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A Study of Water Quality Using Physiochemical Parameters of Kundalika River at Roha Region Dist-Raigad (M.S), India

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Abstract: *The present study was conducted to assess the physico-chemical characteristics of water samples collected from five sampling stations of the Kundalika River. Various water quality parameters including colour, temperature, pH, electrical conductivity, turbidity, total dissolved solids (TDS), dissolved oxygen (DO), acidity, alkalinity, chloride, and sulphate were analysed using standard analytical methods. The results indicated that the river water was colourless at all sampling stations, suggesting the absence of visible pollutants. The water temperature remained constant at 27°C throughout the study period. The pH ranged from 5.75 to 7.08, indicating that most sampling sites were slightly acidic to nearly neutral. Electrical conductivity varied from 71.90 to 88.88 µS/cm, while TDS ranged from 28 to 96 mg/L, indicating a low concentration of dissolved salts. Turbidity values ranged from 0 to 6.6 NTU, with the highest turbidity observed at station KRD. Dissolved oxygen concentrations varied considerably from 2.07 to 9.63 mg/L, reflecting differences in water quality and biological activity among the sampling stations. Acidity, alkalinity, chloride, and sulphate concentrations were generally low and remained within acceptable limits.*

Key Words: Water quality, Physicochemical parameters, Kundalika River, ecological health.

I. INTRODUCTION

River Kundalika is fed by the excess water from Tata Power's Mulshi Dam Project on to a series of hydroelectric projects and dams, including Ravalje followed by Bhira and then Dholvan, where the water is released in the morning typically at 6am. The gush of the water reaches Sutarwadi at 7:30am and water rises at Kolad at 10:00am.A historical trade route called Savalya Ghat descends in Kundalika Valley from Tamihini Ghat Road. Beautifully carved staircases exist at some places, and there are two small water cisterns. This river was a means of trade in ancient times. There are many forts on the hills along the river, including Sugad, Avchitgad, Birwadi fort, Korlai fort, and Revdanda. On the bank of River Kundalika are many retreats and farm houses with mango and watermelon as the chief fruit product, and rice and nachni as the chief farm produce. The soil is very rich in minerals and water is ample via canals fed from River Kundalika's clean water.

Over 90% of Kundalika's water is consumed by industries, including RCF's THAL Project and many MIDC all across. This unfortunately has resulted in pollution, especially dues to Roha's chemical industries releasing a lot of effluents (chemical waste) in the river. On the cards are to use 9000 Quesecs of water by the upcoming Reliance and Essar's new projects in the Villa MIDC. This could kill the rafting besides considerably reducing the river's downstream water levels at Kolad. The river will die a little more and become more placid and shallower.

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The Kundalika's water is beginning to get affected and "Save Kundalika Project" is being undertaken by "EcoMantra Nature Awareness and Travel", a local sustainable and community tourism organisation that runs a unique eco camp on its bank at Kolad.

Water is an essential component of the environment and it sustains life on the earth. All organisms depend on water for their survival. Due to rapid increase in the population of the country and need to meet the increasing demands of irrigation, human and industrial consumption the available water resources in many part of country are getting depleted and the water quality has deteriorated. Rivers are polluted due to the discharge of untreated sewage and industrial effluents (Kumari Sona Rani et al.2018).

Clean and safe water is of vital importance to any nation in the world. Freshwater of adequate quality and quantity is the necessary of sustainable development. Major portion of the available water in Earth is present in the form of surface water sources (Kunwar Raghvendra Singh et al.2022).

II. RESEARCH METHODOLOGY

Study Area: Roha Taluka which is located in the Raigad district extends from the Arabian sea coast to the western Ghat having 3000-4000mm average rainfall.There are different villages in Taluka roha with different water bodies. The Roha Taluka from Raigad district is geographically situated at latitude of 18˚26'22.0992" and longitude of 73˚12'38.0856". Water samples were collected from 5 regions of Kundalika River which is located in Roha Taluka. Clean and sterilized bottles will be used to collects sample. Bottles are rinsed with sample before collecting. Analysis of physicochemical parameters of water like Color, Temp, pH, Conductivity, TDS, DO, Acidity, Alkalinity, Sulfate, Chlorides, Turbidity etc. by using A.P.H.A. 1998.

