



Seasonal Effect of Physico-Chemical Parameters of Beehar River Rewa District (M.P.)

KEYWORDS

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ABSTRACT

The present paper deals with the limnological study of Beehar River from Nov.2010 to Oct.2011, covering all three prevailing seasons in this region. Water was collected during winter, summer and monsoon seasons from five selected sites (S1 to S5). The parameters like depth, temperature, pH, alkalinity, turbidity, dissolved oxygen, chloride, hardness, specific conductivity, TDS, nitrate and phosphate. The water quality is decline due to discharge the domestic sewage, municipal wastes from various area of town which directly or indirectly affect the biotic community of the river.

INTRODUCTION

The physical and chemical property of water influences its suitability for specific applications and affects the general conditions of water body and the contained biota. Each physical and chemical influence does not act separately but acts as a contributor to the sum total of those conditions which make possible the existence of various phenomena of biological productivity. There is a long list of physical, chemical as well as biological parameters which are often employed to characterize the water body for various purposes. The status of water body as far as its productivity is concerned is conditioned by these factors which acting together control or limit production. All of the basic physical and chemical studies of natural water help the applied scientists to understand and plan for its proper uses (Ruttner 1963, Wetzel 1975).

MATERIAL AND METHODS

Beehar River is one of the most important river of Rewa districts. This district is one of the divisional head-quarters of Madhya Pradesh. It is known as the "Place of White Tigers". It is situated about 536 kms. North East of capital Bhopal. It lies between longitude 81° -3' and 82° -18' East and latitude 24°-18' and 25°-11' North, almost in the north east corner of Madhya Pradesh. Its area is 6287 sq. km. and its width is about 105 km. in the East-west and 65 km. in the North-south direction. The town average elevation of 294 meter above the sea level.

The five sampling stations viz. stations S1, S2, S3, S4 and S5 for the purpose of this study were selected to cover physico-chemical parameters of water. Water samples were collected for a period of one year i.e. from Nov.2010 to Oct.2011 and the physico-chemical parameters were analyzed by the methods of APHA (1995).

RESULTS AND DISCUSSION

The range of the seasonally variations of physico-chemical parameters are given in Tables.

Depth:-

During the course of the present study, depth has been measured season and station wise. The value of depth was found to be 92 to 350 cm in winter season, 90 to 290 cm in summer season and 178 to 480.24 cm in monsoon season. The high value was recorded in monsoon season (S1 station) and lowest value was recorded in summer season (S5 station). This might be due to increase in suspended colloid organic matter and detritus due to reduced flow, as also reported by Mishra *et al.* (1999). (Table-2&3).

Table 1. Physico-chemical parameters of Beehar River of Rewa (M.P.) in winter season.

S. No.	Parameters	Stations					Ranges	
		S1	S2	S3	S4	S5	Min.	Max.
1	Depth(cm)	350	110	115	98	92	92	350
2	Water temp. (°C)	22.0	23.0	22.0	22.5	21.0	21.0	23.0
3	pH	7.68	7.5	7.8	7.69	7.45	7.45	7.8
4	Alkalinity (mg/l)	76	80	78	72	56	56	80
5	Turbidity (NTU)	3.0	3.1	2.0	2.2	1.0	1.0	3.1
6	Dissolved oxygen (mg/l)	6.4	6.3	6.8	6.7	6.3	6.3	6.8
7	Chloride (mg/l)	37.61	56.52	42.39	42.39	23.55	23.55	56.52
8	Hardness (mg/l)	192	198	194	208	132	132	208
9	Nitrate (mg/l)	0.22	0.37	0.86	0.29	0.32	0.22	0.86
10	Phosphate (mg/l)	0.02	0.39	0.44	0.07	0.19	0.02	0.44
11	Specific Conductivity (µmho/cm)	386	520	580	325	125	125	580
12	TDS (mg/l)	504	696	432	339	526	339	696

Temperature:-

During present study, the value of water temperature was 21.0°C to 23°C in winter, 29.5°C to 33.5°C in summer and 26°C to 30.6°C in monsoon season. The high value was recorded in summer season at S4 station and lowest value was recorded in winter season at S1 and S4 station (Table-1&2). High temperature values of river water recorded during summer season and monsoon months have been reported by several workers (Yadav and Shrivastava 2011, Shukla *et al.* 1992). The greater light penetration in higher intensity for longer duration in a day is the obvious reason for higher temperature in summer.

Turbidity:-

Water turbidity ranged high between 13.1 to 15.2 NTU in monsoon season and low between 1.0 to 3.1 NTU in winter season. High range was found at S1 station (Table-3).

Table 2. Physico-chemical parameters of Beehar River of Rewa (M.P.) from in summer season.

