

Water Quality Analysis of Indrayani River: Impact of Urbanization And industrial Effluence

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Abstract- Water samples of Indrayani River in Pune, Maharashtra, were analyzed to assess their physico-chemical properties. Parameters such as temperature, pH, biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, total hardness, total alkalinity, total dissolved solids (TDS), and electrical conductivity were evaluated. The four water samples were collected in plastic container of 1 liter's capacity from four different geographic locations along the river also samples were collected with 1.5 feet below from the surface of water at different selective sampling points.

The study aimed to understand purity variations and assess environmental stressors. Results revealed physico-chemical parameters remained within desirable limits specified by Indian drinking water standard IS 10500:2012.

Keywords: Water Quality Parameters, Indrayani River,

I. INTRODUCTION

Water is a universal solvent. It is observed in a liquid form at ambient conditions. Water is one of the most important compounds to the living system on the earth & it plays major role in growth of global level as well as growth of Agriculture, industries & urbanization. In our country growing cities like Pune are situated on the banks of river, for this Reason quality of water in river should be Good. The Indrayani River (Pune, Maharashtra) is one of the rivers in Pune, and we surveyed it for checking the quality of water. The quality of water can be decided on the basis of its physical, chemical and biological properties. [2,6] Now a day's water gets polluted due to increased human activities; increased industrializations and excessive use of fertilizers to get more productivity in the agricultural area is also one of the resins of water pollution [3]. Hence, we must want to check quality of Water and Water is suitable for drinking is most important thing in humans and other living animals. Surface water is one of the major sources of drinking water in rural as well as urban area [4]. Now a days due to the agricultural runoff and industrial waste the quality of water is going to change drastically [17]. If the ground water is contaminated then its quality cannot get the original taste of pure water even though

we stop the entry of pollution causing parameters [16]. Due to rapid urbanization, industrial growth, untreated sewage discharge, and agricultural runoff, the river has experienced increasing levels of pollution. Due to increased urbanization and industrialization demand and supply of fresh water is difficult task in front of government organizations [5]. In this work an attempt is made to present the obtained results in the quality of Indrayani River water for domestic and agricultural purposes [7,8]

II. STUDY AREA

The Indrayani River is life line of thousands of peoples and one of tributaries of Bhima River. It originates at Kurvande village near Lonavala, in the North Western Ghats and flows towards east to meet Bhima River near Tulapur, Pune. The Indrayani River flows through two pilgrimage centers namely Dehu and Alandi. It is very respected as sacred river which is related to the great Saints named as Saint Tukaram Maharaj and Dnyaneshwar Maharaj. There are number village, housing complexes, few cities, educational institutes and many industrial areas like MIDC are in the areas of the Indrayani River. Since last thirty years industrialization is expanding at fast rate around in The Vadgaon and Dehu Gram Panchayats and many other villages do not have sewages treatment facilities, thus they release their untreated sewage wastes into the Indrayani River. Thus, the Indrayani River is getting polluted due to industrial discharge, which cause to death of fishes and aquatic animals.

III. MATERIALS AND METHODS

Water Sampling: The water samples were collected as per the standard methods given by APHA (1995) [1]. Total Four water samples were collected from the river. These samples are collected in one litter plastic bottles, which were washed and rinsed with distilled water before the collection of water samples. After the collection of samples, they are analyzed immediately for various parameters or preserved safely by taking suitable precautions to avoid deterioration



