganic carried through media<sup>(6)</sup>. The organic portion of the wastewater is putrescible, undergoing biological decomposition produce large amount of malodorous gases and it may contain numerous pathogenic or disease producing bacteria. As per the survey conducted by central pollution control board, wastewater is directly discharge into surface water courses either in untreated or partially treated condition thereby throwing heavy load of pollutants containing pathogens, oxygen depleting biodegradable organic matter, non biodegradable organic chemicals etc. Hence there is necessity of sewage analysis for the purpose of measuring the strength of sewage or the degree of pollution of stream, for determining the degree of purity<sup>(2)</sup> and also to decide the economical waste management program as well as to choose the treatment process and deciding the extent of treatment methods<sup>(1)</sup>.

Along with domestic sewage industrial effluents are more effective for water pollution as their flows and strengths are usually varied, intense and concentrated than those of sanitary sewage<sup>(5)</sup>. Such effluents with huge amount of concentration of dissolved nutrients like nitrogen and phosphorous intensively responsible for excessive growth of green plants like algae and hyanith called eutrophication. As organic wastes get into water, bacteria reproduce rapidly and use the entire supply of oxygen, leading to the death of fish and other living organisms are the effects of eutrophication <sup>(7)</sup>. Due to inadequate resources such as absence of STP, all the domestic and industrial waste is not being managed to desired level, reliable for pollution which is directly or indirectly linking to econom-

ic prosperity and also social aspects of life of people lives in an urbanized and industrialized society. Hence their proper agglomeration and safe disposal is the first priority of every governance.

The present study is an attempt to make an assessment of examination of physiochemical characteristics of wastewater and impact of discharge of wastewater on quality of surface water bodies.

## 2 EXPERIMENT

### 2.1 Study Area

Chandrapur is located in the eastern edge of Maharashtra in 'Vidharbha' region. It is located between 19.30' N to 20.45'N Latitude and 78.46'E longitude and situated at 189.90m above from mean sea level. The city is located on the bank of Irai River, and another river flowing through the city is Zarpur River. The present total population of Chandrapur city is 3,74,396 souls whereas the total water supplied to the city is about 54 MLD and the waste water generation is estimated to be about 44.42 MLD from the whole city. As per the survey total 13 major open drains are flowing through the city out of which eight number of drains meet Irai river at different locations , three drains are join to Zarpur river and remaining two drains connect with Ramalao lake. In present study area, the drinking water source is Irai River and the maximum wastewater discharged into the Irai River as such and gets more polluted day by day as compare to other two water bodies. The distribution of approximate discharged quantity of wastewater in three major water bodies is shown in Table.1

### 2.2 Methodology

Domestic sewage samples were collected from eight different sampling stations during the month of July to August 2012, in

Precleaned polypropylene bottles with necessary precautions in between 7:00 am to 9:00 am from each of the sampling sites and brought to laboratory for analysis. Sewage samples were collected from following sampling station shown in table.2. The samples were stored in plastic bottles, preserved and analyzed for various physiochemical parameters like PH, TDS, EC, Alkalinity, Acidity, DO, COD and BOD by standard methods mentioned in NEERI (Manual on Water and Wastewater analysis, 1998).

**TABLE 1**  
DESCRIPTION OF QUANTITY OF WASTEWATER DISCHARGED

Sr. no	Name of water bodies	Catchment area	Total discharged of wastewater
1	Irai river	555 Sq. Km	21.66 MLD
2	Zarpat river	200 Sq. Km	16.04 MLD
3	Ramalao lake	0.045 Sq.Km	6.72 MLD
		Total	44.42 MLD

**TABLE 2**  
DESCRIPTION OF WASTEWATER SAMPLING SITES

Sr.no	Sampling code	Location
1	SP <sub>1</sub>	Near kotpalliwar petrol pump
2	SP <sub>2</sub>	Near Binba gate
3	SP <sub>3</sub>	At vithal mandir khidki
4	SP <sub>4</sub>	At sister colony
5	SP <sub>5</sub>	Near Rahmatnagar road
6	SP <sub>6</sub>	Near Irai river
7	SP <sub>7</sub>	Near thakkar colony
8	SP <sub>8</sub>	Near pathanpura gate

### 3 RESULT AND DISCUSSION

The results of physiochemical analysis of collected sewage samples and respective standards of physiochemical parameters are presented in table 3 and table 4.

#### 3.1 PH

In the present investigation, the PH range found in between 7.5 to 7.85. The recommended range for domestic sewage is in between 5.5 to 9 for disposal in inland surface water and public sewer. Therefore all the samples are within permissible

limit.

