

WATER ANALYSIS OF WATER BODIES OF JAMGHAT TEMPLE, WACHOO POINT, GAVALAN PATI AND DOUBLE GOLAI AT VINDHYACHAL FOREST RESERVE KHARGONE, DISTRICT (M.P.)

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ABSTRACT

The main aim of the present investigation was to study the water analysis of water bodies of Jamghat Temple, Wachoo point, Gavalan Pati, Double golai at vindhyachal forest reserve at khargone district (M.P.). The water samples were collected from all research sites water bodies like pond. The physic-chemical parameters were Water Temperatures, pH, Dissolved Oxygen, COD, Chloride, Total Alkalinity, Total Hardness, Calcium Hardness, Magnesium Hardness, Phosphate Sulphate during 2017 (January 2017- December 2017).

Key Word:- Bird, Jamghat Temple, Wachoo point, Gavalan Pati, Double golai and Avian diversity.

INTRODUCTION

Water pollution is a critical point in India. Almost all water bodies facing the problem of pollution in India. Water bodies are qualitatively and quantitatively affected by industrialization, urbanization and anthropogenic activities (Bhargawa *et al.*, 2007). The aquatic diversity is affected by many physicochemical parameters. These physicochemical factors influenced the ecosystem of river. Many researches are done on water quality in all over India (Deshmikh *et al.*, 2001; Hussan and Ahemad, 2002; Abuzer and Okan, 2007).

The environmental parameters like physio-chemical characteristic are very important factors, which determine ecological diversity. The seasonal variations in physio-chemical condition were worked out by various workers. Agarkar and Garde (1999) described seasonal variation in Physico-chemical parameters of Yelegaon River. Dave *et al.*, (1999) discussed seasonal trends in abiotic factors of lentic habitat at Dhar (M.P.). Physico-chemical parameters Shows positive or negative relationship with each other, such kind relationship were studied by Shrivastava, 2002 and Pthak, 2004. Sharma *et al.* (2013). Thus, the present study “**water analysis of water bodies of jamghat temple, wachoo point, gavalan pati and double golai at vindhyachal forest reserve khargone, district (M.P.)**” was undertaken.

MATERIAL AND METHODS

STUDY AREA:

The Vindhyachal Forest Reserve area (Khargone District (M.P.), India) was selected for present study. It is a complex, discontinuous chain of mountain ridges, hill ranges, highlands and Forest in west-central India. The Vindhya Range is also known as Vindhyachal.

SAMPLING SITES:

The Four sampling sites were selected in Vindhyachal Forest Reserve for present study. They were following.

1. Wahoo point at Mandleshwar:-
2. Jamghat Temple at main Vindhyaachal:-
3. Double golai Balwada:-
4. Gavalan Pati Charbhuj temple Katkut:-

Water analysis Methods:

The water samples were collected from all research sites water bodies like pond. The parameters like water temperature and pH were record on the spot itself. The physic-chemical parameters like (Water Temperatures, pH, Dissolved Oxygen, COD, Chloride, Total Alkalinity, Total Hardness, Calcium Hardness, Magnesium Hardness, Phosphate Sulphate) were done of methods given by APHA (2005).

RESULTS

Physicochemical parameters at Wahoo point, vindhyaachal forest reserve, Khargone.

Parameter s ↓	Air temperature(°C)	Water Temperature(°C)	pH	Dissolve Oxygen (mg/l)	BOD (mg/l)	COD(mg/l)	Chloride (mg/l)	Total Alkalinity (mg/l)	Total Hardness(mg/l)	Calcium Hardness(mg/l)	MAGNESIUM (mg/l)	Phosphate (mg/l)	Sulphate (mg/l)
January	26	16	7.2	4.82	2.8	21	24	174	100	210	50	0.70	5.5
February	24	18	7.5	5.44	3.9	22	34	171	110	220	60	0.55	6.2
March	30	22	7.6	5.64	3.7	19	37	181	125	250	50	0.40	4.0
April	32	24	8.1	6.66	4.2	16	44.2	185	138	260	60	0.35	4.2
May	40	28	8.2	7.12	4.2	13	47.6	199	144	270	70	0.20	5.5
June	42	28	8.1	7.22	4.9	13	51.6	195	185	300	60	0.50	5.5
July	40	26	7.8	7.92	5.2	16	49.9	166	80	230	50	0.75	6.0
August	38	22	7.2	7.54	4.1	18	46	165	80	170	40	0.80	8.5
September	36	27	7.1	6.52	4.2	19	40	173	81	160	60	1.5	9.0
October	25	25	7.2	6.32	4.0	20	33	176	80	280	50	0.90	8.0
November	24	24	7.3	5.42	4.0		28	178	78	260	60	0.90	8.5
December	22	17	7.1	5.32	3.8	21	20	174	81	220	60	0.85	7.5
Average Value	31.5	23.08	7.5	6.49	4.0	18.1	37.9	178	106.8	215.8	55.8	0.7	6.5

Physicochemical parameters at Jamghat Temple, vindhyaachal forest reserve, Khargone.

