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Studies on the Physico-chemical Parameters and Correlation Coefficient of Dharapadavedu Lake, Vellore Tamilnadu, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present studies were carried out based on the physical-chemical parameters and the correlation coefficient of Dharapadavedu Lake. Monthly changes in physicochemical parameters such as Water Temperature, Turbidity, pH, Alkalinity, EC, Hardness, Phosphate, Calcium, Magnesium, Nitrate, Nitrite Sulfate, Phosphate, Chloride, Ammonia, Fluoride, Bio-Chemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD) were analyzed for a period of one year from January to December 2021. The results indicated that the physicochemical parameters of the water were within permissible limits and could be used for fish culture, domestic use, and irrigation. The correlation coefficient indicates positive and negative relationships. All the correlations indicate

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that different parameters are strongly related to each other. A correlation coefficient provides an excellent tool for calculating various water quality parameters within a reasonable degree of accuracy. The observed values of various Physicochemical parameters of water samples were compared with the mean and standard values recommended by WHO. It is discovered that a significant positive correlation exists between Quantities such as EC, Alkalinity, pH, Hardness, Phosphate, Calcium, Magnesium, Nitrate, Sulfate, Phosphate, COD, And BOD contents showing the high significance of the positive relationship ($p<0.01$ level). There was a significant negative relationship between Chloride, Ammonia, Fluoride, and Nitrite ($p< 0.05$ level).

Keywords: Physicochemical parameter; correlation coefficient; Dharapadavedu Lake.

1. INTRODUCTION

"Water is an essential component of the environment and sustains life on earth. All organisms survive on water" [1]. "Freshwater bodies are important wetlands in and around human habitation because they are usually semi-natural ecosystems constructed by man in landscapes suitable for water stagnation" [2]. "The quality of drinking water is essential to life. Contaminants such as bacteria, viruses, heavy metals, nitrates, and salt have polluted water supplies due to improper treatment and disposal of waste from humans, livestock, industrial discharges, domestic discharges, and the extensive use of limited water resources" [3].

"At present, fresh water is being polluted, and an even worse situation is that we encounter a scarcity of this degraded quality of water too. It has raised certain basic challenges in our environment, and we are suffering from both the quality and quantity of water problems. Water quality is an essential parameter to be studied when the overall focus is sustainable development with mankind as the focal point since it is directly linked with human welfare" (Saxena and Saxena, 2013)

"Water quality includes all physical, chemical, and biological factors in water that influence beneficial water use" [4,5]. "Water quality is important for drinking water supply, irrigation, fish production, recreation, and other purposes for which the water must have been impounded. Some of the most important physical and chemical characteristics of tank water include temperature, turbidity, conductivity, dissolved oxygen, pH, nitrogen, and phosphorus" [6].

"Physiologically, dissolved oxygen and temperature are essential for the maintenance of aquatic life. In a related manner, both temperature and dissolved gases regulate other physical and chemical properties of the water, which can affect aquatic life, especially fish assemblages in the reservoir. Additionally, nutrient enrichment, primarily phosphorus, and nitrogen, stimulate unnecessary primary production, which can deplete oxygen. Turbidity is also a key characteristic of water quality, as its effects on light transmission and water clarity define habitat characteristics. In addition, water pH regulates aquatic chemistry, which can affect water use and habitat" [6].

"The health of an aquatic ecosystem is highly dependent on the Physico-chemical and biological characteristics of water" [7,8]. "Reduced water quality has been reported to affect fish communities by affecting habitat, food availability, and dissolved oxygen level, which in turn influence their growth potential and reproductive abilities" [9,10]. The use of the physical, chemical, and biological properties of water to assess water quality gives a good impression of the status, productivity, and sustainability of such a water body.

"Changes in physical characteristics such as temperature, conductivity, transparency, and chemical elements of water such as dissolved oxygen, nitrite, nitrate, and phosphate provide valuable information on water quality, the source (s) of variations, and their impact on watershed functions and fisheries. A systematic study of the correlation of the water quality parameters not only helps to assess the overall water quality but also to quantify the relative concentration of various pollutants in water and provides necessary cues for the implementation of rapid water quality management programs" (Dash et al. 2006). According to Pani and Misra [11], "hypolimnion is frequently observed with the phenomenon of frequent oxygen depletion and the resulting increase in BOD and COD".

