



PHYSICO-CHEMICAL ANALYSIS OF WATER OF BAGH RIVER AT GONDIA DISTRICT OF MAHARASHTRA

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Abstract

In the present study water samples were collected from two selected sampling stations viz., Pujaritola Dam and Kalisarasar Dam from Bagh river within Gondia district of Maharashtra. The physico-chemical characteristics were studied and analyzed for a period of one year from February 2014 to January 2015. The maximum value of turbidity, Dissolved Oxygen, T. S. S., Ca ++, Mg++, Chloride, Sulphate and Phosphate were recorded at Pujaritola Dam and conductivity, C. O. D, B.O. D, T. D. S, Alkalinity, Nitrate and Ammonical Nitrogen at Kalisarasar Dam.

Key words: Bagh river, physico-chemical parameters, C. O. D, B.O. D, T. D. S.

Introduction

Bagh River is tributary of the Wainganga. It flows in the Balaghat district of Madhya Pradesh State and Gondia District of Maharashtra. Bagh River is a complex of three dam namely Sirpur, Kalisarasar and Pujaritola dam. In recent years because of continuous growth in population, rapid industrialization and sewage disposal, the rate of discharge of pollutants into river is water is far higher than the rate of purification. The present study aims to investigate water quality of Bagh River at Gondia district of Maharashtra.

Materials and Methods

Water samples were collected from the two selected sites viz., Bagh River at Pujaritola Dam (Site-1) and Bagh River at Kalisarasar Dam (Site-2) for a period of one year from February 2014 to January 2015. The water quality was analyzed for determination of 17 physico-chemical parameters pH, Turbidity, Conductivity, DO, COD, BOD, TDS, TSS, Alkalinity, Total Hardness, Ca++, Mg ++, Chloride, Sulphate, Nitrate, Ammonical Nitrogen and Phosphate as per the standard methods (APHA 1991).

Results and Discussions

The results of physico-chemical parameters for selected sampling stations (Site I and Site II) are given in the Table 1 and 2.

Both the sites recorded maximum value of pH of Bagh river water as 9.1 in the month of May, 2014, when there was low water levels and high concentration of nutrients in the river and minimum value was recorded as 7.8 at Site I in the month of July, 2014. The decrease pH values in monsoon period were due to dilution caused by the rainwater during monsoon. These findings are also in accordance with Philipose (1960), Sahai and Sinha (1969), Verma *et al.*, (1978), Anitha (2002), Kadam *et al.*, (2007), Narayana *et al.*, (2008), Reddy *et al.*, (2009).

The maximum value of turbidity was recorded as 4.0 NTU at Site I in the month of October 2014 and minimum value was recorded as 1 NTU from both the Site. In the present investigation, the turbidity values were maximum after monsoon and minimum during summer. High values of turbidity post monsoon may be due to influx of silts, sand, high organic matter and low transparency due to suspended inert particulate matter. However, low values of turbidity in summer may be due to clear atmosphere, evaporation of water and high light penetration. Similar results have been reported by Narayana *et al.*, (2008), Reddy *et al.*, (2009) and Kulkarni *et al.*, (1995).

The maximum value of conductivity was recorded as 1380 $\mu\text{S}/\text{cm}$ at Site II in the month of January 2015 and minimum value was recorded as 401 $\mu\text{S}/\text{cm}$ at Site I in the month of August 2014. The high value of electric conductivity could be due to inflow of high quantum of domestic sewage during winter whereas low value may be due to stabilization of water due to sedimentation and increased concentration of slits during monsoon.

The maximum value of Dissolved Oxygen in the Bagh River water was recorded 7.2 at Site I in the month of July, 2014 and minimum value was recorded 3.61 at Site II in the month of May. It is obvious that flowing water during rainy season contains higher dissolved oxygen compared to slow moving water at high temperature during summer months. In the present study dissolved oxygen was minimum during summer season and maximum during rainy season. This investigation is also in close conformity with the finding of Sardhamani and Sivakumari (1995), Kelkar and Nanoti (2005) and Tiwari *et al.*, (2005)

The maximum value of C.O.D was recorded as 136 mg/lit at Site-II in the month

of January, 2015, and minimum value was recorded as 21 at Site I in the month of July 2014.

