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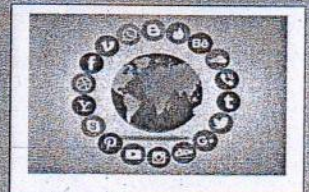
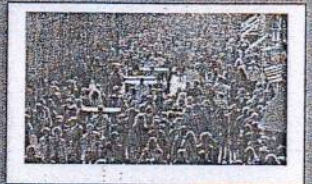
# *Sustainable Innovative Development in Economics, Environment, Agriculture, Health, Society*

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## Assessment of Water Quality of Pawana River in Pcmc and Pune City Area

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### Abstract-

The water quality assessment analysis is most crucial aspects in surface water studies. The water quality is a critical factor for assessing the pollution level. The rapid industrialisation and urbanisation putting enormous pressure on existing environmental resource. The water sample collected from five different locations for appraise the water quality status of Pavana river during all month in PCMC and Pune city area. The total seven water quality parameter used for present research work, such as pH, DO, BOD, COD, Nitrate, Fecal Coliform and Water Quality Index etc. The water quality index is providing average quality of water at a time, based on analytical values of physico-chemical parameters.

**Keywords-** Water Quality Index, Pollution, Water Resource, River Pawana

### Introduction

Water is most significant and precious natural resource present on the surface of the earth, which is play vital role in development of ecosystem. Rivers are the most crucial source of surface water as most of agriculture practices still depends on river water as cheap and suitable for irrigation. The current status of river pollution in India has reached up to point of disasters due to swift growth of industrialization and unintended urbanization, the status of water availability and quality of surface and ground water has been changed due to highly industrialization and urbanization. Water quality of any specific source and are can be assessed using physio-chemical and biological parameters. The values of these parameters are very harmful for human health when the increase above normal level.

### Study Area

The Pawana river originates near south of Lonawala from Western Ghat range, and after the flowing 60 kms to encounter to Mula and Mutha river in Pune. The surrounding area of Pawana river bank is covered by polluted industrial cites of Pune and Pimpri-Chinchwad. The rive is highly polluted due garbage, treated and untreated sewage of metropolitan cities and its sub urbs area. According to Environment Status Report of PCMC the Pawana river is the highly polluted other comparatively.

### Results and Discussion-

The monitored parameter includes a high variety of physio-chemical parameters. It is monitored in the sections where the water is destined for potable use-pH, DO, BOD, COD, Nitrates, Fecal, Water quality Index etc.

The result of water quality parameters are shows in table no.1

Station → Parameters ↓	Ravet	Chinchwad	Pimpri	Kasarwadi	Dapodi
pH	8.03	7.86	7.83	7.74	7.82
DO	6.33	4.33	3.64	3.42	3.64
BOD	4.2	9.32	11.09	12.88	11.89
COD	13.97	30.16	36.62	41.37	39.78
Nitrate	0.96	2.048	2.35	2.57	2.68
Fecal	32.2	267.7	352.9	355.93	475.91
WQI	76.67	51.89	48.81	47.63	48

Table No.- 1 Five-year average variation in water quality parameters of Pavana River at different station from 2016 to 2020 (Source-MPCB)

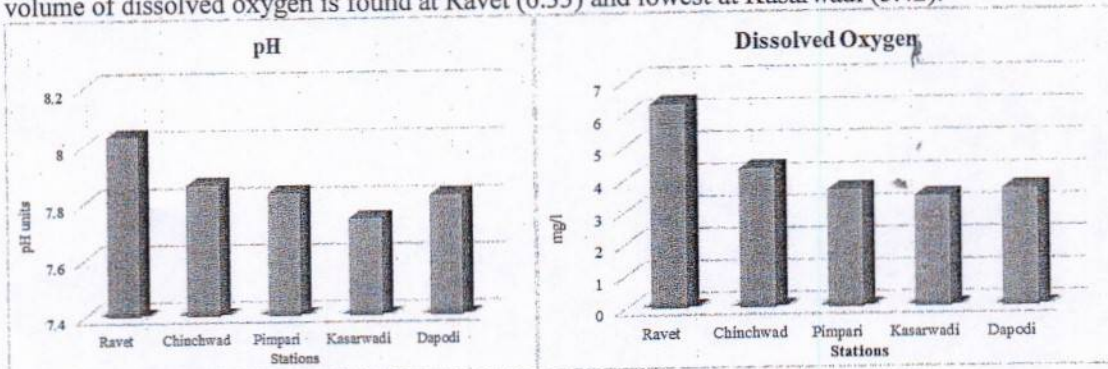
#### 1. pH

pH or 'Potential of hydrogen is indicating the concentration of hydrogen ions in the water. This aspect shows acidity and alkalinity of the water. The pH scale measured up to 0 to 14, the reading between 0 to 7 has considered acidic condition of water and above 7 value has indicated basic or alkaline. The reading value 7 is considered neutral. The study area indicates five-year average highest pH value at Ravet (8.03) and lowest value of pH found at Kasarwadi. Over all the value of pH

is above 7.5. which is nearly boundary of permissible limits. The pH value at Chinchwad, Pimparigaon and Dapodi is 7.86, 7.83 and 7.82 respectively.