The current study focuses on the physicochemical parameters of freshwater in Vellore. The analyzed data were compared with

the mean standard values recommended by whom to determine the changes in water quality parameters by season and the relationship between different Physicochemical parameters. The correlation coefficient between water quality parameters has been systematically calculated.

2. MATERIALS AND METHODS

2.1 Description of the Study Area

The water and plankton samples were collected over a period of a year, from January to December 2021 from a lake in the Dharapadavedu, Vellore district of Tamil Nadu, India. Rainwater is the only supply of water for this lake, For a year, from March January to December 2021, data were collected monthly and analyzed according to seasons, such as summer (March–May), premonsoon (June–August), and monsoon (September–Nadu, India) (Fig. 1). Rainwater is the only supply May which for the March–May .which is located at five separate locations. Every month, data were collected and analyzed according to the seasons, such as summer (March–May), premonsoon (June–August), and monsoon. (September – November,) and post-monsoon (December - February).

2.2 Analysis of Physicochemical Characteristics of Lake Water

The surface water samples were collected in sterile polyethylene bottles and kept in an ice box and transported to the laboratory for the analysis of physicochemical parameters. The water samples were collected during the early morning between 6.00 AM and 8.00 AM for everyone's first week from January to December 2021. Air and water temperature, pH, salinity, dissolved oxygen (DO), total dissolved solids (TDS,) and electrical conductivity (EC) were estimated by using the "µP Based Water & Soil Analysis Kit" (Model 1160).

2.3 Statistical Analysis

Calculation of Standard Deviations and Pearson's Correlation Coefficients

The analysis of water samples, collected from Dharapadavedu lake during three seasons for sixteen parameters has been done, and mean and standard deviations for sixteen important parameters calculated from the analysis results, have been presented in Table 1 Furthermore, Pearson's correlation coefficient for sixteen parameters calculated, have been presented in Table 3 for the study of correlation among different physicochemical parameters by using SPSS-(20.0) software.

3. RESULTS

The Physicochemical parameters (Mean ± S.D) of Dharapadevedu Lake obtained during the present investigation are presented in Table 1.

In the present study, the correlation coefficient (r) between every parameter pair is computed by taking the values as shown in Table 2.

3.1 Electrical Conductivity

Dharapadavedu Lake's electrical conductivity ranges from 1325 to 1750 /cm (Table 1). The highest EC was recorded during the monsoon season (1750 /cm), and the lowest during the winter (1,325 /cm). Electrical conductivity has a highly significant positive relationship ($p< 0.01$) with PH ($r = 0.759$), total hardness ($r = 0.834$), sulfate ($r = 0.730$), phosphorus ($r = 0.900$), Tidey test ($r = 0.732$), and cod ($r = 0.700$), but a negative relationship ($p <0.05$) with nitrate ($r = -0.163$) and fluoride ($r = 0.236$).

3.1.1 pH

The pH values of samples collected from the lake ranged from 7.50 to 9.05, which showed acidic water throughout the year (Table 1). The highest pH recorded during the summer was 9.05, while the lowest pH recorded during the monsoon was 7.50.pH has a highly significant positive relationship ($p <0.01$ level) with the following variables: EC ($r = 0.759$), alkalinity ($r = 0.737$), total hardness ($r = 0.825$), calcium ($r = 0.603$), magnesium ($r = 0.591$), nitrate ($r = 0.755$), sulfate ($r = 0.702$), phosphate ($r = 0.725$), cod ($r = 0.881$), and bod ($r =0.774$)whereas no significant negative relationship exists ($p< 0.05$ level).

3.1.2 Alkalinity

Alkalinity values ranged from 240 to 395 mg/L for Dharapadavedu Lake (Table 1). The maximum value of alkalinity was reported during the summer at 395 mg/L, and the minimum alkalinity was during the winter season at 240 mg/L. There is a strong positive relationship ($p< 0.01$ level) between alkalinity nitrate ($r = 0.790$), sulfate ($r = 0.814$), bod ($r = o.928$), and cod ($r = 0.802$), but no significant negative relationship ($p< 0.05$ level).