The maximum value of B.O.D was recorded as 18 mg/lit at Site-II in the month of January, 2015, and minimum value was recorded as 3.2 at Site I in the month of September, 2014. The higher B.O.D may be associated with the presence of various microbes in water with high inflow of domestic sewage whereas low value due to dilution caused by the rainwater post monsoon.

The B.O.D and C.O.D showed significant increase in the polluted zone which contains varieties of pollutants present in domestic sewage and detergents.

The maximum value of Total dissolved solids was recorded as 1158 mg/lit at Site-II in the month of January, 2015, and minimum value was recorded as 340 mg/lit at Site II in the month of September, 2014.

The maximum value of Total suspended solids was recorded as 36 mg/lit at Site-I in the month of October, 2014, and minimum value was recorded as 20 mg/lit at Site I in the month of July and September, 2014 respectively.

The high amount of suspended, dissolved and total solids adversely affect the quality of water and unsuitable for any purpose including irrigation (Karthikeyan *et al.*, 2002).

The maximum alkalinity was recorded 350 mg/lit at Site II in the month of May 2014 and the minimum was recorded as 60 at Site – II in the month of October 2014.

In the present study total alkalinity was high during summer followed by steep fall in monsoon periods. The low alkalinity was recorded in the month of October, after monsoon, due to dilution. A similar opinion has been expressed by Singh and Ghosh (1999), Shanti *et al.*, (2002) and Shivkumar *et al.*, (2003).

The Total Hardness was recorded 410 mg/lit at both the Sites in the month of January 2015 and the minimum was recorded as 72 at Site – II in the month of October 2014. The result supports the view of Salve and Hiware (2006) that the Total Hardness was higher in winter.

The maximum concentration Ca^{++} was recorded as 66.4 mg/lit at Site-I in the month of July, 2014 and the minimum concentration was recorded 21.6 at Site-1 in the month of May, 2014. The value of calcium content of both the sites was in higher range than those

of the beels of Assam and West Bengal studied by Suguan (2000), CIFRI.

The maximum concentration Mg^{++} was recorded as 73 mg/lit at Site-I in the month of January, 2015 and the minimum concentration was recorded 4.3 mg/lit at Site-1 in the month of October, 2014. The value of Magnesium content of both the sites was in higher range than those of the beels of Assam and West Bengal studied by Suguan (2000), CIFRI.

The maximum concentration Chloride was recorded as 197 mg/lit at Site-I in the month of January, 2015 and the minimum concentration was recorded 33 mg/lit at Site-1 in the month of October, 2014.

The maximum concentration Sulphate was recorded as 250 mg/lit at Site-I in the month of April, 2014 and the minimum concentration was recorded 32 mg/lit at Site-1 in the month of September, 2014. Maximum concentration of sulphate during summer may be due low water level and low sulphate concentration due to the dilution during monsoon. The present finding is similar to that of Reddy *et al.*, (2009), Telkhade *et al.*, (2008) and Shanti *et al.*, (2006).

The maximum concentration Nitrate was recorded as 6.48 mg/lit at Site-II in the month of September, 2014 and the minimum concentration was recorded 0.8 mg/lit at Site-1 in the month of August, 2014. High nitrate concentration is responsible for algal blooms in water body. The study supports the finding of Mishra *et al.*, (2008) and Parikh and Mankodi (2012).

The maximum concentration Ammonical Nitrogen was recorded as 3.7 mg/lit at Site-II in the month of May, 2014 and the minimum concentration was recorded 0.7 mg/lit at Site-1 in the month of April, 2014.

The maximum concentration Phosphate was recorded as 1.71 mg/lit at Site-I in the month of April, 2014 and the minimum concentration was recorded 0.04 mg/lit at Site-1 in the month of July and August, 2014. In the present investigation, the phosphate value were maximum during summer month due to low water levels and high concentration of nutrients in the river whereas minimum in monsoon due to dilution caused by the rainwater during monsoon. These findings are also in accordance with Philipose (1960), Sahai and Sinha (1969), Anitha (2002), Kadam *et al.*, (2007), and Reddy *et al.*, (2009).

