

Status of the Ulhas River with Reference to Water Pollution at Badlapur City, Dist. Thane

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Abstract: *Though the Common Effluent Treatment Plants are working towards the abatement of the pollution of the Ulhas River, on the other side the fact of contribution of Municipal Sewage from the residential colonies around the area towards the pollution of the Ulhas river is over sighted. The present study of the various stretches of the Ulhas river and the various contributory nallas to ascertain the strength of the waste, self purification capacity of the river water bodies is undertaken and on that basis appropriate decision regarding the possible treatment technology for sewage generated and site selection for the treatment plants in Badlapur city.*

Keywords: Ulhas River, WQI, NSF, Fecal Coliform, BOD, DO.

1. Introduction

India is a land of many rivers and mountains. Its geographical area of about 329 M.Ha is criss-crossed by a large number of small and big rivers, some of them figuring amongst the mighty rivers of the world. It's been said that the major contributors to the pollution of the Ulhas River are industries located around the river area. But the fact is there are Common Effluent Treatment Plants working towards the abatement of the pollution of the Ulhas River. On the other side the fact of contribution of Municipal Sewage the residential colonies around the area towards the pollution of the Ulhas river is over sighted. It is necessary to carry out appropriate studies through extensive monitoring and analysis of the various stretches of the river and the various nallas through which the sewage is discharged into the river. This would ascertain the strength of the waste, self-purification capacity of the river water bodies and on that basis appropriate decision regarding the possible treatment technology for sewage generated and site selection for the treatment plants.

2. Methodology

Four sampling points R, A, B, C were considered on the Ulhas River. Point R is taken as a reference point which is located about 9.5 km from point A. location of point R is selected on the river before it enters in the city and the said location is least effected due to Badlapur city water pollution. The point A on the river is selected at point after the confluence of the river with Kondeshwar Lake over flow Nalla. Point B is selected at point after the river confluences with MIDC Badlapur adjoining Nalla. The point C is selected after the river confluence with overflow of the Chikloli Dam. From point A, B & C we can achieve 2 stretch water qualities, both these stretches will provide pollution impact and river quality status of the Ulhas River. In order to interpret the data sets recorded across the study stretch in the comprehensive and illustrative manner, study stretch was analyzed for evaluation of the surface water quality. To present the multiple variables such as Fecal Coliform, pH,

Biochemical Oxygen Demand (BOD), Dissolve Oxygen (DO), Nitrate and Turbidity into one single value; Water Quality Index (WQI) was calculated for surface water. The WQI calculated is presented along with the data sets. Based on the study Remedial Measures and Responsibility of various stake holders can be decided.

3. Water Quality Index (WQI)

Water quality index (WQI) is valuable and unique rating to depict the overall water quality status in a single term that is helpful for the selection of appropriate treatment technique to meet the concerned issues.

3.1 Use of WQI in India

An index is a mean device to reduce a large quantity of data down to a simplest form. The water quality indices help to evaluate the water quality profile of a river in its entire stretch and to identify the reaches where the gap between the desired and the existing water quality is significant enough to warrant urgent pollution control measures. In India the NSF WQI is being used by CPCB, with a slight modification in weights.

The NSF WQI is expressed mathematically as:

$$NSFWQI = \sum_{i=1}^p WiIi,$$

Where

Ii = sub index for ith water quality parameter

Wi = weight (in terms of importance) associated with water quality parameter

p = number of water quality parameters.

