Environment Conservation Journal 7 (1-2) 79-82, 2006
(ISSN 0972-3099)

Correlation Of Physico-Chemical Parameters In Virla Reservoir, M.P.

S. K. Pathak and L. K. Mudgal*
Department of Zoology, Govt. Autonomous Holkar Science College, Indore (India)
*Govt. Girls P. G. College, Moti Tabela, Indore (India)

Abstract
Water samples were collected from Virla reservoir during July 2001 to June 2003. In the present study an inter-relations has been established by statistical methods. Statistical analysis of the present data indicated the existence of a positive correlationship among various physico-chemical parameters, like water temperature, transparency, pH, free carbondioxide, alkalinity, dissolved oxygen (DO), biochemical oxygen demand (BOD), hardness and phosphate.

Introduction
Now a days limnology has become a well established interdisciplinary branch of science in ecology (Tiwari and Patel, 1991). The statistical technique to interpret data of various aquatic habitat were also used by Nair *et al*. (1980), Tiwari and Mazoor (1988), Somashehara Rao (1990), Kannan and Rajasekaran *et al*.(1991), Reddy *et al*. (1992), Nagarajan *et al*.(1993), Singanan *et al*.(1995), Prakash (1996), Dnembare and Ponde (1997), Nadoni *et al*.(2001). The correlation analysis method is a very useful tool for assessing the water quality parameters.

Material and Methods
Virla reservoir in the vicinity of Virla village with an expansion of 525 hectares is located at 21°-50'-30^0 latitude and 75°-23'-30^0 longitude about 309 M above the MSL. The reservoir is primarily rainfed and has been stagnant since state time.

Water samples were drawn from the surface of sampling site in 5 liters capacity plastic containers,in the first week of every month for 24 months i.e.from July 2001 to June 2003. Analysis of various physico-chemical parameters was done according to the procedure given in the standard method of APHA (1989) and Trivedi & Goel (1986).The results of monthly analysis for the parameters were taken as an average of 24 months study (Table-1).The correlation coefficient 'r' was calculated directly by using computer program SPSS (Table-2,3,&4).

Result and Discussion
The seasonal data obtained for the various physico-chemical features are presented in table-1. The correlation coefficient among the different parameters are presented in the table-2. All the high degree positive and the high degree negative correlation coefficients 'r' are presented in table-3 and table-4 respectively. The analysis shows the high degree positive correlation between alkalinity and phosphate (0.893). There is also a high degree positive correlation between transparency and DO (0.885), pH and alkalinity (0.873), BOD & alkalinity (0.859), pH and phosphate (0.826) and BOD and phosphate (0.764). Similarly a moderate positive correlation exists between transparency and BOD (0.747), & Hardness (0.726), water temperature and BOD (0.652), Hardness & phosphate (0.579) and free carbon-dioxide & DO (0.518).

The high degree negative correlation coefficient 'r' between DO and BOD (-0.988), DO and alkalinity (- 0.895), transparency & BOD (-0.839) and alkalinity (-0.827), DO & Phosphate (-0.794), DO & pH (-0.786) and transparency with phosphate (-0.784). The moderate negative correlation is also shown between transparency & pH (-0.718), water temperature with DO (-0.706) & transparency (-0.651),free carbon-dioxide with water temperature(-0.605), alkalinity (-0.592), pH (-0.562) and phosphate (-0.511) .

Conclusion

The correlation coefficient 'r' among the parameters was negative 18 times and positive 19 times. This showed that positive relationship dominated in the present reservoir. The study helps in predicting compositional structure and their dependence to each other in reservoir ecosystem. It also gives an idea about quick monitoring of water and pollution status.

Acknowledgement

The authors are thankful to the principal, Govt. P. G. College, Khargone for providing laboratory facilities.

References

APHA 1995: *Standard methods for the examination of water and waste water*, American Public Health Association, 19th Edn.

Dnembare, A.J. and Ponde, G.M. 1997: Correlations of ground water quality parameters of Sonai area (maharashtra).***Poll. Res***. 16: 188-190.

Kannan, N. and Rajasekaran, N. 1991: Correlations of water quality parameters of printing industry effluents in Sivakashi (South India). ***Ind. J. Environ.Hlth***. 33:330-335.

Nagarajan, S., Swaminathan, M. and Sabarathinam. 1993: Correlation study on physico-chemical characteristics of ground water in and around Chidambaram town, Tamil Nadu. ***Poll.Res***. 12: 245-250.

Nair, B.M.S., Seth, O. N. and Mishra, K.D. 1980: *Limnological Studies on a village Pond, India (Vidisha)* I Physico-chemical characteristics. Proc. Nat. Symp. Past. Present & Feature of Bhopal Lakes: 195-201.

