

STUDIES ON SEASONAL VARIATIONS IN PHYSICO -CHEMICAL PARAMETERS OF PARTAPUR DAM AT DAKRA, MAKHDUMPUR, JEHANABAD, BIHAR, INDIA .

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ABSTRACT

The present study deals with the seasonal variations in physico-chemical parameters of Partapur dam in winter , summer and monsoon. Various parameters were analysed month wise and finally computed variations in season wise. The water receive from channel of Phalgu river and passes through this study area, meandering at various places and finally fall into the river Ganges. The area has a potential fish landing avenue due to suitable breeding and feeding ground. The water is alkaline , calcium rich and with bicarbonate type alkalinity.

Keywords: Physico- chemical , Parameters , Partapur dam , bicarbonate alkalinity.

INTRODUCTION:

The motive of this recent investigation is to determine the importance of the major physico- chemical parameters of Partapur dam and its environment which is an absolute necessities for survival and sustenance of existing fauna and flora.

The study were done in a stretch of approximately 2 Km up and down stream of Partapur dam in Jehanabad district . Its geographical coordinates are 25°13'0"N latitude and 84°59'0"E longitude. The surface run off water from adjoining agricultural land containing pesticides and fertilizers, cattle wallowing, taking bath, washing clothes etc. contaminate the quality of water. An important work has been done in this connection by Afser and Khaliq (1995) and Johar (1981).

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 2017 to December 2017. Some of the results were recorded at the sampling sites whereas the others were recorded in the laboratory. The Physico-chemical analysis 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 analysed 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 AND DISCUSSION :

The various Physico-chemical parameters were quantitatively analysed and presented in Table- 1 & 2 and in Fig.1 .The water temperature showed variation with respect to seasons as highest in summer due to intense sun shine and lowest during winter due to short photoperiod . This result is supported by finding of Jhingran (1975) , Pahwa and Mehrotra (1966).

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 containing silt and turbulence of water by wind and rainfall.

PH of water was observed alkaline throughout the investigation period . The slight variation was recorded which showed maxima during summer and minima during monsoon due to heavy rainfall and dilution effect. Ray *et.al.* (1966) and Sarkar and Rai (1964) have also made similar findings.

The water transparency were recorded highest in winter due to calm water and settling of suspended particles , clay and silica and lowest 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 observed highest during winter and lowest during summer and showed inverse relationship with temperature which is akin to finding of Bohra (1977) and Mishra and Yadav (1978) .The content of Free carbon dioxide was observed minimum in monsoon and maximum in summer owing to decomposition of organic matters by microbial organisms as suggested by Narayan *et.al.* (2007).

The carbonate alkalinity was absent in most of the months and maximum value observed in February . The bicarbonate alkalinity showed maxima during summer due to decomposition of organic matters and minima during winter season. Michael (1969) also made similar observations.

The total hardness was observed maximum in summer and minimum in winter which was akin to findings of Kaur and Sharma (2001) .The highest value of hardness can be attributed to lower level of water volume and increase in rate of evaporation at high temperature.

Chloride content was observed highest in summer and lowest during monsoon. Lakshmi Narayan (1959) , Ray *et.al.* (1966) and Pahwa and Mehrotra (1966) were also made similar findings.

The maximum and minimum sulphate content was observed during summer and winter season respectively due to low and high water level . Agarkar and Garode (2000) were also made similar observations.

The silica content was observed maximum during monsoon and minimum during winter season. The maximum amount of silica content during monsoon may be due to silica brought from catchment area and minimum during winter season may be attributed to abundance population of diatoms .The similar findings were also made by Pahwa and Mehrotra (1966).

The nitrogen content was recorded highest in summer and lowest during monsoon season which may be attributed due to dilution factors like flood and rain. Verma *et.al.*(1971) were also made similar observations.

The phosphorus content showed maxima during monsoon owing to influx of water from catchment area and minima during winter which may be due to luxuriant growth of phytoplankton organisms which utilized for their growth and reproduction. Michael (1964) and Saha *et.al.* (1971) were also noticed similar observations.

BOD Was recorded highest during summer due to decomposition of organic matters by microbial organisms and lowest during winter. Sachidanandamurthy and Yajurvedi (2006) were also made similar findings.