Fig.1

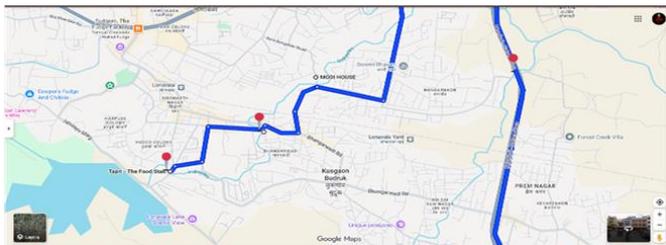


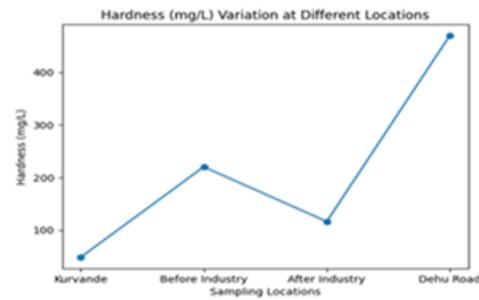
Fig. 2

IV. RESULT AND DISCUSSION

Parameter	Kurvande	Before Industry	After Industry	Dehu Road	IS 1050 Limit
Temperature	17°C	19.8°C	21.9°C	24.3°C	—
pH	7.09	7.03	7.68	6.80	6.5–8.5 (D)
Alkalinity (mg/L)	30.00	20.00	40.00	100.00	—
Hardness (mg/L)	48.00	220.00	116.00	470.00	300 (D)
Chloride (mg/L)	9.78	7.82	20.54	19.56	250 (D)
TDS(mg/L)	470.00	285.50	145.00	270.00	500 (D)
Conductivity (μ S/cm)	850.00	510.00	260.00	270.00	—
COD (mg/L)	Nil	Nil	9.6	Nil	—
BOD (mg/L)	Nil	Nil	1.7	Nil	—

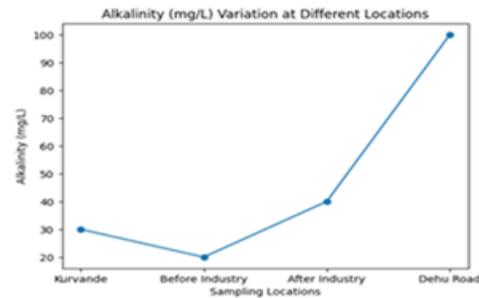
1] pH

The pH values of the river water ranged from 6.80 to 7.68, indicating a near-neutral to slightly alkaline nature of the river water; it might be due to the discharge of domestic effluents which are mixed in the river body [9,10]. The highest pH was observed at the after-industry location, which may be attributed to the discharge of industrial effluents containing alkaline substances. However, all observed pH values were within the permissible limits prescribed by IS 10500 (6.5–8.5), indicating no immediate acidity or alkalinity-related risk



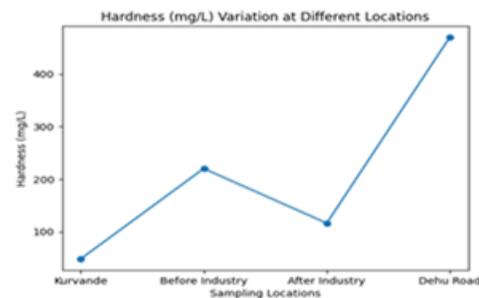
2]Alkalinity:

Alkalinity values varied between 20 mg/L and 100 mg/L. The lowest alkalinity was recorded before the industrial zone, while the highest value was observed at Dehu Road, suggesting the influence of domestic sewage and surface runoff. Although no specific BIS limit is prescribed for alkalinity, the observed values indicate a moderate buffering capacity of the river water.



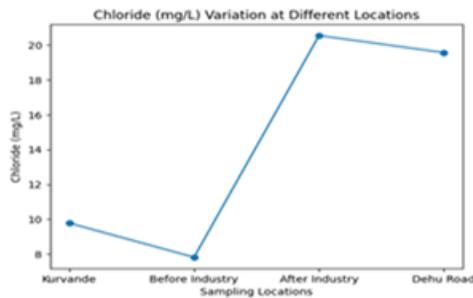
3] Hardness

Total hardness showed considerable variation along the river stretch. The minimum hardness (48 mg/L) was observed at Kurvande, indicating soft water conditions upstream. In contrast, a significantly higher hardness value (470 mg/L) was recorded at Dehu Road, exceeding the desirable limit of 300 mg/L as per IS 10500. This increase may be attributed to urban runoff, sewage discharge, and dissolution of calcium and magnesium salts due to anthropogenic activities.



