

RESEARCH ARTICLE

Studies on seasonal variations in physico-chemical parameters of Phadke Pada Pond at Diva , Thane , India .

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ABSTRACT

The Phadke Pada pond is situated near polytechnic college, Diva, Thane and Its geographical coordinates are 19°8'0" North and 72°59'0" East. The present work focused on the seasonal variations in physico-chemical parameters of this fresh water pond during winter, summer and monsoon. Various parameters were analysed month wise and finally computed variation in season wise. The water is alkaline, calcium rich and with bicarbonatetype alkalinity.

Keywords: Physico- chemical Parameters, Phadke, Pada pond, Diva, Thane.

INTRODUCTION

The purpose of this present investigation is to determine the values of the major physico-chemical parameters of Phadke Pada pond and its environment which is an absolute necessity for survival and sustenance of existing fauna and flora.

The pond is situated near the vicinity of temple. The people of the surrounding wash their clothes, vehicles, taking bath; cattle wallowing etc. and contaminate the quality of the water. An important work has been done in this connection by Afser and Khalique (1995), Johar (1981) and Rajnarayan *et al.* (2007).

MATERIAL AND METHOD:

For the study of physico-chemical analysis water samples were collected at monthly intervals for a period of one year from January 2014 to December 2014. Some of the results were recorded at the sampling sites whereas the others were recorded in the laboratory. The physico-chemical analyses of various parameters were made following the standard methods of Trivedi and Goel (1984), APHA (1985). pH was determined by pH meter and lovibond disc comparator using colorimeter indicators of different pH ranges. Temperature was recorded

by mercury thermometer graduated up to 110°C . Chloride and silicate were estimated as given by Mishra (1968). Total hardness was estimated by EDTA method. The nitrogen was estimated by macro – kjeldhal method. The dissolved oxygen was analyzed by Winkler’s method. Primary productivity was measured using light and dark bottle and transparency was estimated by Secchi Disc method. The monthly data were pooled into seasonal means.

RESULTS

The quantitative analysis of various physico-chemical parameters are presented in Table- 1 & 2 and in Fig 1 .The water temperature varied with variation of seasons as lowest in winter and highest in summer. This result is supported by finding of Jhingran (1975),Pahwa and Mehrotra (1966).

Table 1 : Monthly Physico- chemical parameters of phadkepada pond at Diva, 2014.

Parameters/ Months	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WT°C	19.5	20.8	24.2	25.0	26.9	23.7	22.4	22.3	24.1	24.3	20.3	20.6
WC	C	C	C	PT	PT	PT	T	T	PT	C	C	C
TRANSP(cm)	45.2	50.5	43.6	44.0	40.3	38.6	30.2	26.6	29.5	31.3	47.6	52.8
pH	7.8	7.9	7.8	8.0	8.2	8.0	7.2	7.4	7.6	7.5	7.6	7.6
DO2(mg/L)	8.2	8.0	7.6	7.2	6.9	6.3	7.2	7.5	7.8	8.0	7.8	8.6
FCO2(mg/L)	13.1	11.0	15.3	16.000	18.2	20.2	18.9	10.2	8.3	7.2	12.3	12.8
CA(mg/L)	20.5	18.2	-	14.0	15.3	-	-	-	8.6	-	-	13.5
BA(mg/L)	162.4	173.0	250.2	260.4	268.5	290.2	200.3	196.5	181.3	175.2	170.1	182.3
CL(mg/L)	65.0	70.2	112.5	120.3	116.2	110.6	40.5	46.7	50.2	53.6	50.5	58.3
SL(mg/L)	12.5	13.8	15.6	19.2	22.0	23.3	30.5	35.8	28.3	25.0	13.0	11.5
SUL(mg/L)	22.6	25.4	36.2	45.8	40.3	39.0	35.3	27.8	22.8	38.6	26.7	30.2
TH(mg/L)	86.4	75.6	120.5	131.2	135.4	125.0	115.0	112.2	105.6	95.7	90.3	80.2
TN(mg/L)	0.33	0.40	0.46	0.55	0.62	0.58	0.12	0.15	0.20	0.25	0.30	0.32
PHOS(mg/L)	0.36	0.35	0.40	0.45	0.52	0.53	0.60	0.63	0.56	0.50	0.46	0.44
BOD(mg/L)	2.0	3.0	3.4	3.6	3.7	2.5	2.3	2.5	2.5	2.4	2.1	1.9
GPP(mgC/L/hr)	1.30	1.28	1.35	1.4	1.45	1.35	1.22	1.15	1.10	1.12	1.25	1.21

Table-2: Seasonal Physco - chemical parameters of Phadke Pada pond at Diva , 2014.