3.1.3 Total hardness

The total hardness of Dharapadavedu Lake water ranges between 240 and 320 mg/L (Table 1). The maximum amount of total hardness in the water was recorded during the summer season at 320 mg/L, and the minimum amount of total hardness was recorded during the winter season at 240 mg/L. Total hardness shows a significant positive relationship ($p<0.01$ level). Positive relationships were found for EC ($r = 0.834$), PH ($r = 0.525$), phosphate ($r = 0.819$), and cod ($r = 0.758$), while negative relationships were found for nitrate ($r = -0.128$) and fluoride ($r = -0.068$) ($p <0.05$ level).

3.1.4 Calcium

The analysis of calcium revealed a range of between 53 and 115 (Table 1). The maximum amount of calcium recorded in water during the summer season was 115 mg/L, and the minimum amount of calcium in water was recorded during the monsoon season at 53 mg/L. Calcium has a highly significant positive ($p< 0.01$ level) relationship with alkalinity ($r = 0.840$), magnesium ($r = 0.925$), and BOD ($r = 0.810$), whereas the Tidey test ($r = 0.052$) has a negative ($p <0.05$ level) relationship.

3.1.5 Magnesium

The amount of magnesium recorded in the water ranges between 32 and 112 mg/L (Table 1). The maximum amount of magnesium in the water was recorded during the Summer season at 112 mg/L, while the minimum value was recorded during the monsoon season at 32 mg/L. Magnesium has a highly significant positive relationship ($p <0.01$) with alkalinity ($r = 0.833$), calcium ($r = 0.925$), and fluoride ($r = 0.0724$), but a negative relationship ($p < 0.05$) with Tidey test ($r = 018$).

3.1.6 Nitrite

Nitrite concentrations in Dharapadavedu lake water range between 0.11 and 0.23 mg/L (Table 1). The maximum amount of nitrate was recorded during the summer season (0.23 mg/L), and the minimum amount of nitrite in water was recorded during the monsoon season (0.11 mg/L). Nitrite has a highly significant positive relationship ($p <0.01$ level) with calcium ($r = 0.600$), magnesium ($r = 0.655$), and fluoride ($r = 0.701$), but a negative relationship ($p 0.05$ level) with total hardness ($r = -0.128$), chloride ($r = -0.24$), phosphate ($r = 144$), and Tidey test ($r = -0143$).

3.1.7 Nitrate

The amount of nitrate recorded in the water of Dharapadavedu Lake ranges between 13 and 75 mg/L (Table 1). The maximum amount of nitrate in water was 75 mg/L during the summer season, and the lowest amount of nitrate in water was 13 mg/L during the winter season. Nitrate has the highest positive correlation ($p <0.01$ level), followed by pH ($r = 0.755$), alkalinity ($r = 0.790$), and sulfate ($r = 0.710$) with no negative correlation ($p < 0.05$ level).

3.1.8 Chloride

Dharapadevedu Lake chloride concentration ranges between 315 and 391 mg/L (Table 1). The maximum chloride reported in the summer season was 391 mg/L, and the minimum value of chloride recorded during the monsoon season was 315 mg/L. Chloride has a highly significant negative relationship ($p 0.05$ level)with manganese ($r = -0.26$), nitrite ($r = -0.24$), fluoride ($r = -0.455$), and Tidey ($r = -0.262$).

3.1.9 Fluoride

The analysis of fluoride revealed a range of 1.0 to 2.0 The maximum fluoride reported in the summer season was 2.0 mg/L, and the minimum value of chloride recorded during monsoon season was 1.0 mg/L. Fluoride has a strong positive relationship ($p <0.01$) with magnesium ($r = 0.724$), whereas EC ($r = -0.236$), total hardness ($r = -068$), phosphate ($r = -0.261$), and Tidey test ($r = -0.241$) have a strong negative relationship ($p <0.05$).