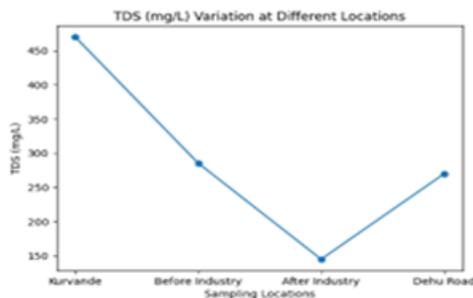
4] Chloride

High number of chlorides in the water body indicates the pollution levels due to organic waste or industrial waste [14,15]. Chloride concentration ranged from 7.82 mg/L to 20.54 mg/L, with the highest value observed at the after-industry location. Elevated chloride levels downstream indicate possible contamination from industrial effluents and domestic wastewater. However, all values were well within the permissible limit of 250 mg/L, suggesting no significant chloride pollution



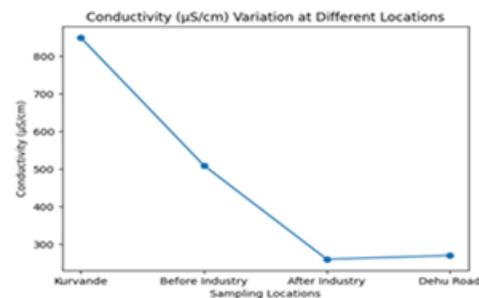
5) Total Dissolved Solids (TDS)

TDS values ranged from 145 mg/L to 470 mg/L. The highest TDS concentration was observed at Kurvande, possibly due to natural mineral dissolution, while the lowest was recorded at the after-industry location. All TDS values were within the BIS permissible limit of 500 mg/L, indicating acceptable salinity levels for drinking purposes.



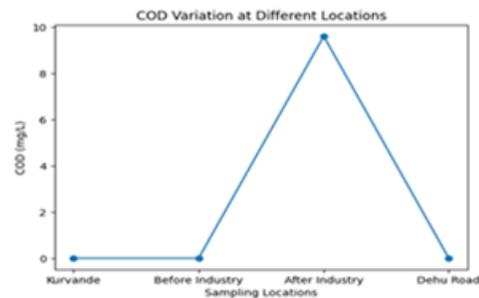
6) Conductivity

Conductivity values varied from 260 μ S/cm to 850 μ S/cm, reflecting variations in ionic concentration along the river stretch. The highest conductivity at Kurvande suggests higher dissolved ion content upstream, whereas lower values downstream may indicate dilution effects. Conductivity values show a strong correlation with TDS levels.



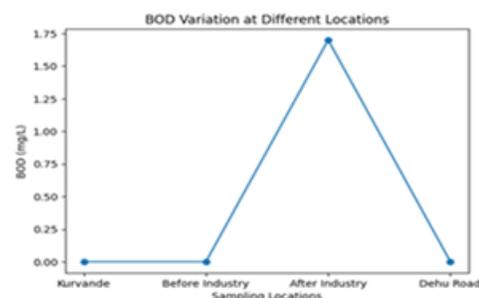
7) Chemical Oxygen Demand (COD)

COD values were Nil at all locations except the after-industry site, where a COD value of 9.6 mg/L was recorded. This confirms the presence of chemically oxidizable organic and inorganic pollutants introduced through industrial effluents. The localized increase in COD highlights the impact of industrial activities on river water quality.



8) Biochemical Oxygen Demand (BOD)

BOD was found to be Nil at Kurvande, before-industry, and Dehu Road locations, indicating minimum biodegradable organic pollution at these sites. However, a measurable BOD value of 1.7 mg/L was recorded at the after-industry location, suggesting the presence of biodegradable organic matter due to industrial discharge. Although the value is relatively low, it indicates localized organic pollution. If BOD is increased oxygen is depleted in the river body; hence, lesser amount of oxygen is available for the aquatic life [11]. The COD gives an idea about the organic matter in the water body [12,13]



V. CONCLUSION

The present study assessed the physico-chemical characteristics of the Indrayani River at four selected locations.

Overall, the study reveals that although the Indrayani River is under pressure due to urbanization, industrial discharge, and untreated sewage, the water quality parameters during the study period were mostly within permissible limits. However, continuous monitoring, proper treatment of industrial effluents, and effective sewage management are essential to prevent future deterioration of river water quality and to protect the ecological health of the Indrayani River.

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