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Impact of Sewage Effluents on the Water Chemistry of Kundalika River at Roha, Dist. Raigad, Maharashtra, India.

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Abstract : *River water pollution is one of the areas of major issue to the environmentalists. Water quality is an index of health and wellbeing of a society. Roha town is located on the bank of Kundalika river. The industrialization, urbanization and modern practices of agriculture around the Roha town have direct impact the Kundalika river water. Such factor influences the water resources in terms of lowering the quality of water. The study area selected were the three sites of Kundalika River near to the Roha town. The physicochemical parameters like Temp, pH, TDS,DO, Total Hardness and Chlorides were studied to ascertain the drinking water quality. In general all the parameters are within the permissible limit prescribed by various standards with exception of the few.*

Key Words: Water chemistry, DO, Sewage, Kundalika river.

1. INTRODUCTION

Natural water is extremely varied in chemical composition and factors controlling the composition include physical, chemical and biological processes. Rivers are the most important water resource. Unfortunately, the rivers are being polluted by indiscriminate disposal of sewage, industrial wastes and human activities. The rivers are always the victims of the negative impacts of urbanization. Most water bodies become contaminated due to incorporation of untreated solid and liquid waste. Generation of hazardous waste has become an integral part of different activities of modern man. A large quantity of sewage and industrial waste find its way to river and other water bodies. Large towns in India are situated on the river banks, their run-off and those from agricultural lands find their way to the river making the water unfit for human use.

Industrial wastewater and municipal sewage effluents can have major impacts on chemical loads in surface waters downstream of developed urban areas and their effluents are likely to have greater effects on rivers and streams during drought conditions. Water is the major constituent of all living things and needed by them for various purposes. The demand for quality drinking water had changed considerably with the development in olden days, the only requirement of drinking water was that it should be free flowing and non-turbid. The need for better environment and health cannot be over emphasized. With increasing industrialization, urbanization and growth of population. Urbanization has direct impact on water bodies as the settlement takes place around the vicinity of water bodies

II. MATERIALS AND METHODS

Water samples were collected monthly a period of one year from July 2022 to June 2023. Three spots were fixed for the study as Upstream, Midstream and Downstream. The upstream is located near the MIDC water supply pumping station. Midstream is near Roha town and Downstream is located near the Roha-RIL road bridge. The people used the water for bathing, washing and other purposes from Midstream and Downstream.

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pH and temperature were measured immediately. pH was measured by using Equiptronics make pH meter and temperature was recorded in 0C. Analytical techniques as described in standard method for water pollution studies (APHA, 1985, Trivedy & Goel, 1984, Bandela et al, 2005 and NEERI, 1988) were adopted for physico-chemical analysis.

Results:

Table No.1:- Physico-chemical parameters of water samples collected from three sampling stations in Kundalika River (KR) during monsoon, winter and summer season (2025-2026).

SEASON	Temp			pH			TDS		
	KRI	KRII	KRIII	KRI	KRII	KRIII	KRI	KRII	KRIII
Monsoon	26	25	27	7.9	7.6	7.4	435	560	570
Winter	24	22	23	8.1	8.3	8.6	442	520	540
Summer	28	27	30	7.2	7.4	7.5	550	640	670
SEASON	Dissolved Oxygen			Total Hardness mg/lit			Chlorides		
	KRI	KRII	ARIII	KRI	KRII	KRIII	KRI	KRII	KRIII
Monsoon	5.2	4.5	4.4	115	110	105	62.20	70.20	62.00
Winter	6.1	5.4	3.9	125	132	125	70.32	72.30	65.00
Summer	4.3	4.7	3.5	125	138	145	72.42	74.50	76.20

Table No.2:- BIS standard values for the parameters analyzed for the river water.

Sr.No.	Parameters	Standard values (BIS 10500-91)
1	Temp	20 to 35 Degree Celsius
2	pH	6.0 to 8.0
3	Total Dissolved Solids	Less than 500 ppm
4	Dissolved oxygen	6.5 to 8.0 mg/lit
5	Total Hardness	121 to 180 mg/lit
6	Chloride	10 .00 to 20.00 mg/lit

III. DISCUSSION

1. Temperature: Temperature fluctuates both daily and seasonally and are responsible for increase or decrease of the river temperature. The variation in water temperature may be due to different timing of collection and the influence of season The temperature decrease in water will increase the capacity of oxygen to dissolve in it (Bhave and Borse, 2001), (Shivanikar et. al., 1999). In the present study the temperature varies in between 22oC to 30oC (Table No.1).

2. pH:The pH of the river water ranges between 7.2 for KRI sample in summer and 8.6 for KRIII sample during winter period (Table No.1). In general the pH was within the limits of the standard values (APHA, 1985). For the drinking water the pH should be of 6.0 to 8.5 (BIS). But in the study area it is slightly more during winter period.

3. Total Dissolved Solids: Total solid ranges from 455 mg/L for KRI sample in monsoon season to 670 mg/L for KRIII sample during summer period (Table No.1). Only two samples are within the permissible limits prescribed by WHO. High value of total solids 762.5 to 8411.8 mg/L was reported by Jameson and Rana (1996).

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4. Dissolved Oxygen: The dissolved oxygen ranged between 3.5 mg/L for KRIII in summer and 6.1 mg/L for KRI sample in winter season (Table No.1). The low dissolved oxygen in water may be due to the addition of sewage demanding oxygen leading to oxygen depletion (Koshy and Nayar, 1999, Dutta et. al., 2001, Shivanikar et. al, 1999).

5. Total Hardness: TH ranges from 105 mg/L for KRI sample in monsoon to 145 mg/L for KRIII during summer season (Table No.1). Maximum value was recorded during post monsoon. It might be due to discharge of sewage and lowering of water column. Minimum value was recorded during monsoon. Similar results were observed by Koshy and Nayar (1999), Mishra and Tripathi (2001) reported high value of 295 mg/L in Ganga river.

6. Chlorides: It ranges between 62.0 mg/L for sample KRIII in monsoon and 76.20 mg/ L for sample KRIII during summer season (Table No.1). The fluctuations of chloride are governed by the dilution due to inflow of water, concentration by evaporation and input from surface run-off during monsoon because of dilution. Koshy and Nayar (1999) reported high value in the range 110 mg/L to 176.0 mg/L.

Conclusion: The results indicate that KRIII was comparatively more affected by seasonal changes, as it showed higher TDS, hardness and chloride concentrations and lower DO during summer. Nevertheless, the measured pH, TDS, hardness and chloride values indicate that the water exhibited generally acceptable physicochemical characteristics, while the comparatively low DO values observed at some stations, particularly during summer, warrant attention. The study highlights the importance of regular seasonal monitoring of water quality to identify changes in pollution levels and to ensure the sustainable management and protection of the water resource.

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