PARAMETERS/SEASONS	WINTER	SUMMER	MONSOON
WT°C	20.3	24.9	23.3
Transp(cm)	49.02	42.37	29.40
pH	7.7	8.0	7.42
DO2(mg/L)	8.1	7.0	7.6
FCO2(mg/L)	12.3	17.4	6.4
CA(mg/L)	13.05	7.32	2.15
BA(mg/L)	171.95	267.32	188.32
CL(mg/L)	61.0	114.9	47.75
SL(mg/L)	12.7	20.02	29.9
SUL(mg/L)	26.22	40.32	31.12
TH(mg/L)	83.12	128.25	107.25
TN(mg/L)	0.33	0.55	0.18
PHOS(mg/L)	0.40	0.48	0.57
BOD(mg/L)	2.25	3.30	2.42
GPP(mgC/L/hr)	1.26	1.38	1.13

WT°C = Water temperature WC = Water colour T = Turbid PT = Partially turbid C = Clear
 FCO₂ = Free carbon dioxide CA = Carbonate Alkalinity BA = Bi carbonate Alkalinity CL = Chloride
 SL = Silicate SUL = Sulphate TH = Total Hardness TN = Total Nitrogen PHOS = Phosphate
 Transp = Transparency

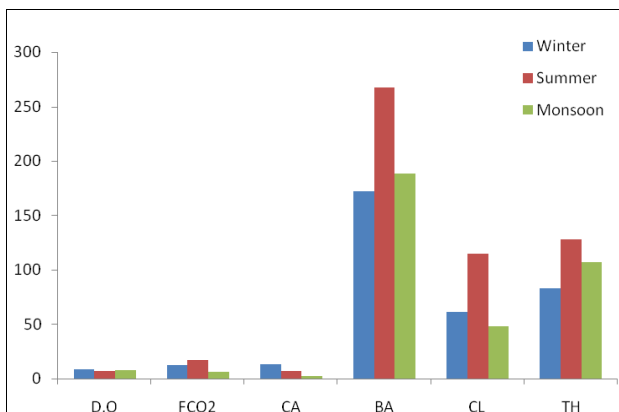


Fig.1 A: Seasonal variations of Dissolved Oxygen, Free carbon dioxide, Carbonate alkalinity, Bicarbonate alkalinity, Chloride content & Total Hardness at Phadke Pada pond.

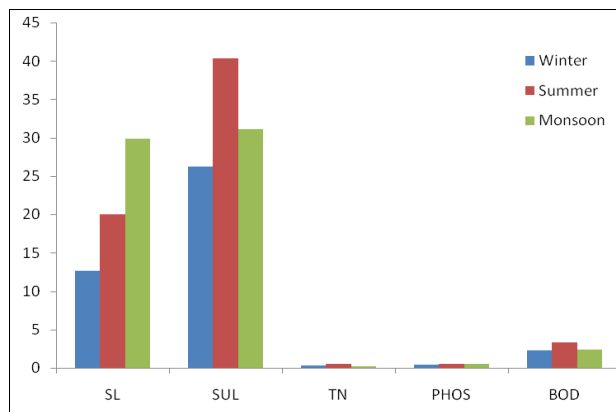


Fig.1B: Seasonal variations of Silicate, Sulphate, Total Nitrogen, Phosphate Phosphorous & Biological Oxygen Demand at Phadke Pada pond.