Prakash, M.M. 1996: *Correlation among the physico-chemical characteristics of pond water pollution* (S.R.Mishra ed.) pp.441-451.APH Publishing Corporation, New Delhi, India.

Reddy, P.J., Krishna, D. and Gajghate, D.D. 1992: Correlates of COD and BOD sewage water of some major Indian cities. ***Poll. Res***. 11: 69-72.

Singanan, M.K., Rao, Soma Shekarappa and Ramababy,C. 1995: A correlation study on physico-chemical characteristics of ground water in Rameswaram island. ***Ind. J. Environ. Pro***. 15: 213-217.

Somashekara Rao, K. 1990: Correlations among water quality parameters of ground waters of Nazvid town and Nazvid Mandalam. ***Ind. J. Environ. Prot***. 13: 261-266.

Tiwari, T.N. and Mazoor Ali. 1988: Correlation among water quality parameters of industrial waters. ***Ind. J. Environ. Prot***. 8: 44.

Tiwari, T.N. and Patel, M.K. 1991: Limnological application of some well known Mathematical Techniques. In *Current Trends in Limnology* I(Ed.N.K.Shastree) pp:301-318. Narendra Publishing House,New Delhi.

Trivedy, R.K. and Goel, P.K. 1986: *Chemical and biological methods for water pollution studies*. Environmental Publications, Karad, India.

Vadhirajan, R., Pandey, G. and Swami, M.S.R.1993: Correlation among some Physico-chemical parameters of surface water in Manali area, Madras. ***IJEP***. 13(6): 420-430.

Table 1: Site wise Range and Average values of Physico-Chemical characteristics at Virla Reservoir During July 2001 to June 2003

Parameters	Site I		Site II		Site III		Site IV	
	Range	Average	Range	Average	Range	Average	Range	Average
Water temp.(°C)	19.20-32.50	24.93	19.40-33.00	26.27	19.70-33.40	25.75	20.40-34.20	26.65
Transparency (cm.)	71-170	116.16	62.165	110.50	60-161	103.62	57-148	97.29
pH	7.38-8.76	8.10	7.45-8.85	8.17	7.52-9.00	8.23	7.58-9.26	8.32
COD(mg/l.)	3.86-4.38	4.10	3.94-4.42	4.24	3.98-4.48	4.23	4.20-4.55	4.37
Alkalinity (mg/l.)	133-238	183.95	140-245	190.50	144-252	195.70	147-256	199.54
DO (mg/l.)	6.39-9.84	8.37	6.23-9.78	8.27	6.10-9.62	8.11	5.80-9.51	8.01
BOD(mg/l.)	3.26-5.02	3.87	3.28-5.15	3.97	3.33-5.26	4.02	3.37-5.53	4.09
Hardness (mg/l.)	150-208	173.33	160-214	181.29	162-222	185.79	165-233	191.79
Phosphate (mg/l.)	0.20-0.36	0.27	0.21-0.39	0.29	0.24-0.45	0.34	0.27-0.50	0.37

Table 2: Correlation Matrix of Physico-Chemical factors at Virla Reservoir During July 2001 to June 2003

Parameters	Water Temp.	Transparency	pH	Carbondioxide	Alkalinity	Dissolve Oxygen	BOD	Hardness	Phosphate
Water Temp.	1	-0.651	0.879	-0.605	0.885	-0.706	0.652	0.762	0.821
Transparency		1	-0.718	0.651	-0.827	0.885	-0.839	-0.259	-0.784
pH			1	-0.562	0.873	-0.786	0.747	0.726	0.826
Carbondioxide				1	-0.592	0.518	-0.450	-0.332	-0.511
Alkalinity					1	-0.895	0.859	0.497	0.893
Dissolve Oxygen						1	-0.988	-0.238	-0.794
BOD							1	0.190	0.764
Hardness								1	0.579
Phosphate									1

Table 3: High Degree Positive Correlation Values of Physico-Chemical factors at Virla Reservoir During July 2001 to June 2003

Parameters	Temp.	Transparency	pH	CO_2	Alkalinity	DO	BOD	Hardness	Phosphate
Water Temp.	1		0.879		0.885			0.762	0.821
Transparency		1				0.885			
pH			1						0.826
Carbondioxide				1					
Alkalinity					1		0.859		0.893
DO						1			
BOD							1		0.764
Hardness								1	
Phosphate									1

Table 4: High Degree Negative Correlation Values of Physico-Chemical factors at Virla Reservoir During July 2001 to June 2003

Parameters	Water Temp	Transparency	pH	CO_2	Alkalinity	DO	BOD	Hardness	Phosphate
Water Temp.	1								
Transparency		1			-0.827		-0.839		-0.784
pH			1			-0.789			
Carbondioxide				1					
Alkalinity					1	-0.895			
DO						1	-0.988		-0.794
BOD							1		
Hardness								1	
Phosphate									1