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CORRELATION COEFFICIENT STUDY OF PHYSICO-CHEMICAL PARAMETERS OF KHANAPUR WATER RESERVOIR, DIST. OSMANABAD MAHARASHTRA, 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

Present work deals with the assessment of physico chemical parameters of water samples of Khanapur Water reservoir at different selected sites in the year July 2019 - June 2020. The water sample were collected were analyzed, as per standard methods parameters such as Temperature, pH, EC, Turbidity were measured in situ. Correlation coefficients were calculated between different pairs of parameters to identify the positive and negatively correlated parameters was applied for checking significance. Correlation coefficient showed high significant positive and negative relationship ($p< 0.01$ level) and also show significant positive and negative relationship ($p<0.05$ level) in different pairs of parameters.

Keywords: Correlation coefficient; physico chemical parameters; Khanapur Water reservoir; India.

1. INTRODUCTION

Water being a universal solvent has been and is being utilized by mankind time and now of the total amount of global water, only 2.4% is distributed on the main land, of which only a small portion can be utilized as fresh water Divya and Deepak S [1].

In the ponds, river and ground water used for domestic and agricultural purposes. The quality of water may be described according to their physico chemical and micro-biological characteristics. For effective maintenance of water quality through appropriate control measures, continuous monitoring of large number of quality parameters is essential.

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However it is very difficult and laborious task for regular monitoring of all the parameters even if adequate manpower and laboratory facilities are available. Therefore, in recent years an alternative approach based on statistical correlation, has been used to develop mathematical relationship for comparison of physico chemical parameters. Mayur (2007); Garge [2]; Mitali [3]. Navneet [4]. Patil [5]. Madhulekha (2017).

2. MATERIALS AND METHODS

The water samples were collected from Khanapur Water reservoir from four different sites for the year July 2019 - June 2020.. The selected sampling site is denoted by Site A. Site B. Site C. Site D respectively. the physical parameter such as temperature was recorded by using mercury thermometer. The pH of water was determined by using Hanna made pen pH meter. The chemical parameters of water such as dissolved oxygen, free carbondioxde. Alkalinity. Hardness, Chloride were determined by standards methods described by American Public Health Association [6]; Kodarkar [7]; Trivedy et al. [8]. Simple correlation coefficient (r) analysis between parameters. ANOVA have been employed for the stastical interpretation of data obtained from the study is discussed.

3. RESULTS AND DISCUSSION

Studies of physico chemical parameters of Khanapur Water reservoir water suggests that the various parameters depending upon the hydrochemistry of the study area. The physical factors contributing the great role in water quality such as Temperature. pH. Turbidiry water level and intensity of illumination is also an important factors to maintain the water quality [9.10.11.12].

In the present study description of correlation coefficient (r) for the year July 2019 - June 2020 is represented in Table 1.

Water temperature exhibited highly significant positive correlation with Electrical Conductivity (r = 0.771). Alkalinity (r = 0.710). Chloride (r = 0.709) and negative correlation with Turbidity(r = -0.123). Dissolved oxygen (r = -0.093). Free Carbon dioxide (r = -0.154) (Table 1). This shows that with increase or decrease in the values of Temperature; Turbidity. DO. Free CO2 also exhibit decrease or increase in their values. Negative correlation between water temperature and dissolved oxygen was also observed by Goldman and Horne [13]; Bahura [14]; Singh et al., (2002).

pH shows highly significant positive correlation with Electronic conductivity (r = 0.714).Total dissolved solids (r = 0.783). Alkalinity (r = 0.558) and highly significant negative correlation with Free CO2 (r = -0.833) (Table 1). So with increase or decrease in the values of pH. Transparency. Free CO2 values increases or decreases. While. Turbidity. EC. TDS. DO. Alk.. Chloride. Hardness values shows fluctuation with increase in values of pH. Shradha. (2011) observed pH shows negative correlation with Turbidity, dissolved oxygen, Chloride.

Transparency exhibited significant positive correlation with conductivity (r = 0.402). Free CO2 (r = 0.518). Alkalinity (r = 0.299). Chloride (r= 0.303). Hardness (r = 0.463) and highly significant negative correlation with Turbidity (r = - 0.700). DO (r = -0.686) (Table 1).