#### 3.2 Total Dissolved Solid (TDS)

Total dissolved solid in sewage samples are found in the range of 329 to 603 mg/l. This range indicates that the sewage effluents are contaminated with high level of water insoluble solids. This range is within permissible limit specified by WHO/CPCB and may be suitable for discharge in inland surface water. Higher value of TDS may be due to higher electrical conductivity of wastewater samples.

#### 3.3 Electrical Conductivity (EC)

Electrical conductivity is a measurement of salinity of wastewater. To high conductivity causes corrosion problem in the sewage pipe network. Conductivity is also affected by temperature: the warmer the water, the higher the conductivity. The value of EC varies in between 658 to 1207 micro/cm. EC measures the total concentration of ionic solutes. High values of EC indicate high total dissolved solids concentration. This implies that the ability of an electric current to pass through the wastewater is proportional to the concentration of ionic solutes dissolved in the water<sup>(8)</sup>. The highest value of EC implies that sewage effluents carry more ionic pollutants.

#### 3.4 Alkalinity

The range of alkalinity was observed in between 30 to 115 mg/l which indicates that the sample of wastewater is slightly alkaline in nature.

#### 3.5 Dissolved Oxygen (DO)

The range of dissolved oxygen are found maximum at sampling station SP3, SP6, SP7, and SP9 in between 6.5 to 7.6 mg/l whereas the sampling station SP2, SP4, SP5 and SP3 having negligible DO. The condition with zero DO harmful for dilution method of wastewater produces anaerobic condition absorbs, offensive condition result and odour and unsightly appearances produced.

#### 3.6 Chemical Oxygen Demand (COD)

Chemical oxygen demand is the oxygen require to oxidize the biodegradable organic's (BO's) as well as the non biodegradable organics (NBO's) both<sup>(6)</sup>. The COD of wastewater will therefore always be more than its BOD. The COD of sewage found in the range of 22.2 to 148mg/l in the present investigation, which are 1.6 to 3 times more than the values of BOD. The higher the BOD/COD ratio more amenable the wastewater is to biological treatment<sup>(2)</sup>. The knowledge of BOD to COD ratio is helpful to choose an appropriate treatment process for a particular wastewater in present study. As per the specified standard the range of COD is lie in pre-

**3.7 Biochemical Oxygen Demand (BOD)**

The obtained values of BOD at maximum sampling station varied from 34.91 to 83.11 mg/l are above the recommended range of 30 mg/l for discharge of effluents in inland surface water specified by CPCB but might be suitable for effluent discharged in public sewer. The obtained values of BOD are sign of heavy organic load and higher growth of microorganisms; this is an indication of water pollution. The wastewater with high BOD value may create great problem for the conventional water treatment process<sup>(3)</sup>.

TABLE 3

ANALYSIS OF SEWAGE WATER COLLECTED IN JULY AND AUGUST 2012

Pa- ra-me- ters	SP <sub>1</sub>	SP <sub>2</sub>	SP <sub>3</sub>	SP <sub>4</sub>	SP <sub>5</sub>	SP <sub>6</sub>	SP <sub>7</sub>	SP <sub>8</sub>
PH	7.8 5	7.4	7.5	7.5	7.8	7.6 5	7.5 5	7.5
TDS	387	448	329	503	390	334	404	603
EC	774	896	658	100 5	779	667	808	120 7
Alka- linity	30	85	40	115	50	45	80	100
DO	1.8	0.1	7.6	0	0.7	6.5	7.5	0
COD	68. 63	47. 4	58. 2	21. 2	48. 2	116	148	75. 5
BOD	22. 96	27. 38	35. 95	54. 29	34. 91	83. 11	43. 34	78. 5

All the parameters expressed in mg/lit. Except P<sup>H</sup> and EC (micro/cm).

All the data is on average of two determinations.

NS - Not specified.

SP- sampling point

TABLE 4

GENERAL STANDARDS FOR DISCHARGE OF EFFLUENTS (CPCB, 1995)

Sr. no	Parameters, Units	Standards	
		Inland surface water	Public sewer
1	PH value	5.5 to 9.0	5.5 to 9.0
2	TDS (mg/l)	2100	2100
3	EC(micros/cm)	NS	NS
4	Alkalinity( mg/l)	NS	NS
5	DO (mg/l)	NS	NS
6	COD (mg/l)	250	----

7	BOD (mg/l)	30	350
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**4 CONCLUSION**

The obtained result indicates that the wastewater samples are intensively polluted with ionic and organic load. In view of the above findings, it becomes abundantly clear that pretreatment of wastewater before disposal should receive highest priority to control water pollution and protect public health. Due to highest concentration of ionic pollutants the salinity of surface water bodies may be increased. The values of BOD found at highest level than the prescribed limit which concern great problem of water pollution and soil pollution too, which ultimately affects the underground water quality.

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