

Water Quality of Rampur Reservoir of Guna District (Madhya Pradesh, India)

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Abstract

Rampur reservoir is one of the artificial water bodies of Guna (M.P.). The villagers use it mainly for irrigation as well as for pisciculture. Physico-chemical studies were undertaken to enhance the Limnological knowledge about the tank and to explore possibilities for better management of pisciculture. In the present study various physico-chemical factors such as water temperature, transparency, turbidity, conductivity, pH, alkalinity, dissolved oxygen and chloride were investigated. The recorded parameters showed interrelationship and also indicated the suitability of reservoir for the purpose of drinking and pisciculture. Proper awareness of pisciculture to the villagers is required for the proper utilization and exploitation of Rampur reservoir.

Key words: Rampur reservoir, water quality, pisciculture

Introduction

The Rampur reservoir is one of the artificial water bodies of Guna, situated at a distance of just 34 miles from Guna town. The work on the tank was started in 1908 and was completed in 1917. Rampur is the nearest village. Direction of the reservoir is north west of Guna, it lies between 24° 47' N and 77° 10' E. The reservoir has a catchment area of approximately 102 sq miles and it is a part of Chambal Jamuna Basin. The reservoir serves as a source of irrigation for the villagers. Fishermen and villagers also use it for drinking purposes and pisciculture of major carps and locally available fishes. No scientific study has been conducted on the reservoir so far. Therefore, the present study was undertaken to gain a basic knowledge of Rampur reservoir. This would not only enable the preliminary limnological knowledge but also help in exploring the possibilities for better management, development and augmentation of pisciculture.

Materials and Methods

Monthly sampling was carried out at two different sampling stations, namely A and B for one year (from April 1999 to March 2000). The samples were collected at 10 - 11 A. M. The physico-chemical parameters were analysed as per the procedure given in APHA 1981 and Trivedy and Goel 1986.

Results

Various physico-chemical parameters are shown in Table 1 and 2. The summary of the results is as under.

Colour

The water is almost colourless. The water was turbid during monsoon. The colour as reflected from the reservoir was light green during winter and light brown during summer.

Temperature

The temperature varied from 18 °C to 29.5 °C. The minimum water temperature was recorded at station A i.e. 18 °C during January 2000 and maximum at stations B i.e. 29.5 °C during May 1999. During December 1999 the temperature was recorded 22.0 °C at both the stations.

Transparency

The transparency was recorded maximum during February - March at both the stations (60.5 cm Station A and 63 cm Station B). The minimum values were recorded during September at both the stations (24.0 cm station A and 25 Cm station B).

Turbidity

Turbidity is a measure of extent to which light is either scattered or absorbed by the suspended material in water. The turbidity ranged from 30.1 in March to 66.0 NTU in September at Station A and 30.9 in December to 68.0 NTU in September at spot B.

pH

Rampur reservoir maintained an alkaline pH throughout the investigation period and pH was recorded between 7.1 and 8.9. The pH was minimum i.e. 7.1 in the month of September 1999 and October 1999 at spot A and B respectively. The maximum value i.e. 8.90 was recorded in the month of May 1999 and July 1999 at spot A and B respectively.

Conductivity

The conductivity was recorded minimum during December 1999 i.e. 120mohs at spot B and maximum during September 1999 i.e. 240.9 mohs at spot A.

Alkalinity

The alkalinity showed higher value during summer and lower value during monsoon and winter.

Dissolved oxygen

Maximum dissolved Oxygen level (13.0 mg/L at station A and 12.0 mg/L at station B) at the Rampur reservoir was recorded during May 1999. The minimum dissolved oxygen level of 7.0 mg/L was recorded at station A and B during the month of September and August respectively.

Chloride

The chloride values varied from 4.0 mg/L (station A during December) to 9.2 mg/L (station B during May). From June onwards the values showed a decreasing trend up to December.