S. No.	Parameters	Stations					Ranges	
		S1	S2	S3	S4	S5	Min.	Max.
1	Depth(cm)	290	100.1	105.2	95	90	90	290
2	Water temp. (°C)	32.0	31.5	29.5	33.5	33.0	29.5	33.5
3	pH	7.58	7.23	7.65	7.73	7.53	7.23	7.73
4	Alkalinity (mg/l)	84	88	84	78	64	64	88
5	Turbidity (NTU)	8.2	8.0	7.4	7.2	6.3	6.3	8.2
6	Dissolved oxygen (mg/l)	6.0	5.4	5.9	6.0	6.2	5.4	6.2
7	Chloride (mg/l)	56.52	80.07	61.23	65.94	32.97	32.97	80.07
8	Hardness (mg/l)	204	216	204	256	144	144	256
9	Nitrate (mg/l)	0.38	0.46	2.82	0.36	0.89	0.36	2.82
10	Phosphate (mg/l)	0.26	0.37	1.42	0.14	0.64	0.14	1.42
11	Specific Conductivity (µmho/cm)	195	534	689	444	195	195	689
12	TDS (mg/l)	640	735	695	600	608	600	735

Hydrogen ion concentration (pH):-

The pH of the water samples was in the range of 7.45 to 7.80 in winter season, 7.23 to 7.73 in summer season and 7.60 to 7.83 in monsoon season. The pH value was high at S3 station (winter season) and lower value was found at S2 station (summer season). The maximum pH was recorded in monsoon season, moderate in winter and lower in summer season during study period (Table-1&2).

Alkalinity:-

The alkalinity range was 56-80mg/l winter, 64-88mg/l summer and 52-72mg/l monsoon season. The higher values of alkalinity were recorded in summer season followed by rainy and winter season. The high range was found at S2 station (Table-2). Similar opinion has been expressed by Jain *et al.* (1996).

Dissolved oxygen (DO):-

The value of dissolved oxygen was found to be high 6.8mg/l at station S3 and low 6.3mg/l at S2 station (winter season); 6.2mg/l at S5 and 5.4mg/l at S2 station (summer season) and 6.6mg/l at S4 station and 6.0mg/l at S2 station (monsoon season). Lowest value of DO was found in summer season and highest value of DO was found in winter season. This was supported by Khan and Siddique (1974).

Specific conductivity:-

The study period the range of specific conductivity was found to be between 125 to 580 µmho/cm in winter, 195 to 689 µmho/cm in summer and 250 to 786 µmho/cm in monsoon.

The value of specific conductivity was found to be high 786 µmho/cm at S3 station (monsoon season) and lower value was found in 125 µmho/cm at S5 station (winter season), (Table- 1&3).

Hardness:-

The value of total hardness registered in the present study ranged from 132-208mg/l winter, 144-256 mg/l summer and 124-200 mg/l monsoon. The maximum values of total hardness were recorded in summer season, moderate in monsoon (rainy) season and minimum in winter season (Table-1, 2&3).

Chloride:-

The range of chloride was 23.55-56.52mg/l in winter season, 32.97-80.07mg/l in summer season and 28.26-37.68mg/l in monsoon season. Maximum value was found at S2 station in summer season (Table-2). Similar results have been observed by Tripathi (1982).

Table 3. Physico-chemical parameters of Beehar River of Rewa (M.P.) from in monsoon season.

S. No.	Parameters	Stations					Ranges	
		S1	S2	S3	S4	S5	Min.	Max.
1	Depth(cm)	480.2	215	290.1	210.2	178	178	480.2
2	Water temp. (°C)	26.0	26.5	30.6	26.0	27.0	26.0	30.6
3	pH	7.6	7.79	7.83	7.5	7.69	7.5	7.83
4	Alkalinity (mg/l)	68	72	64	60	52	52	72
5	Turbidity (NTU)	15.2	14.0	14.2	13.1	13.3	13.1	15.2
6	Dissolved oxygen (mg/l)	6.0	6.3	6.4	6.6	6.0	6.0	6.6
7	Chloride (mg/l)	32.92	32.97	37.68	28.26	37.68	28.26	37.68
8	Hardness (mg/l)	176	188	188	200	124	124	200
9	Nitrate (mg/l)	0.42	0.59	2.9	2.24	0.44	0.42	2.9
10	Phosphate (mg/l)	0.38	0.31	1.65	1.98	0.32	0.31	1.98
11	Specific Conductivity (µmho/cm)	308	695	786	570	250	250	786
12	TDS (mg/l)	800	1280	1640	1280	1105	800	1640

Nitrate:-

Nitrate is one of the most important nutrients in aquatic ecosystem. The values of nitrate content of river water were recorded between 0.22 to 0.86 mg/l in winter season, 0.36 to 0.89 mg/l in summer season and 0.42 to 2.90mg/l in monsoon season. The higher values of nitrate content were recorded in monsoon season, moderate in summer season and lower in winter season during study period (Table-1&3). Similar observation were also been reported by Poonam *et al.* (2000).

Phosphate:-

Phosphate is one of the major nutrients responsible for biological productivity. The phosphate level was found to 0.02 to 0.44mg/l in winter season, 0.14 to 1.42mg/l in summer season and 0.31 to 1.98mg/l in monsoon season. The phos-

phate level was less during winter period and high during summer season (Table-1&2). Similar seasonal variation was observed by Singh (1990) and Sultan *et al.* (2003).

Total Dissolved Solids (TDS):-

During the study period the values of TDS showed more or less similar pattern of fluctuation as in case of conductivity. Here the minimum range of TDS was found in winter season (339-696mg/l) and maximum range was found in monsoon season (800-1640mg/l) in the study period. The minimum TDS value was found at S4 station in winter season (Table-1).

Similar phenomena were also observed by Khan and Ejike (1983) in a manmade lake in Ghana and Joss platue (Nigeria) respectively.

Slightly high concentration of chloride, phosphate and nitrate was found probably due to waste discharge of the town into the river. Any characteristics of water that affects the survival, reproduction, growth and production of aquatic species, influences management decisions, causes environmental impacts or reduces product quality and safety can be considered a water quality variable.

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