3.1.10 Sulfate

Sulfate in the water collected from the Dharapadavedu Lake ranges between 140 and 285 mg/L (Table 1). The maximum amount of sulfate in the water was recorded during the summer season at 285 mg/L, and the minimum amount of total hardness was recorded during the winter season at 140 mg/L. The concentration of sulfate in Dharapadevedu Lake has a strong positive relationship ($p <0.01$ level) with EC ($r = 0.730$), alkalinity ($r = 0.814$), nitrate ($r = 0.710$), phosphate ($r = 0.712$), COD ($r = 0.761$), and bod ($r = 0.857$).

3.1.11 Phosphate

Phosphate recorded in the water of Dharapadevdu Lake ranges between 0.13 to 0.35 mg/L (Table 1). The maximum amount of phosphate recorded during the summer season was 0.35 mg/L, and the minimum amount of phosphate was recorded during the monsoon season at 0.13 mg/L. Phosphate has a highly significant positive relationship ($p < 0.01$) with EC ($r = 0.900$), PH ($r = 0.725$), total hardness ($r = 0.819$), and sulfate ($r = 0.712$), but a highly significant negative relationship ($p\ 0.05$) with nitrite ($r = -0.144$) and fluoride ($r = -0.261$).

3.1.12 Tidey test

The tidey test of the water collected from the Dharapadavedu Lake ranges between 0.5 to 0.9 mg/L (Table 1). The maximum amount of Tidey test in the water was recorded during the summer season at 0.9 mg/L, and the minimum amount of Tidey test was recorded during the winter season at 0.5 mg/LEC ($r = 0.732$) has a highly significant positive relationship ($p < 0.01$), whereas calcium ($r = -0.052$), magnesium ($r = -0.08$), nitrite ($r = -0.143$), chloride ($r = -0.262$), and fluoride ($r = -0.241$) have a highly significant negative relationship ($p < 0.05$).

3.1.13 COD

Lake had a COD value ranging from 192 to 372 mg/L (Table 1). The maximum COD value was reported during the summer season at 372 mg/L, and the lowest COD value was reported during the winter season at 192 mg/L. pH ($r = o.881$), Alkalinity ($r = 0.802$), Total Hardness ($r = 0.758$), Nitrite ($r = 0.776$), Sulfate ($r = 0.761$), and Bod ($r = -0.913$) all have a highly significant positive relationship ($p < 0.01$ level).

3.1.14 BOD

The amount of BOD recorded in the water ranges between 12 to 26 mg/L (Table 1). The maximum amount of BOD in the water was recorded during the summer season at 26 mg/L, while the minimum value was recorded during the monsoon season at 12 mg/L. PH ($r = 0.774$), alkalinity ($r = 0.928$), calcium ($r = 0.810$), nitrite ($r = 0.790$), sulfate ($r = 0.857$), and cod ($r = 0.913$) all have a significant positive relationship with BOD ($p < 0.01$ level).

4. DISCUSSION

“In the present study, the correlation coefficient (r) between every parameter was computed by taking the (mean and standard deviation) values as shown in Table 2. The correlation coefficient (r) between any two parameters, x and, y is calculated for parameters such as water temperature, pH, turbidity, total dissolved solids, total hardness, chloride, phosphate, nitrate, dissolved oxygen, biological oxygen demand, and the Cod of the Dharapadavedu lake” [12]. The degree of linear association of the water quality parameters as measured by the simple correlation coefficient (r) is presented in Table 3.

The comparison of various Physico-chemical parameters deduced from Dharapadevedu Lake allowed us to study this water body. Quantities such as EC, alkalinity, pH, hardness, and phosphate, calcium, magnesium, nitrate, sulfate, phosphate, COD, BOD contents show the high significance of the positive relationship ($p<0.01$ level). There was a significant negative relationship between chloride, ammonia, fluoride, and nitrite ($p < 0.05$ level).