Parameter s ↓	Air temperature(°C)	Water Temperature(°C)	pH	Dissolve Oxygen (mg/l)	BOD (mg/l)	COD(mg/l)	Chloride (mg/l)	Total Alkalinity (mg/l)	Total Hardness(mg/l)	Calcium Hardness(mg/l)	MAGNESIUM (mg/l)	Phosphate (mg/l)	Sulphate (mg/l)
January	25	17	7.7	4.62	2.2	22	23	173	111	170	60	0.60	5.8
February	25	19	7.7	5.62	2.5	24	35	170	115	180	60	0.45	6.0
March	29	23	7.8	5.42	3.2	21	36	179	120	200	60	0.42	4.5
April	30	26	8.3	6.52	3.3	17	44.0	184	141	220	60	0.40	5.0
May	41	27	8.3	7.21	4.5	14	48.2	197	149	200	70	0.25	5.5
June	43	27	8.1	7.58	4.4	12	52.8	195	194	230	50	0.50	6.5
July	41	27	7.9	7.62	4.8	18	51.0	165	80	180	40	0.72	6.0
August	40	24	7.2	7.56	5.2	18	47	160	81	170	30	0.80	8.5
September	34	26	7.3	6.24	4.1	20	40	169	77	140	30	1.0	9.5
October	26	26	7.3	6.23	4.0	20	32	174	75	230	40	0.90	8.5
November	27	27	7.3	5.87	3.2	20	26	175	74	170	40	0.95	8.5
December	25	19	7.2	5.44	2.3	22	18	173	82	170	50	0.75	7.5
Average Value	32.1	24.00	7.6	6.55	3.6	19	37.7	176	108.2	181.6	49.1	0.64	6.8

Physicochemical parameters at Double golai Balwada, vindhyachal forest reserve, Khargone.

Parameter s ↓	Air temperature(°C)	Water Temperature(°C)	pH	Dissolve Oxygen (mg/l)	BOD (mg/l)	COD(mg/l)	Chloride (mg/l)	Total Alkalinity (mg/l)	Total Hardness(mg/l)	Calcium Hardness(mg/l)	MAGNESIUM (mg/l)	Phosphate (mg/l)	Sulphate (mg/l)
January	26	18	7.7	5.12	2.2	20	23	169	110	220	60	0.65	6.5
February	27	29	7.7	5.41	3.0	20	33	168	115	240	60	0.65	6.2
March	30	21	8.	6.15	3.6	19	38	179	136	270	50	0.60	4.5

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April	33	25	8.2	6.25	4.0	15	45.3	185	142	280	40	0.40	4.8
May	42	26	8.2	7.54	4.8	14	48.7	197	152	250	60	0.20	6.0
June	44	26	8.2	7.86	5.2	13	52.9	195	196	300	50	0.50	6.8
July	40	24	8.3	8.45	4.6	15	51.6	164	82	180	40	0.75	6.3
August	42	23	7.9	7.66	4.0	15	48	160	84	160	40	0.85	8.0
September	33	25	7.7	6.86	3.3	16	39	165	77	130	50	1.2	9.0
October	27	26	7.4	6.12	3.0	18	33	172	78	280	60	1.5	8.6
November	29	24	7.3	5.32	2.8	18	24	174	75	230	50	0.70	8.2
December	24	19	7.3	5.87	2.2	20	20	170	86	220	40	0.85	7.5
Average Value	33.0	23.8	7.8	6.7	3.5	16.9	38	174	111	221.6	50	0.73	6.8

Physicochemical parameters at Gavalan Pati Charbhuj temple Katkut, vindhyachal forest reserve, Khargone.