Turbidity shows highly significant positive correlation with TDS (r = 0.784). DO (r = 0.732) and highly significant negative correlation with Free CO2 (r = -0.845) (Table 1).

Electrical conductivity shows negative correlations with Free CO2 (r =-0.534) and highly significant positive correlation with Alkalinity (r = 0.888). Chloride (r = 0.885).

Total Dissolved solids (TDS) shows highly significant positive correlation with DO (r = 0.854) and highly significant negative correlations with Free Co_2 (r =-0.853). If the correlation between Electrical conductance and Total dissolved solids is considered. it reveals that the two parameters are positively related indicating the fact that the raise in Electrical conductivity is due to increased Total dissolved solids.

Dissolved oxygen shows highly significant negative correlation with Free CO2 (r = - 0.714) and positive correlation with remaining parameters.

Free CO_2 showed positive correlation with Transparency (r = 0.518). Hardness (r = 0.016) while negative correlation with remaining parameters. Similar result found by Chavan [15].

Alkalinity showed negative correlation with Free CO_2. Turbidity etc while highly significant positive correlation with Chloride (r = 0.999).

Table 1. Variation of Correlation coefficients of physico-chemical parameters from Khanapur Water reservoir During July 2019 - June 2020

Parameters	Temp. °C	pH	Tra. (cm)	Turbidity (NTU)	E.C (µmho/cm)	T.D.S (Mg/L)	D.O (Mg/L)	Free CO2 (Mg/L)	Alk. (Mg/L).	Chloride (Mg/L)	Hardness (Mg/L)
Temp. (°C)	1										
pH	0.413	1									
Tra (cm)	0.559*	-0.073	1								
Turbidity(NTU)	-0.123	0.523	-0.700**	1							
E C	0.771**	0.714**	0.402	0.258	1						
T D S (Mg/L)	0.289	0.787**	-0.345	0.784**	0.472	1					
DO (Mg/L)	-0.093	0.533	-0.686**	0.732**	0.096	0.854	1				
Free CO2(Mg/L)	-0.154	-0.833**	0.518	-0.845	-0.534	-0.853**	-0.714**	1			
Alk. (Mg/L)	0.710**	0.558**	0.299	0.248	0.888**	0.391	-0.018	-0.503	1		
Chloride (Mg/L)	0.709**	0.529	0.303	0.255	0.885**	0.386	-0.023	-0.498	0.999**	1	
Hardness (Mg/L).)	0.416	0.085	0.463	-0.185	0.385	0.035	-0.276	0.016	0.455	0.470	1

*** = Correlation is high significant at p = 0.01 level, '-' indicate negative correlation, * = Correlation is significant at p = 0.05 level*
Tra. = Transparency, EC = Electrical conductivity, T.D.S = Total Dissolved Solids, DO = Dissolved oxygen

Chloride is generally present in natural waters. Chloride shows highly significant positive correlation with Temp. (r =0.709), Electronic conductivity (r = 0.855), Alkalinity (r =0.999).Similarly, results have been reported by Shinde [16] showed Chloride highly significant positive correlation with Temp. and Alkalinity.

Hardness showed negative correlation with turbidity, DO, and showed positive correlation with remaining parameters (Table 1). Bhandari, (2008) found that a significant positive correlation between Hardness and pH.

Shinde [16] found that different result, high significant positive relationship with turbidity, electrical conductivity, total dissolved solids and high significant negative relationship with transparency.

4. CONCLUSION

The study of correlation coefficient (r) greatly facilitates the calculation of some parameters without experimental determination. The correlation coefficient indicates positive and negative significant correlation of physico-chemical parameters with each other. Positive correlation mean one parameter increase with other parameters also increase and negative correlation mean one parameter increase with other parameters decrease.

Since other parameters and their functions can be explained by using these conditions, utilization of such methodology will thus greatly facilitate the task of rapid monitoring of the status of pollution of water economically and this is the most important part of any pollution study to suggest some effective and economic way for water quality management.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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