Table No. – 1: Physico- chemical parameters of Bagh River at Pujaritola Dam in Gondia District of Maharashtra.

S. No.	Name of Parameter	Unit	Months								
			Feb - 14	Mar - 14	April - 14	May - 14	July -14	Aug - 14	Sep - 14	Oct - 14	Jan - 15
1.	pH	--	8.2	-	8.7	9.1	7.8	8.1	8.8	8.0	8.0
2.	Turbidity	NTU	-	-	1.0	1.0	1.0	2.0	1.0	4.0	1.0
3.	Conductivity	µS/cm	-	-	672	667	931	401	551	564	824
4.	DO	mg/lit	5.1	-	5.4	5.2	7.2	4.6	6.1	6.8	5.0
5.	COD	mg/lit	-	-	28	32.0	21	26	28	34	82
6.	BOD	mg/lit	7.2	-	5.0	7.0	5.0	6.4	3.2	9.8	12
7.	TDS	mg/lit	-	-	560	534	720	360	410	412	958
8.	TSS	mg/lit	-	-	26	30	20	30	20	36	32
9.	Alkalinity	mg/lit	-	-	224	280	180	70	110	82	140
10.	Total Hardness	mg/lit	-	-	210	262	320	140	120	82	410
11.	Ca ⁺⁺	mg/lit	-	-	62.0	21.6	66.4	33.6	29.6	32	44.0
12.	Mg ⁺⁺	mg/lit	-	-	14.0	15.0	37.4	13.6	11.2	4.3	73.0
13.	Chloride	mg/lit	-	-	99.0	50	178	40	33	40	197
14.	Sulphate	mg/lit	-	-	250	120	156	54	32	81	130
15.	Nitrate	mg/lit	-	-	2.8	1.7	1.22	0.8	4.54	2.1	1.7
16.	Ammonical Nitrogen	mg/lit	-	-	0.7	1.0	2.36	4.8	0.75	2.27	1.3
17.	Phosphate	mg/lit	-	-	1.6	0.87	0.07	0.19	0.06	1.3	0.2

Table No. – 2: Physico- chemical parameters of Bagh River at Kalisarar Dam in Gondia District of Maharashtra.

S. No.	Name of Parameter	Unit	Months								
			Feb -14	Mar - 14	April - 14	May - 14	July -14	Aug - 14	Sep - 14	Oct - 14	Jan - 15
1.	pH	--	8.2	8.15	8.7	9.1	8.53	8.14	8.97	7.96	8.0
2.	Turbidity	NTU	-	-	1.0	1.0	1.0	2.0	1.0	1.0	-
3.	Conductivity	µS/cm	-	-	715	655	857	417	445	419	1380
4.	DO	mg/lit	6.1	5	4.94	3.61	5.87	4.82	6.4	5.8	4.6
5.	COD	mg/lit	-	-	26	26	28	24	29	47	136
6.	BOD	mg/lit	14	8	5.2	14	6	7.8	7.8	10.2	18.0
7.	TDS	mg/lit	-	-	692	526	694	372	340	314	1158
8.	TSS	mg/lit	-	-	22	32	24	34	24	30	34
9.	Alkalinity	mg/lit	-	-	236	350	190	78	80	60	140
10.	Total Hardness	mg/lit	-	-	220	260	200	136	74	72	410
11.	Ca ⁺⁺	mg/lit	-	-	66	36	64	32	22.4	22	44
12.	Mg ⁺⁺	mg/lit	-	-	13.1	14.3	9.7	13.6	4.4	6.2	72
13.	Chloride	mg/lit	-	-	89	119	178	37	40	39	197
14.	Sulphate	mg/lit	-	-	238	15	132	48	40	56	130
15.	Nitrate	mg/lit	-	-	3.1	1.95	1.91	0.9	6.48	1.24	1.72
16.	Ammonical Nitrogen	mg/lit	-	-	0.74	3.7	3.4	2.3	3.1	2.01	1.08
17.	Phosphate	mg/lit	-	-	0.042	1.71	0.04	0.04	0.09	0.9	0.49

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