GPP was recorded highest during summer and winter due to intense sunshine and abundance phytoplankton organisms respectively and lowest during monsoon due to cloudy weather .

CONCLUSION:

The dam is an aquatic ecosystem which provides suitable niches for fauna and flora which in turns such aquatic organisms get shelter , food , suitable breeding and feeding ground etc. For their proper growth and healthy life it is an absolute necessity to analyse the quality of water at regular intervals. This is a quality assurance process to ensure that the analysed values of physico-chemical parameters are almost within the limit of range. In this way the vigour health of aquatic ecosystem and environments are guaranteed.

TABLE – 1 : Month wise Physico - chemical parameters of Partapur dam at Dakra , Makhdumpur, 2017.

Parameters/ Months	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WT°C	17.6	19.5	25.1	26.0	29.5	27.2	23.4	23.0	25.1	25.4	22.6	20.0
WC	C	C	C	C	PT	PT	T	T	T	C	C	C
TRANSP(cm)	44.3	49.5	42.6	43.5	39.4	36.0	27.5	29.2	32.6	33.5	48.6	47.5
pH	7.7	7.8	7.7	7.9	8.1	7.9	7.1	7.3	7.5	7.4	7.5	7.5
DO2(mg/L)	8.4	8.2	7.8	7.4	7.1	6.5	7.4	7.7	7.9	8.2	8.0	8.8
FCO2(mg/L)	15.0	12.9	17.5	18.0	20.2	22.3	20.0	12.5	10.5	9.4	14.5	14.9
CA(mg/L)	20.3	22.6	18.5	16.5	17.4	-	-	10.6	-	-	-	15.5
BA(mg/L)	180.5	190.2	268.5	280.0	288.0	310.5	220.4	216.5	200.0	195.2	190.4	200.5
CL(mg/L)	67.2	72.4	114.7	122.5	118.4	112.8	42.7	48.9	52.4	55.8	52.7	60.5
SL(mg/L)	13.4	14.9	16.7	20.3	23.1	24.4	31.6	36.9	29.4	29.1	14.0	12.6
SUL(mg/L)	24.8	27.6	38.4	48.0	42.5	41.2	37.5	30.0	24.0	40.8	28.9	32.4
TH(mg/L)	88.0	77.2	122.5	125.6	128.0	126.5	117.0	115.4	108.9	95.5	92.6	83.5
TN(mg/L)	0.36	0.43	0.49	0.58	0.69	0.61	0.15	0.18	0.22	0.28	0.32	0.34
PHOS(mg/L)	0.38	0.37	0.42	0.47	0.54	0.55	0.62	0.65	0.58	0.52	0.48	0.46
BOD(mg/L)	2.3	3.3	3.7	3.9	4.0	2.8	2.6	2.8	2.8	2.7	2.4	2.2
GPP(mgC/L/hr)	1.35	1.33	1.40	1.9	1.95	1.85	1.62	1.50	1.25	1.62	1.75	1.70

TABLE-2: Seasonal variation of Physico - chemical parameters of Partapur dam at Dakra, Makhdumpur 2017.

PARAMETERS/SEASONS	WINTER	SUMMER	MONSOON
WT°C	19.9	26.9	24.2
Transp(cm)	46.8	40.3	30.7
pH	7.6	7.9	7.3
DO2(mg/L)	8.8	7.2	7.8
FCO2(mg/L)	14.3	19.5	13.1
CA(mg/L)	14.6	8.4	2.6
BA(mg/L)	190.4	286.6	208.0
CL(mg/L)	63.2	117.1	49.9
SL(mg/L)	13.7	21.1	31.0
SUL(mg/L)	28.4	42.5	33.0
TH(mg/L)	85.3	125.5	110.2
TN(mg/L)	0.36	0.58	0.20
PHOS(mg/L)	0.42	0.49	0.59
BOD(mg/L)	2.5	3.6	2.7
GPP(mgC/L/hr)	1.5	1.7	1.4