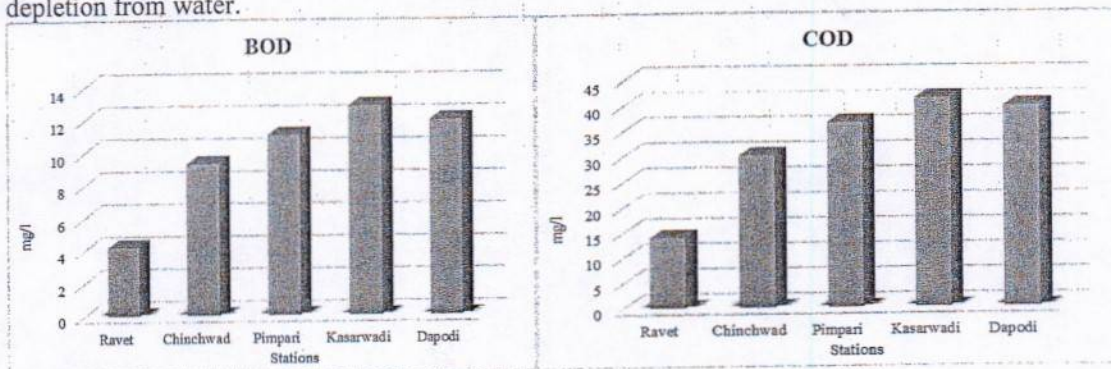
**2. Dissolved Oxygen (DO)**

The concentration of dissolved oxygen is varied from station to station. The volume of DO has change due to activity of solubility of dissolved oxygen. The solubility is totally depending on the changing rate of temperature, when the temperature is decreased the Dissolved oxygen is increased. The highest volume of dissolved oxygen is found at Ravet (6.33) and lowest at Kasarwadi (3.42).



**3. Biochemical Oxygen Demand (BOD)**

Biological oxygen demand is the amount of oxygen that requires for bacteria to degrade the organic component present in the waste water. The aim of BOD test is to determine the amount of biochemically oxidizable carbonaceous matter (Gupta et al..2003). The values of BOD aspect at river stations ranges from 12.88 mg/l at Kasarwaadi and 4.2 mg/l at Ravet it is lowest value. Whereas at stream stations the value BOD ranges from 9.32 mg/l at Chinchwad stream to 11.09 mg/l at Pimparigaon, and 11.89 mg/l at Dapodi stream. Highest vales of BOD indicate that water is polluted with organic matter. BOD values are increase due to high volume of nitrate; they cause oxygen depletion from water.

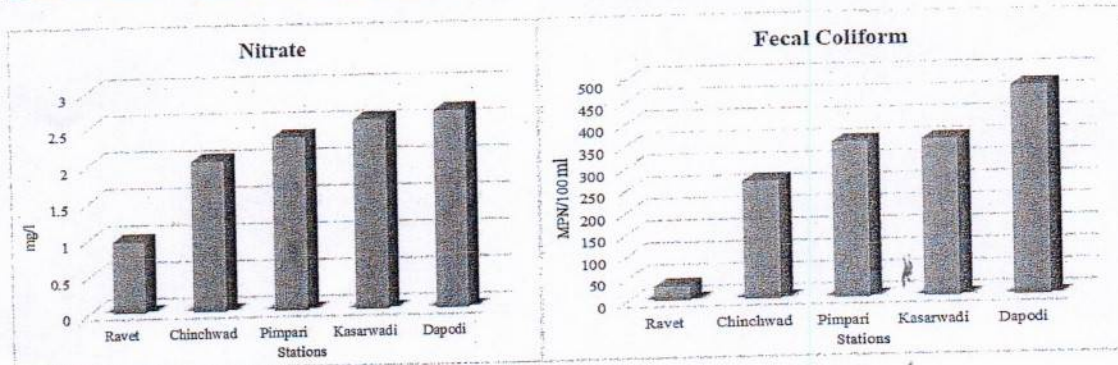


**4. COD**

Chemical Oxygen Demand (COD) is another vital water quality parameter. It is similar to BOD. High volume of COD means a greater amount of oxidizable organic material in water, the affect on dissolved oxygen and reduce its level. In the present research work research COD level varies from 13.97 mg/l to 41.37 mg/l. The maximum COD level 41.37 mg/l observed at Kasarwadi, which expressed increased water pollution level in Pavana River and minimum volume observed at Ravet. The Pimparigaon, Dapodi, and Chinchwad has increasing level of COD.