Parameter s ↓	Months ↓												
	Air temperature(°C)	Water Temperature(°C)	pH	Dissolve Oxygen (mg/l)	BOD (mg/l)	COD(mg/l)	Chloride (mg/l)	Total Alkalinity (mg/l)	Total Hardness(mg/l)	Calcium Hardness(mg/l)	MAGNESIUM (mg/l)	Phosphate (mg/l)	Sulphate (mg/l)
January	24	18	7.8	4.88	2.0	20	24	165	105	210	50	0.50	6.3
February	28	22	7.8	5.44	2.6	21	36	164	112	200	60	0.45	6.4
March	29	24	7.9	5.89	3.5	18	36.8	172	130	220	50	0.40	4.3
April	33	26	8.0	6.75	4.2	15	45.9	182	143	190	60	0.40	5.5
May	41	28	8.3	7.25	4.8	13	48.3	196	163	180	70	0.25	5.5
June	45	29	8.4	7.62	4.8	13	52.8	195	205	220	60	0.45	6.4
July	44	25	7.7	7.65	4.7	13	51.0	166	86	140	40	0.75	6.2
August	43	23	7.3	7.42	4.2	14	47	159	85	160	30	0.80	8.0
September	30	26	7.4	6.47	4.1	16	38	162	81	130	50	0.85	9.6
October	28	26	7.6	6.23	4.1	15	33	170	76	210	40	0.80	8.5

November	28	26	7. 6	5.35	3.8	17	26	172	74	190	60	0.75	8.3
December	23	18	7. 3	5.12	3.2	18	21	168	89	200	50	0.77	7.0
Average Value	33.0	24.25	7. 7	6.52	3.8	16	38.3	172.5	112.4	180	51.6	0.59	6.8

Physico-chemical parameters of water were analyzed from selected site (Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut) of Vindhyaachal Forest Reserve area (Khargone District (M.P.), India during 2017 (January 2017- December 2017).

Water analysis Air Temperature (°C)

Maximum air temperature were recorded in May and June as 42°C 43°C, 44°C and 45° and minimum air temperature were recorded in December as 22 °C, 25 °C, 24°C, 23°C at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut of Vindhyaachal Forest Reserve area (Khargone District (M.P.), India during 2017 respectively (January 2017- December 2017).

Water Temperature (°C)

Maximum water temperature were recorded in May and June as 28°C 27°C, 26°C and 29° C and minimum air temperature were recorded in January as 16 °C, 17 °C, 18 °C, 18 °C at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut of Vindhyaachal Forest Reserve area (Khargone District (M.P.), India during 2017 respectively (January 2017- December 2017).

pH Values

Maximum pH were recorded in May and June as 8.2, 8.3, 8.2 and 8.4 and minimum pH were recorded in December as 7.1, 7.3, 7.3 and 7.3 at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut of Vindhyaachal Forest Reserve area (Khargone District (M.P.), India during 2017 respectively (January 2017- December 2018).

Dissolve Oxygen

Maximum DO were recorded in July as 7.92, 7.62, 8.45 and 7.65 mg/l and minimum DO were recorded in January as 4.82, 4.62, 5.12 and 4.88 mg/l at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut of Vindhyaachal Forest Reserve area (Khargone District (M.P.), India during 2017 respectively (January 2017- December 2018).

Biological Oxygen Demand

Maximum BOD values were observed in June-July as 5.2, 4.8, 5.2 and 4.8 mg/l and minimum values were observed in January as 2.8, 2.2, 2.6 and 2.0 mg/l at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut respectively.

Chemical Oxygen Demand

Maximum COD values were observed in February as 22, 24, 20 and 21 mg/l and minimum value were observed in June as 13, 12, 13 and 13 mg/l at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut respectively.

Chloride (mg/l)

Maximum Chloride values were observed in June as 51.6, 52.8, 52.9 and 52.8 mg/l and minimum value were observed in December as 20, 18, 20 and 21 mg/l at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut respectively.

Total Alkalinity

Maximum total alkalinity values were observed in May as 199, 197, 197 and 196 mg/l and minimum value were observed in August as 165, 160, 160 and 159 mg/l at Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhujia temple Katkut respectively.

Total Hardness

Maximum total hardness values were observed in June as 185, 194, 196 and 205 mg/l and minimum value were observed in November as 78, 74, 75 and 74 mg/l in Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

Calcium Hardness

Maximum calcium hardness values were observed in June as 300, 230, 300 and 220 mg/l and minimum value were observed in September as 160, 140, 130 and 130 mg/l in Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

MAGNESIUM (Mg)

Maximum magnesium hardness values were observed in May as 70, 70, 60 and 70 mg/l and minimum value were observed in August as 40, 30, 40 and 30 mg/l in Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

Phosphate (mg/l)

Maximum phosphate values were observed in September as 1.5, 1.0, 1.2 and 0.85 mg/l and minimum value were observed in May as 0.20, 0.25, 0.20 and 0.25 mg/l in Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

Sulphate (mg/l)

Maximum sulphate values were observed in September as 9.0, 9.5, 9.0 and 9.6 mg/l and minimum value were observed in March as 4.0, 4.5, 4.5 and 4.3 mg/l in Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

DISCUSSION

Physicochemical parameters affect the aquatic diversity. In India all water bodies are facing the problem of pollution. In India water pollution is a critical point. Anthropogenic activities, industrialization and urbanization are qualitatively and quantitatively affected to the water bodies (**Bhardwaj, 2005**). Many scientist are worked on Physicochemical parameters of water (Agarkar and Garde 1999; Dave *et al.*, 1999; Ade *et al.*, 2001; Hussan and Ahemad, 2002; **Duran, 2006**; Abuzer and Okan, 2007).