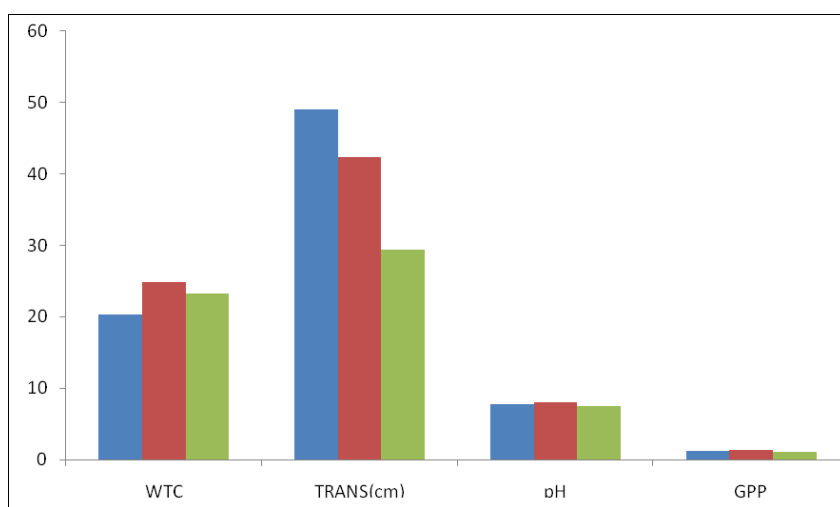


Fig.1C: Seasonal variations of Water colour, Transparency, pH & Gross Primary Productivity (mgC/l/hr) at Phadke Pada pond

The Water colour was observed clear in winter, partly turbid in summer and yellowish turbid during monsoon may be due to receiving water from catchment area.

The pH was recorded alkaline throughout the year. It showed slight variation which was maximum during summer and minimum in monsoon due to heavy rainfall and dilution effect as supported by Ray *et al.* (1966) and Sarkar and Rai (1964). The transparency maxima were observed in winter due to settlement of silica, clay and suspended particles and minima in monsoon which may be due to rainfall and receiving flood from catchment area. This finding is supported by Kedar *et al.* (2008).

The D.O. was recorded minimum in summer and maximum during winter and showed inverse

relationship with temperature which is similar to finding of Bohra (1977) and Mishra and Yadav (1978). The Free carbon dioxide was recorded lowest in monsoon and highest in summer due to decomposition of organic matters by microbial organisms as supported by Narayan *et al.* (2007).

The Carbonate alkalinity was observed nil during most of the months and highest value recorded in January. The bicarbonate alkalinity was recorded maximum during summer due to decomposition of organic matters and lowest in winter season. Michael (1969) also made similar findings. The Total hardness was recorded highest in summer and lowest in winter as suggested by Kaur and Sharma (2001). The increase in hardness can be attributed to decrease in water volume and increase in rate of evaporation at high temperature. The Chloride content was recorded maximum during summer and minimum during

monsoon. Similar findings were also made by Lakshmi Narayan (1959), Ray *et al.* (1966) and Pahwa and Mehrotra (1966).

The Sulphate content was observed highest in summer due to low water level and lowest in winter as supported by Agarkar and Garode (2000). The Silica content was reported highest during monsoon and lowest during winter season. The lowest amount of silica during winter season may be attributed to maximum population of diatoms and highest during monsoon may be due to silica brought out from catchment area. Pahwa and Mehrotra (1966) also made similar observations. The Nitrogen content was maximum during summer and minimum during monsoon season which may be attributed due to dilution factor of heavy rain and flood. Similar findings were also made by Verma *et al.* (1971). The Phosphorus was recorded highest during monsoon due to inflow of water from catchment area where as the lowest value was observed in winter which may be due to higher phytoplankton organisms which utilized for growth and reproduction as reported by Michael (1964) and Saha *et al.* (1971).

BOD was observed maximum in summer due to decomposition of organic matters by excessive activity of microbial organisms and lowest during winter season. This finding is also supported by Sachidanandamurthy and Yajurvedi (2006).

GPP was noticed maximum in summer and winter due to bright sun shine and minimum in monsoon.

CONCLUSION

Pond is an aquatic ecosystem for proper growth, development, reproduction and survival of fauna and flora, there is desirable need to analyse the quality of water at regular intervals. This is a quality assurance process to ensure that the observed values of physico-chemical parameters are almost within the limit of range. In this way the good health of aquatic system and environments are guaranteed.

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