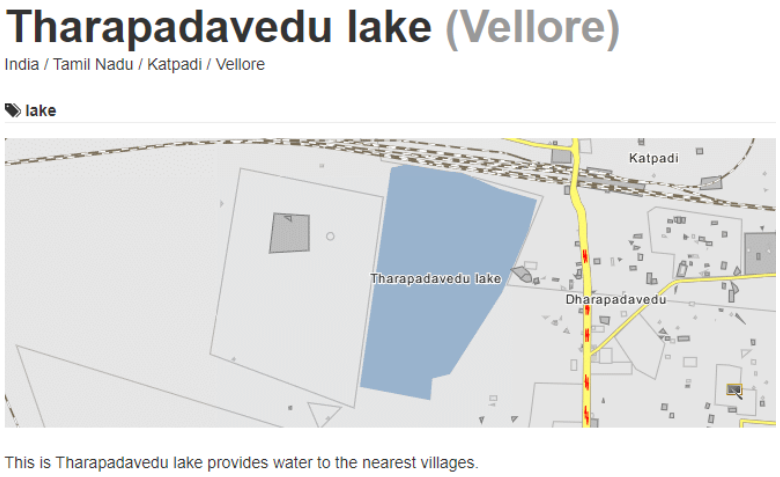

Fig. 1. This figure represents the Dharapadavedu Lake

Table 1. Mean with standard Values of physico-chemical parameters at Dharapadavedu Lake (Jan-Dec2020)

S. No.	Parameter	Mean	Std. Deviation	N
1.	EC	1528.167	155.0143	12
2.	PH	8.1425	0.51764	12
3.	ALKALINITY	341.4167	43.57326	12
4.	TH	274.9167	25.17379	12
5.	CALCIUM	85	19.08355	12
6.	MAGENISIUM	75.3333	25.33533	12
7.	AMMONIA	0.0183	0.0575	12
8.	NITRITE	0.175	0.0576	12
9.	NITRATE	49.1667	20.94509	12
10.	CHLORIDE	334.1129	107.7311	12
11.	FULORIDE	1.375	0.37689	12
12.	SULPAHTE	223.75	40.29014	12
13.	PHOSPHATE	0.2042	0.0912	12
14.	TIDEY	0.7417	0.1379	12
15.	BOD	20.1667	5.16691	12
16.	COD	310.8333	64.3892	12

Table 2. The relationship between physical-chemical parameters in seasonal variations during the study period

S.No	Parameter	Winter	Summer	Monsoon
1.	EC	1.605±94.52	1,595 ±142.	1,383±73.60
2.	pH	8.04±0.27	8.68±0.38	7.71±0.19
3.	alkalinity	351.50±46.05	378.75±14.74	330.00±26.22
4.	Total hardness	281±14.16	291.25±24.59	252.50±11.46
5.	Calcium	69±11.66	105.50±7,63	80.50±10.52
6.	magnesium	48.50±12.54	101.00±6.96	76.50±13.39
7.	Ammonia	0.00±0.00	0.05±0.09	0.01±0.01
8.	Nitrite	0.14±0.04	0.19±0.05	0.20±0.05
9.	Nitrate	44.50±21.93	67.50±12.09	35.50±3.50
10.	Chloride	368±12.22	378.75±10.26	255.09±149.14
11.	Fluoride	1.00±0.00	1.50±0.00	1.63±0.41
12.	Sulphate	221±53.90	245.00±23.74	205.00±13.69
13.	Phosphate	0.23±0.07	0.24±0.11	0.14±0.01
14.	Tidey test	0.80±0.07	0.78±0.08	0.65±0.17
15.	bod	39.25±12.89	56.25±7.40	42.75±5.93
16.	cod	310±98.39	467.75±32.52	328.75±91.75

Table 3. Pearsons' correlation coefficibetweenween physicochemical parameter study from Dharapadavedu Lake