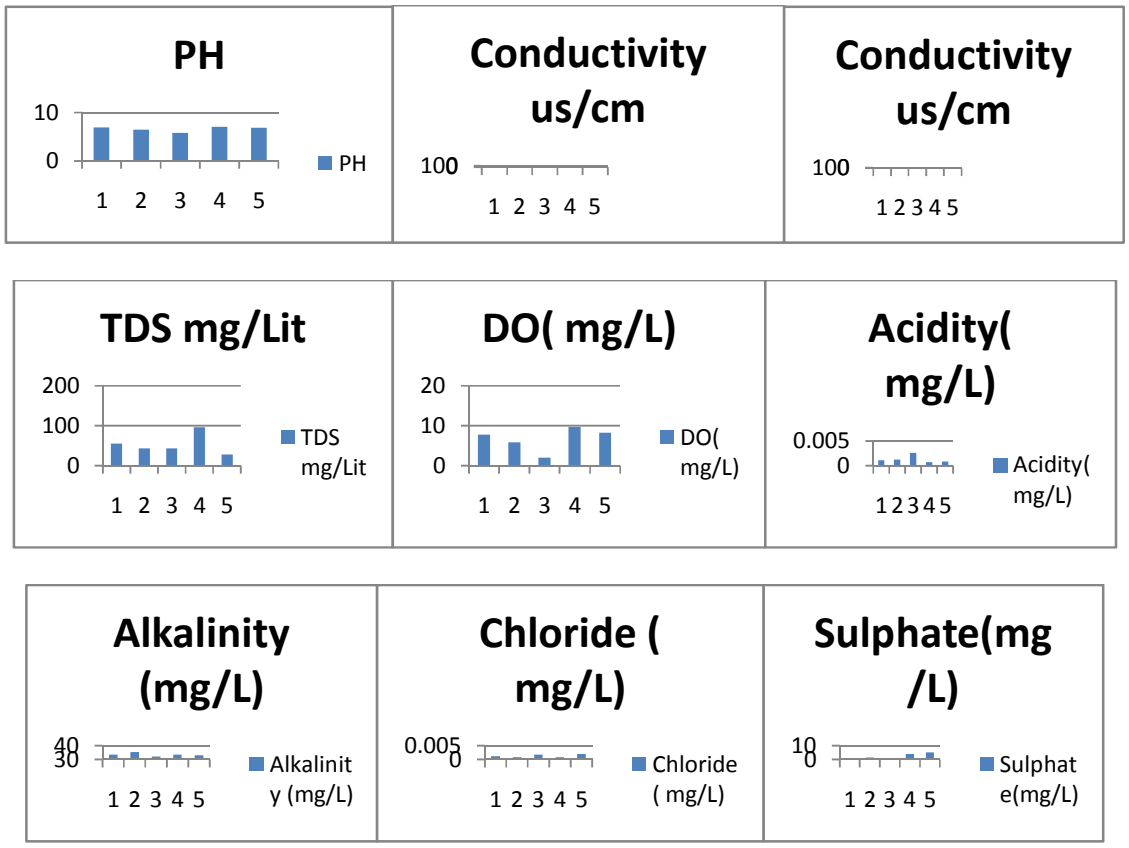
III. RESULTS

Table No.1:- Physico-chemical parameters of water samples collected from three sampling stations in Kundalika River.

Sr.No.	Parameters	KRD	KRNB	KRDK	KRK	KRZ
1.	Colour	Colourless	Colourless	Colourless	Colourless	Colurless
2.	Temperature (°C)	27	27	27	27	27
3.	PH	6.908	6.46	5.75	7.08	6.82
4.	Conductivity (us/cm)	83.57	74.78	73.78	71.90	88.88
5.	Turbidity(NTU)	6.6	3.9	0.4	1.0	0
6.	TDS (ppm or mg/L)	55	43	43	96	28
7.	DO(mg/L)	7.81	5.82	2.07	9.63	8.20
8.	Acidity(mg/L)	0.0011	0.00122	0.00256	0.00076	0.00088
9.	Alkalinity (mg/L)	33.49	35.34	32.10	33.49	33.03
10.	Chloride (mg/L)	0.00125	0.000899	0.001749	0.000849	0.001999
11.	Sulphate(mg/L)	0.3	1.2	0.3	4.0	4.9

KRD: Kundalika river water sample from Dhatav region
KRNB: Kundalika river water sample from New bridge region
KRDK: Kundalika river water sample from Devkanhe region
KRK: Kundalika river water sample from Kolad region
KRZ: Kundalika river water sample from Zolambe region

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IV. DISCUSSION

The physico-chemical analysis of water samples collected from five locations of the Kundalika River revealed noticeable variations in water quality parameters among the sampling various stations.

1. **Colour:**The water samples were colourless at all stations, indicating the absence of significant suspended coloured impurities and suggesting relatively clean surface water.
2. **Temperature:** The temperature remained constant at 27°C throughout all sampling sites, reflecting uniform environmental conditions during sampling.
3. **pH:** In the present study, the pH values ranged from 5.75 (KRDK) to 7.08 (KRK). Most stations exhibited nearly neutral pH, while KRDK showed slightly acidic conditions. Such variation may result from natural decomposition of organic matter, runoff from surrounding land, or local geological characteristics. The observed pH values are generally suitable for sustaining aquatic organisms, although continued monitoring is advisable at acidic locations.The pH range for drinking water is 6.5 to 8.5.(Lakshmi P et al 2016).
4. **Electrical Conductivity**: The total amount of dissolved ions (TDS) in the water, are estimated using electrical conductivity (EC). The low conductivity in the Kundalika river in which they reported that the large measure of soluble ions which is confirmed by the presence of other metals and chlorides as well as other parameters (V. R. Jadhavar et al.2013).

