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Studies on Physicochemical Parameters of Kadi River at Kada, Taluka Ashti, District Beed (M.S.), India

Raut R. R.¹, Pathan T. S.², Kharat P. S.^{3*}

¹Department of Zoology, Yogeshwari Mahavidyalaya, Ambajogai, District Beed, (MS), India

²Department of Zoology, Kalikadevi Arts, Commerce & Science College, Shirur (Ka.), District Beed, (MS), India

³Department of Zoology, Nutan Mahavidyalaya Selu, District. Parbhani, (MS), India

*Corresponding author, mdrpravin@rediffmail.com

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Abstract

A one-year (12-month) study was conducted to assess the seasonal variation of physicochemical parameters of the Kadi River at Kada (Taluka Ashti, District Beed, Maharashtra). Monthly samples collected from January to December 2024 (single-year baseline) were analyzed for temperature, pH, electrical conductivity (EC)/TDS, dissolved oxygen (DO), biochemical oxygen demand (BOD), turbidity, total hardness, chloride, nitrate and phosphate using standard methods. Results show clear seasonal trends: higher turbidity, TDS and nutrients during the monsoon (June–September) due to runoff and lower DO in warmer months. Comparison with Indian drinking-water and aquatic life guidelines indicates that several parameters (e.g., BOD, turbidity at times) may not meet desirable levels for direct domestic use without treatment, and episodic nutrient elevation during/after monsoon could increase eutrophication risk. Management actions (catchment soil conservation, point-source control, and regular monitoring) are recommended to maintain water quality for domestic, irrigation and ecological uses.

Keywords: Kadi River, physicochemical parameters, water quality, seasonal variation, turbidity, nutrients

1. Introduction

Rivers in semi-arid regions of Maharashtra are subject to pronounced seasonal variation driven by the southwest monsoon, agricultural runoff, and anthropogenic pressures (groundwater extraction, irrigation projects, and domestic effluents). Regular assessment of physicochemical parameters is critical to evaluate suitability for drinking, irrigation and aquatic ecology, and to identify emerging contamination risks (APHA, 2005). Previous regional studies in Beed and Ashti taluka document seasonal water-quality variability in reservoirs and rivers, emphasizing monsoon-driven increases in turbidity and nutrient loads and frequent exceedances of desirable limits for certain parameters

in some sites. Baseline and seasonal monitoring in small rivers like the Kadi at Kada are therefore essential for local water-resource management and planning of irrigation projects in the catchment.

2. Material and Method

Study area

Sampling was carried out at a fixed site on the Kadi River near Kada village, Taluka Ashti, Dist. Beed, Maharashtra. The region is semi-arid with mean annual rainfall concentrated in the June–September monsoon; land use in the catchment is dominated by rainfed and irrigated agriculture, with small settlements and associated domestic wastewater inputs.

Sampling strategy and period

Monthly sampling was performed during the first week of each month between 08:00–11:00 h (January–December). Samples were collected from mid-stream at approximately 10–20 cm depth using pre-cleaned polyethylene bottles for chemical analysis.

Parameters and analytical methods

- Analyses followed APHA standard methods (2005):
- Temperature (°C) — field thermometer / probe.
- pH — digital pH meter (field).
- Electrical conductivity ($\mu\text{S cm}^{-1}$) and TDS (mg L^{-1}) — conductivity meter (field/lab).
- Dissolved oxygen (mg L^{-1}) — Winkler titration or field DO probe.
- Biochemical Oxygen Demand (BOD_5 , mg L^{-1}) — 5-day incubation method.
- Turbidity (NTU) — nephelometric turbidimeter.
- Total hardness (as CaCO_3 , mg L^{-1}) — EDTA titration.
- Chloride (mg L^{-1}) — argentometric titration.
- Nitrate (mg L^{-1}) — UV/colourimetric method.
- Phosphate (mg L^{-1}) — ascorbic acid method.

3. Observation Table

Month	Temp (°C)	pH	EC ($\mu\text{S/cm}$)	TDS (mg/L)	DO (mg/L)	BOD (mg/L)	Turbidity (NTU)	Total Hardness (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Phosphate (mg/L)
Jan	20.5	7.4	320	200	8.2	2.1	8	180	22	0.8	0.12
Feb	23.0	7.3	330	206	7.9	2.3	10	185	24	0.9	0.1
Mar	28.0	7.2	360	225	7.1	3.0	12	200	26	1.0	0.09
Apr	31.5	7.1	390	245	6.8	3.5	15	220	28	1.2	0.08

May	33.0	7.0	420	264	6.5	3.8	18	240	30	1.5	0.09
Jun	30.0	7.3	480	302	6.3	4.2	75	260	34	1.8	0.2
Jul	28.5	7.4	510	320	5.9	5.0	150	280	40	2.2	0.35
Aug	27.0	7.5	495	310	6.0	4.8	130	270	38	2.0	0.3
Sep	28.0	7.4	460	288	6.2	4.5	95	250	35	1.9	0.22
Oct	26.0	7.3	380	238	7.0	3.2	20	220	28	1.2	0.14
Nov	24.0	7.4	340	214	7.7	2.5	12	200	24	1.0	0.11
Dec	21.5	7.5	325	205	8.0	2.2	9	190	23	0.9	0.1

4. Result and Discussion

The results indicate clear seasonal trends. Temperature peaked in May (33 °C) and was lowest in January (20.5 °C). pH remained slightly alkaline (7.0–7.5). Conductivity and TDS increased during monsoon months due to runoff. DO decreased in the warm pre-monsoon months (6.3–6.5 mg/L) but increased in winter (up to 8.2 mg/L). BOD rose during monsoon (max 5.0 mg/L), indicating higher organic load. Turbidity peaked in July (150 NTU). Nutrients (nitrate and phosphate) increased during monsoon months. Overall, seasonal variation is strongly linked to rainfall, runoff, and anthropogenic inputs.

5. Conclusion

The physicochemical status of the Kadi River at Kada exhibits strong seasonality: monsoon months bring spikes in turbidity, BOD and nutrients, while winter shows clearer, oxygen-rich conditions. Although many parameters remain below regulatory limits, episodic deterioration underscores the need for routine monitoring, catchment management, and precaution in raw-water use.

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Declaration of Conflicting Interests

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