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

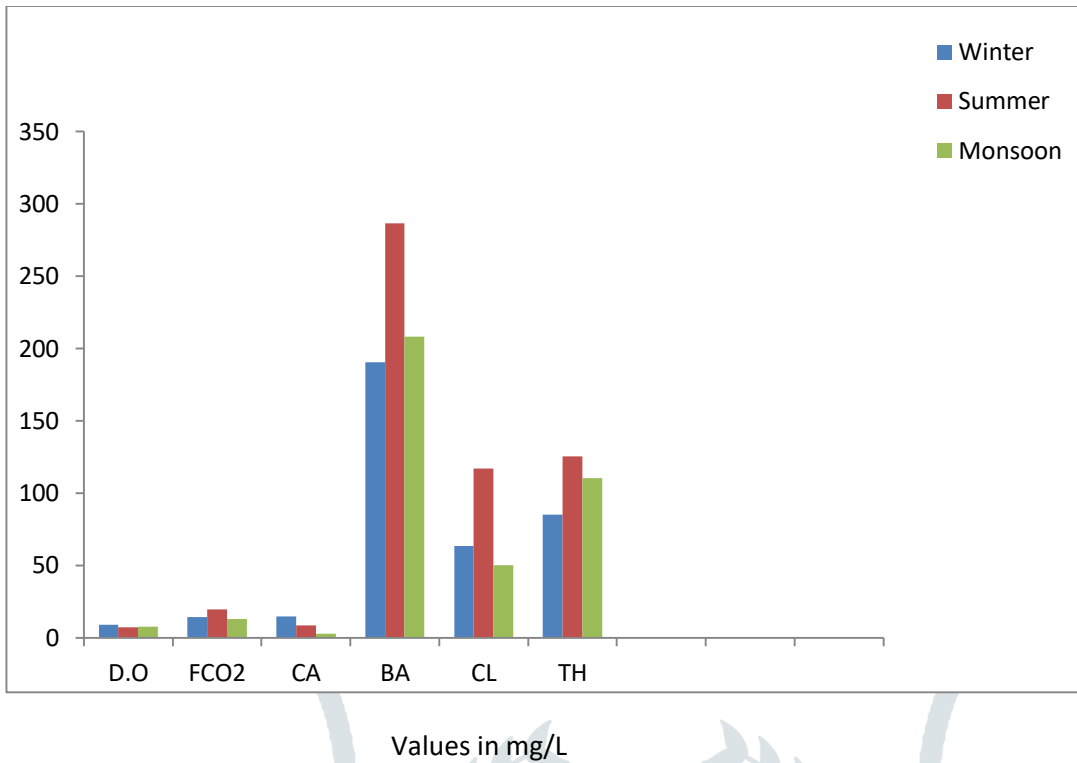


Fig.1 A: Seasonal variations of Dissolved Oxygen, Free carbon dioxide, Carbonate alkalinity, Bicarbonate alkalinity, Chloride content and Total Hardness of Partapur dam.