   In the study area, the electrical conductivity values (71.90–88.88 µS/cm) were comparatively low, indicating a low concentration of dissolved ionic substances. The highest conductivity at KRZ may be associated with natural mineral dissolution or surface runoff. Similarly, TDS values ranged from 28 to 96 mg/L, which are well below the permissible limits for drinking water, indicating excellent mineral quality and low dissolved

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solid content.

5. **Turbidity:** From the present study, it is observed that Turbidity varied from 0 to 6.6 NTU. The highest turbidity at KRD suggests the presence of suspended particles, which may originate from soil erosion, rainfall runoff, or human activities near the riverbank. In contrast, the absence of turbidity at KRZ indicates clear water with minimal suspended matter.

   According to BIS 10500:2012 and WHO guidelines, the permissible limit for drinking water is 1 NTU, and 5 NTU in the absence of an alternate source. Higher turbidity affects the life indirectly by cutting the light to be utilized by the phytoplankton growth.(V.R.Jadhavar et al.2013).Samples with turbidity 0.0 to 1.0 NTU are considered to have excellent clarity. Samples showing 3.9 NTU and 6.6 NTU exceed the desirable limit and indicate the presence of suspended solids, which may require filtration or sedimentation before use. Overall, most of the samples fall within acceptable limits and indicate good physical quality of water.
6. **TDS (Total Dissolved Solids):** Solids may negatively affect water quality in a variety of ways. Total dissolved solids are a measure of the many types of minerals that are present in water (TDS). Total Dissolved Solids (TDS) is a measure of the total amount of inorganic and organic substances dissolved in water.(Tigga and Pandey 2023).

   From the present study, it is observed that the TDS in water samples ranged from a minimum value of 28 mg/L(KRZ) to a maximum of 96 mg/L(KRK) with a median value of 43 mg/L(KRNB). According to BIS, the acceptable limit for TDS is 500mg/L (BIS, 2012). Low TDS indicate low pollution influx. Since all the samples have TDS values well below 100 ppm, the water can be classified as low-mineral water with excellent purity.
7. **DO (Dissolved Oxygen):** Dissolved oxygen (DO) is one of the most important indicators of aquatic ecosystem health. DO values ranged from 2.07 mg/L at KRDK to 9.63 mg/L at KRK. The high DO concentration at KRK reflects good aeration and favourable conditions for aquatic organisms. However, the low DO concentration at KRDK indicates possible organic pollution, microbial decomposition of organic matter, or stagnant water conditions, which may adversely affect aquatic life if such conditions persist. Similar trends were also observed at Pithampur area (Kothari 2004).
8. **Acidity:** From the present study, the acidity of the water samples was determined and found to be 0.0011(KRD), 0.00122 (KRNBB), 0.00256 (KRDK), 0.00076 (KRK), and 0.00088 (KRZ). These values are extremely low and indicate that the water samples are almost neutral in nature. Such low acidity suggests that the water is non-corrosive and will not cause damage to distribution pipes or plumbing systems. Also, water with negligible acidity is safe for drinking and does not impart any sour taste. Hence, the samples can be considered to be of good quality with respect to acidity. Very low acidity values indicate that the water samples are chemically stable, non-corrosive, and safe for drinking and domestic purposes.
9. **Alkalinity:** From the present study, it is observed that the alkalinity values of water ranges from a minimum value of 32.10 (KRDK) to a maximum value of 35.34 (KRNB) with a mean value of 33.49. The median of the values is 33.49 (KRD). Alkalinity is composed primarily of carbonate (CO32-) and bicarbonate (HCO32-). Alkalinity acts as a stabilizer for pH. Alkalinity, pH and hardness affects the toxicity of many substances in the water. Alkalinity makes water useful and helps in coagulation. It is less preferable at less than 100mg/L for domestic use (Gupta, 2017).
10. **Chloride:** From the present study, it is observed that the Chloride content water samples ranged from a minimum value of 0.000849 (KRK) to a maximum of value of 0.001999 (KRZ) with a median value of 0.00125 (KRD) indicating variations in the chloride levels. The BIS prescribed limit for chloride in drinking water is 250mg/L (BIS, 2012). All our water samples are having chloride concentration less than the prescribed limit.
11. **Sulphate:** From the present study, it is observed that the sulphate content in water samples ranged from a minimum value of 0.3 mg/L(KRD and KRDK) which is below detection limit (BDL) to a maximum value of

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4.9 mg/L(KRZ) with a mean value of 2.14 mg/L. The WHO and BIS prescribes limits for sulphate in drinking water is 500mg/L and 200mg/L respectively (BIS, 2012) (WHO, 1998).

V. CONCLUSION

The physico-chemical assessment indicates that the Kundalika River possesses good water quality at most of the selected sampling locations. Except for the slightly acidic pH and low dissolved oxygen at KRDK and the elevated turbidity observed at KRD and KRNB, all other parameters were well within the permissible limits recommended by BIS and WHO.The study concludes that the river water is generally suitable for sustaining aquatic ecosystems and can be considered of good environmental quality. Nevertheless, continuous monitoring and effective pollution control measures are recommended, particularly at Devkanhe, to ensure the long-term ecological health and sustainable management of the Kundalika River.

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