In present investigation average air temperature were recorded for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut as 31.5 °C, 32.1 °C, 33.00 °C and 33.00 °C respectively (Table-1 and Fig-1).

Average water temperature were recorded for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut as 23.8 °C, 24.00 °C, 23.8 °C and 24.25 °C respectively. Temperature variations were observed by many scientists like Varunprasath and Daniel, 2010; Aweng *et al.*, 2011, Wahizatul *et al.*, 2011; Pir *et al.*, 2012; Mohan *et al.*, 2013; Sharma *et al.*, 2013). Results of the present study also support the findings of above mention authors' results.

In the present investigation average pH values were observed as 7.5, 7.6, 7.8 and 7.7 for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. The pH value recorded in different water bodies by many scientists like Yogendra and Puttaiah, 2008; Varunprasath and Daniel, 2010; Mohan *et al.*, 2013). However, the pH value recorded in present investigation also shows conformities with above mention authors results.

In the present investigaton average DO values were recorded as 6.49, 6.55, 6.7 and 6.52 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. The amount of dissolved oxygen (DO) observed in different water bodies by many scientists like (George *et al.*, 2009; Aweng *et al.*, 2010; Prabhakar *et al.*, 2012; Sharma and Chowdhary, 2012). However, DO content observed in the present investigation also support the findings of above mention authors results.

In the present investigation average BOD values were observed as 4.0, 3.6, 3.5 and 3.8 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. The range of

Biological Oxygen Demand (BOD) was estimated in different water bodies by many scientists like (Varunprasath and Daniel, 2010; Bhatt *et al.*, 2011; Prabhakar *et al.*, 2012; Ogidiaka, 2012). The BOD values recorded in present investigation support the findings of above mention authors.

In the present investigation average COD values were observed as 18.1, 19, 16.9 and 16 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. COD values were noticed was estimated in different water bodies by many scientists like (Shrivastava, 1996; Waskel and Baghel, 2014). However, COD content observed in the present investigation also support the findings of above mention authors results.

In the present investigation average Chloride values were observed as 37.9, 37.7, 38 and 38.3 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. Similar results were observed by many authors like (Yogendra and Puttaiah, 2008; Sharma and Chowdhary, 2011; Mohan *et al.*, 2013). The chloride content obtained in present study is also in conformities with the findings of previous researchers.

In the present investigation average total alkalinity values were observed as 178, 176, 174 and 172.5 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. Similar results were observed by many authors like (Sharma *et al.*, 2008; Balachandran *et al.*, (2012). The alkalinity value recorded in present investigation also shows conformities with above mention authors results.

In the present investigation average total hardness values were observed as 106.8, 108.2, 111 and 112.4 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

Total Hardness values were noticed was estimated in different water bodies by many scientists like (Shittu *et al.*, (2008), Pir *et al.* (2012) and Sharma *et al.* (2013).

In the present investigation average calcium hardness values were observed 215.8, 181.6, 221.6 and 180 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

In the present investigation average magnesium hardness values were observed as 55.8, 49.1, 50 and 51.6 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. Similar results were observed by many authors like Shittu *et al.*, 2008; Pir *et al.*, 2012; Sharma *et al.*, (2012) and Sharma *et al.* (2013). Thus the present investigation results are corroborating with above mention authors results.

In the present investigation average phosphate values were observed as 0.7, 0.64, 0.73 and 0.59 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively.

In the present investigation average sulphate values were observed as 6.5, 6.8, 6.8 and 6.8 mg/l for Wachoo point, Jamghat Temple, Double golai Balwada and Gavalan Pati Charbhuj temple Katkut respectively. Phosphate and sulphate values were noticed was estimated in different water bodies by many scientists like (Kudthlang and Thane, 2010; Ogidiaka, 2012; Prabhakar *et al.*, 2012; Mohan *et al.*, 2013). Similar values of phosphate and sulphate were recorded in present investigation as suggested by previous authors.

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