**5. Nitrate-**

Nitrate shows the end product of oxidation of nitrogenous matter and its concentration may depend on the denitrification and nitrification process of micro-organism. The high amount of nitrogenous compound is found in domestic water. Nitrates has fixed amount of atmospheric nitrogen, the nitrogen fixing organism is also important contributor to nitrates in the west water. The level of nitrate is increased towards the downstream side of Pavana river. During this study the level of nitrates ranged from 0.96 mg/l to 2.68 mg/l. The lowest value recorded at Ravet and highest value is recorded at Dapodi location.



**6. Fecal Coliform**

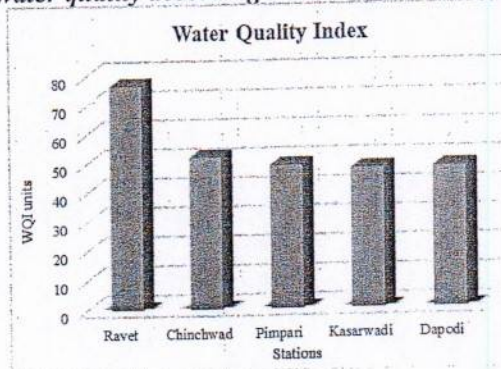
The fecal coliforms are bacteria that are always present in the waste water. They are also found in plant and soil material. Water pollution caused by fecal contamination is a serious problem due to the potential for contracting diseases. The ranges found between 42.2 to 475.91 MPN/100 ml. The extreme volume of fecal coliforms recorded at Dapodi and lowest value is recorded at Ravet. The rate of fecal coliforms increases with downstream area.

**7. WQI**

The water Quality Index was developed by Horton in United States by selecting ten most general water parameters such as pH, DO, Coliforms, Alkalinity, Chloride etc. This method was widely applied and accepted in African, Asian and European countries. Generally, the score of water quality is found between 48 to 76.67. The highest volume of WQI is found at Ravet (67.47) which indicates water good and excellent water quality and lowest volume is found at Dapodi which shows the water quality of river is bad and polluted. Generally, the water of Pawana river comes under polluted categories.

Sr. No.	WQI	Quality classification	Remarks
1	63 - 100	Good and Excellent	Non-Polluted
2	50 - 63	Medium to Good	Non-Polluted
3	38 - 50	Bad	Polluted
4	38 and less	Bad to Very Bad	Heavily Polluted

*Table 2. Status of water quality according to the WQI values (House and Ellis, 1987)*



**Conclusion-**

The contemporary study discloses that the water quality of river Pawana is deteriorated. The domestic sewage and industrial influenced water directly mixed in to river Pawana, due to quality of river water has been down. To recover the quality of water, sewage water treatment plant essential at large scale. Over all this study will pave the path towards achieving river rejuvenation scheme under smart city goals and maintaining sustainable environment and healthy ecosystem.

**References-**

1. **Pachkor, R.T. and Parbat, D.K (2017)** Assessment of Works under Jalyukta Shivar Campaign – A Case Study of Pusad Region. *International Journal for Research in Applied Science & Engineering Technology*. 5 (4): 1614- 1619.
2. **Abdulwahid, S.J.**, "Water quality index of delizhiyan springs and shawrawa river within soran district, erbil, kurdistan region of iraq", *J. Appl. Environ. Biol. Sci.*, 3(1). 40-48. 2013.
3. **Pawan Kumar Singh and Pradeep Shrivastava (2015)**, Analysis of water quality of river Narmada, *International Journal of Current Research*, VOL-7, Issue, 12, pp.24073-24076, December, 2015
4. **Gupta, S., Bhatnagar, M. and Jain, R. (2003)** Physico-chemical characteristics and analysis of Fe and Zn in tube well water and sewage water of Bikaner City. *Asian J. Chem.*, Vol-15: 727-730.
5. **Anoop Kumar Shukla, C. S. P. Ojha and R. D. Garg (2017)**, Surface Water Quality Assessment of Ganga River Basin, India Using Index Mapping, *IGARSS*, ISBN. 978-1-5090-4951-6/17 Pg.5609-5612
6. **Shweta Tyagi1, Bhavtosh Sharma, Prashant Singh1, Rajendra Dobhal, (2013)**, Water Quality Assessment in Terms of Water Quality Index, *American Journal of Water Resources*, 1(3): 34-38
7. **Pawan Kumar Singh, Pradeep Shrivastava, (2015)** Analysis of Water Quality of River Narmada, *International Journal of Current Research*. 7(12): 24073-24076
8. **Patil S, Gabale S, Padade G, Durugkar T, Jalamkar S, Mawal S, (2019)** Water quality and land use land cover analysis of Pawna River: Lifeline of sister city of Pune, India, *International Journal of Multidisciplinary Research and Development*, 6(11): 242-251
9. **Koshy, M. and Nayar, T.V. (2000)** Water quality of river Pamba at Kozhencherry. *Pollution Research*, 19(4): 665-668.