		EC	PH	ALKALINIT	TOTAL	CALCIUM	MANGE	AMMONIA	NITRITE	NITRATE	CHLORIDE	FLUR	SUL	PHOS	TIDEY	COD	BOD
EC		1	.759**	0.436	.834**	0.137	0.055	0.398	-0.163	0.554	0.194	-0.236	.730**	.900**	.732**	.700*	0.56
			0.004	0.157	0.001	0.67	0.865	0.2	0.614	0.062	0.545	0.46	0.007	0	0.007	0.011	0.058
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
PH		.759**	1	.737**	.825**	.603*	.591*	0.543	0.176	.755**	0.288	0.121	.702*	.725**	0.528	.881**	.774**
		0.004		0.006	0.001	0.038	0.043	0.068	0.583	0.005	0.365	0.709	0.011	0.008	0.077	0	0.003
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
ALKALINITY		0.436	.737**	1	.577*	.840**	.833**	0.319	0.487	.790**	0.124	0.491	.814**	0.422	0.094	.802**	.928**
		0.157	0.006		0.049	0.001	0.001	0.312	0.108	0.002	0.701	0.105	0.001	0.172	0.772	0.002	0
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
TOTAL		.834**	.825**	.577*	1	0.295	0.281	0.416	-0.128	.604*	0.413	-0.068	.639*	.819**	0.509	.758**	0.555
		0.001	0.001	0.049		0.353	0.376	0.179	0.693	0.038	0.182	0.833	0.025	0.001	0.091	0.004	0.061
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
CALCIUM		0.137	.603*	.840**	0.295	1	.925**	0.166	.600*	0.558	0.115	.581*	0.527	0.111	-0.052	.673*	.810**
		0.67	0.038	0.001	0.353		0	0.607	0.039	0.059	0.722	0.047	0.078	0.732	0.873	0.016	0.001
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
MANGE		0.055	.591*	.833**	0.281	.925**	1	0.258	.655*	0.523	-0.026	.724**	0.429	0.091	-0.08	0.545	.699*
		0.865	0.043	0.001	0.376	0		0.419	0.021	0.081	0.935	0.008	0.164	0.779	0.805	0.067	0.011
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
AMMONIA		0.398	0.543	0.319	0.416	0.166	0.258	1	0.277	0.373	0.069	0.157	0.403	0.48	0.399	0.283	0.268
		0.2	0.068	0.312	0.179	0.607	0.419		0.383	0.232	0.831	0.625	0.194	0.114	0.198	0.374	0.4
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
NITRITE		-0.163	0.176	0.487	-0.128	.600*	.655*	0.277	1	0.049	-0.24	.701*	0.246	-0.144	-0.143	0.211	0.435
		0.614	0.583	0.108	0.693	0.039	0.021	0.383		0.88	0.452	0.011	0.441	0.654	0.657	0.511	0.157
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
NITRATE		0.554	.755**	.790**	.604*	0.558	0.523	0.373	0.049	1	0.293	0.072	.710**	0.47	0.174	.776**	.790**
		0.062	0.005	0.002	0.038	0.059	0.081	0.232	0.88		0.356	0.824	0.01	0.123	0.589	0.003	0.002
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
CHLORIDE		0.194	0.288	0.124	0.413	0.115	-0.026	0.069	-0.24	0.293	1	-0.455	0.138	0.372	-0.262	0.332	0.155
		0.545	0.365	0.701	0.182	0.722	0.935	0.831	0.452	0.356		0.137	0.67	0.234	0.41	0.292	0.631
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
FLUR		-0.236	0.121	0.491	-0.068	.581*	.724**	0.157	.701*	0.072	-0.455	1	0.079	-0.261	-0.241	0.152	0.347
		0.46	0.709	0.105	0.833	0.047	0.008	0.625	0.011	0.824	0.137		0.808	0.412	0.451	0.638	0.268
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
SUL		.730**	.702*	.814**	.639*	0.527	0.429	0.403	0.246	.710**	0.138	0.079	1	.712**	0.427	.761**	.857**
		0.007	0.011	0.001	0.025	0.078	0.164	0.194	0.441	0.01	0.67	0.808		0.009	0.166	0.004	0
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
PHOS		.900**	.725**	0.422	.819**	0.111	0.091	0.48	-0.144	0.47	0.372	-0.261	.712**	1	0.57	0.569	0.464
		0	0.008	0.172	0.001	0.732	0.779	0.114	0.654	0.123	0.234	0.412	0.009		0.053	0.053	0.129
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
TIDEY		.732**	0.528	0.094	0.509	-0.052	-0.08	0.399	-0.143	0.174	-0.262	-0.241	0.427	0.57	1	0.359	0.215
		0.007	0.077	0.772	0.091	0.873	0.805	0.198	0.657	0.589	0.41	0.451	0.166	0.053		0.251	0.503
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COD		.700*	.881**	.802**	.758**	.673*	0.545	0.283	0.211	.776**	0.332	0.152	.761**	0.569	0.359	1	.913**
		0.011	0	0.002	0.004	0.016	0.067	0.374	0.511	0.003	0.292	0.638	0.004	0.053	0.251		0
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
BOD		0.56	.774**	.928**	0.555	.810**	.699*	0.268	0.435	.790**	0.155	0.347	.857**	0.464	0.215	.913**	1
		0.058	0.003	0	0.061	0.001	0.011	0.4	0.157	0.002	0.631	0.268	0	0.129	0.503	0	
		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