The modified weights (Wi) and the equation for the sub-indices (Ii) as per CPCB, are given in Tables 3.1 and 3.2, respectively. The range of the NSF WQI corresponding to various designated best use classification is given in Table 3.3. [10]

Table 3.1: The modified weights (Wi) as per CPCB

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Water quality parameters	Original Weights from NSF WQI	Modified Weights as per CPCB
DO	0.17	0.31
FC	0.15	0.28
pH	0.12	0.22
BOD	0.10	0.19
Total	0.54	1.00

*CPCB 2001

Table 3.2: The equation for the sub-indices (Ii) as per CPCB

Water Quality Parameters	Range Applicable	Equation
DO (Percent saturation)	0-40% saturation	$IDO = 0.18 + 0.66 \times (\% \text{ Saturation DO})$
	40-100% saturation	$IDO = -13.55 + 1.17 \times (\% \text{ Saturation DO})$
	100-140% saturation	$IDO = 163.34 - 0.62 \times (\% \text{ Saturation DO})$
B.O.D.(mg/l)	0-10	$IBOD = 96.67 - 7 \text{ (BOD)}$
	10-30	$IBOD = 38.9 - 1.23 \text{ (BOD)}$
	> 30	$IBOD = 2$
pH	2-5	$I_{pH} = 16.1 + 7.35 \times (\text{pH})$
	5-7.3	$I_{pH} = -142.67 + 33.5 \times (\text{pH})$
	7.3-10	$I_{pH} = 316.96 - 29.85 \times (\text{pH})$
	10-12	$I_{pH} = 96.17 - 8.0 \times (\text{pH})$
	<2, >12	$I_{pH} = 0$
Fecal Coliform (counts/100ml)	$1-10^3$	$IFC = 97.2 - 26.6 \times \log(\text{FC})$
	10^3-10^5	$IFC = 42.33 - 7.75 \times \log(\text{FC})$
	$>10^5$	$IFC = 2$

Table 3.3: WQI corresponding to various designated best use classification is given

Sr. No.	NSF WQI	Description of Water Quality (1978)	Class by CPCB	Remarks
1	63-100	Good to Excellent	A	Non polluted
2	50-63	Medium to Excellent	B	No polluted
3	38-50	Bad	C	Polluted
4	38 & less	Bad to Very Bad	D, E	Heavily polluted

*CPCB, 2001

4. Discussion

In the present study, a comparative analysis of physical and Chemical characteristics of the Ulhas river water carried out based on physical characteristics like pH, Temperature, turbidity, in conjunction with chemical Characteristics such as DO, BOD, Fecal Coli form, Nitrate etc., the water quality has been assessed.

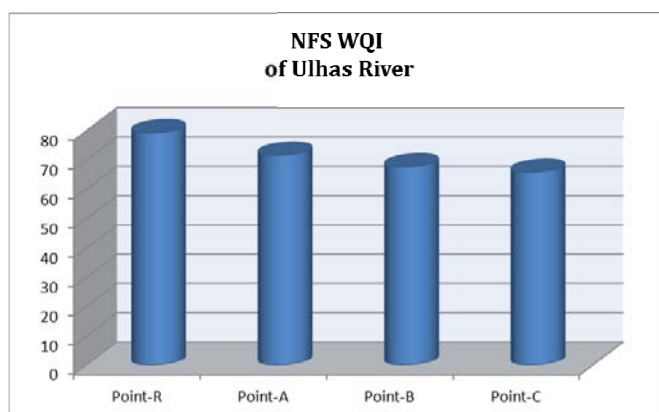


Figure 4.1: NFS WQI of the Ulhas River

5. Summary & Conclusion

The water quality of the Ulhas River found varied in ranges as per NSF WQI categorisation. It was observed ranging in between Good to Medium in the area from sampling point R

to sampling point C. In study area the impact on quality of water of the Ulhas River was observed mainly due to discharge of untreated domestic waste water emerging from Badlapur city. Water quality was observed deteriorating in the study area from sampling point R to Point C. The pollution level pattern found increasing in terms of BOD, Turbidity, Nitrate, Fecal Coliform, whereas Dissolve Oxygen (DO) found decreasing patterns except for rainy season. At sampling Point B and Point C: two local nallas (N2 and N3) confluence to river the Ulhas, which are carrying untreated domestic waste water from the city where level of pollutants found high in terms of BOD, COD, Nitrate, Fecal Coliform, turbidity and slight decrease in dissolve oxygen levels.

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