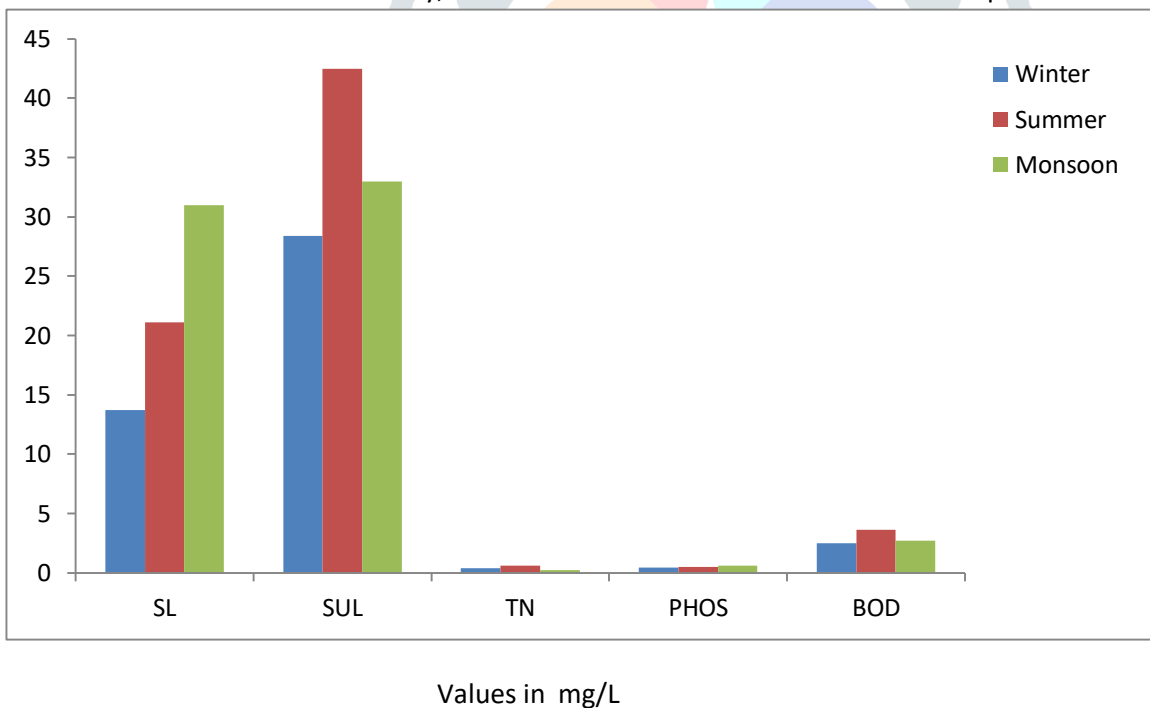


Fig.1B : Seasonal variations of Silicate, Sulphate, Total Nitrogen, Phosphate and Biological Oxygen Demand of Partapur dam.

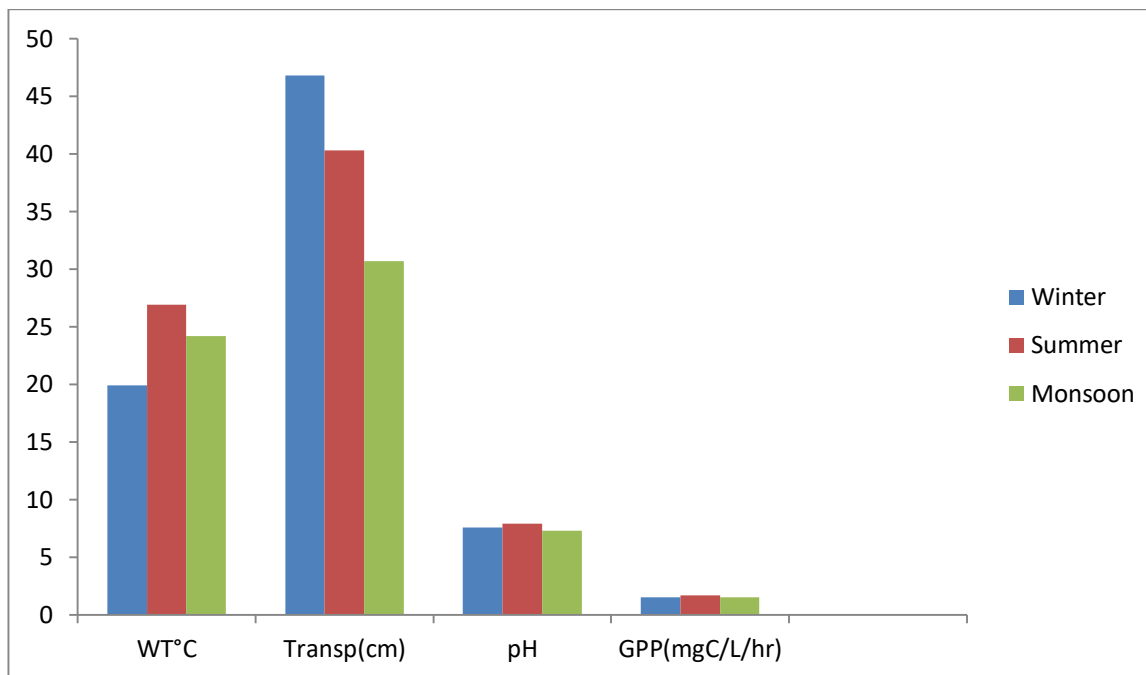


Fig.1C: Seasonal variations of Water temperature , Transparency , pH and Gross primary productivity of Partapur dam.

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