5. CONCLUSION

Seasonal fluctuations in various physicochemical parameters are observed during the summer, monsoon, and winter seasons. According to the study, the lake's water has high concentrations of water temperature, turbidity, pH, alkalinity, Total Hardness, Chloride, Dissolved Oxygen (DO), Bio-chemical Oxygen Demand, and Chemical Oxygen Demand due to the addition of detergents and soap from washing clothes around the lake, which are directly released into the lake, as well as evaporation, which makes the water more concentrated during the summer season. Other physicochemical parameters were within WHO's [13] recommended limits. The

correlation coefficient represents the positive and negative correlation for both physicochemical parameters. This investigation might also help in the lake's long-term management. Pollution levels should be continuously monitored to improve water quality, and favorable conditions for fish survival, growth, and reproduction should be maintained.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Smitha Physicochemical characteristics of water samples of Bantwal Taluk, South-Western Karnataka, India. J Environ Biol. 2007;28:591-595.
2. .Yadav P, Yadav AK, Khare PK. Physico-chemical characteristics of a freshwater pond of Orai, U.P., Central India. Octa Journal of Biosciences. 2013;1: 177-184.
3. Onwughara NI, Ajiwe VIE, Nnabuenyi HO. Physicochemical studies of water from selected boreholes in Umuahia North Local Government Area, in Abia State, Nigeria. International Journal of Pure & Applied Bioscience. 2013;1:34-4
4. Alley ER. Water quality control handbook. Vol. 2. New York: McGraw-Hill; 2007.
5. Spellman FR. Handbook of water and wastewater treatment plant operations. 3rd ed. Boca Raton: CRC Press; 2013.
6. Akongyuure DN, Alhassan EH. Variation of water quality parameters and correlation among them and fish catch per unit effort of the Tono Reservoir in Northern Ghana. Journal of Freshwater Ecology. 2021 Dec 10;36(1):253-69.
7. Venkatesharaju K. Physico-chemical and bacteriological investigation on the river Cauvery of Kollegal stretch in Karnataka. J Sci Eng Technol. 2010;6(1):50–59.
8. Rameshkumar S, Radhakrishnan K, Aanand S, Rajaram R. Influence of physicochemical water quality on aquatic macrophyte diversity in seasonal wetlands. Appl Water Sci. 2019;9(1):12.
9. Reynolds J. Effects of water quality on fish species in cutler reservoir Saxenana, MM, 1987. Environmental analysis of water, soil, and air. Agro-botanical Publishers, India. 2014;1-176.
10. Shetty A, Venkateshwarlu M, Muralidharan M. Effect of water quality on the composition of fish communities in three coastal rivers of Karnataka, India. Int J Aquat Biol. 2015;3(1):42–51.
11. Pani S, Misra SM. Impact of hydraulic detention on the water quality characteristics of a tropical wetland (Lower Lake). Environmental pollution and its management (Ed. Pankaj Srivastava). 2000;18-28.
12. Qureshimatva U, Maurya RR, Gamit B, Solanki HA. Studies on the physico-chemical parameters and correlation coefficient of Sarkhej Roza lake, district Ahmedabad, Gujarat, India. Journal of Environmental & Analytical Toxicology. 2015;5(284):2161-0525.
13. World Health Organization (WHO). Guideline for drinking water quality. Health criteria and other supporting information (2nd Ed Geneva). 1998;2:231-270.