Table 1. Physico-chemical characteristics of Rampur reservoir at Spot A

Months	Colour Appearance	Temperature °C	pH	Turbidity NTU	Conductivity mhos/cm	Dissolved Oxygen mg/L	Transparency cm	Chloride mg/L	Total Alkalinity mg/L
April 1999	Light brown	27.5	8.5	38.5	140.2	11.5	54.9	8.4	261.5
May 1999	Light brown	29.0	8.7	40.0	141.7	13.0	53.2	9.0	289.0
June 1999	Light brown	27.0	8.8	44.9	199.8	12.0	49.1	7.5	258.0
July 1999	Turbid	26.5	8.9	50.0	201.5	10.5	41.6	7.0	254.5
August 1999	Turbid	25.9	7.7	62.5	208.2	7.5	32.1	6.8	232.8
September 1999	Turbid	24.5	7.6	68.0	240.9	7.0	24.0	5.9	215.9
October 1999	Turbid	24.1	7.1	54.1	192.2	7.9	38.0	5.5	165.0
November 1999	Light green	24.0	8.1	41.5	132.0	8.0	45.0	5.7	104.9
December 1999	Light green	22.0	8.3	30.9	124.0	8.3	51.5	4.0	104.0
January 2000	Light green	18.0	8.0	33.5	134.5	8.5	55.9	6.5	167.0
February 2000	Light green	20.0	8.2	31.0	135.4	8.5	60.5	7.8	172.0
March 2000	Light brown	25.0	8.4	37.2	138.9	8.7	58.0	8.2	220.0

Table 2. Physico-chemical characteristics of Rampur reservoir at Spot B

Months	Colour Appearance	Temperature °C	pH	Turbidity NTU	Conductivity mhos/ cm	Dissolved Oxygen mg/ L	Transparency cm	Chloride mg/L	Total Alkalinity mg/ L
April 1999	Light brown	28.0	8.7	40.0	141.2	11.9	59.1	8.9	265.0
May 1999	Light brown	29.5	8.9	44.9	144.8	12.0	51.5	9.2	320.0
June 1999	Light brown	26.5	8.1	52.1	200.0	10.5	46.8	7.7	289.0
July 1999	Turbid	26.0	8.2	59.2	204.6	7.6	40.0	7.4	261.5
August 1999	Turbid	25.4	7.8	62.5	210.2	7.0	35.1	6.2	254.5
September 1999	Turbid	24.0	7.1	66.0	235.8	7.8	25.0	6.1	230.9
October 1999	Turbid	23.6	8.0	52.9	180.7	8.2	36.2	6.3	212.9
November 1999	Light green	23.2	8.1	44.6	128.0	8.2	43.0	6.8	105.0
December 1999	Light green	22.0	8.3	30.9	120.0	8.3	51.5	5.7	108.0
January 2000	Light green	18.1	8.1	34.1	123.8	8.6	56.0	7.0	170.0
February 2000	Light green	20.5	8.3	32.9	134.5	8.6	61.2	7.6	215.0
March 2000	Light green	25.5	8.5	30.1	136.9	9.2	63.0	8.6	235.0

Discussion

In the present study water temperature of Rampur reservoir varied from 18 °C to 29.5° C throughout the year. The fluctuations in the water temperature have relationships with the air temperature being maximum during summer and minimum during winter. Rao 1955 and Saha and Pandit 1986 also reported same results.

Present observations showed minimum transparency during monsoon seasons and it increases subsequently. If we compare it with turbidity we find that it is inversely proportional to the turbidity. The low depth of visibility during monsoon is attributed to the highest turbidity of water caused by suspended silt and organic debris, similar trend was observed by Balkhi 1987 and Khanna *et al.* 1999. Bhatt and Negi 1985 also reported higher values of turbidity during monsoon for a river ecosystem.

Similarly, the highest value of conductivity during monsoon (September 240 mhos/ cm at station A and 235.8 mhos/ cm at station B) may also be due to high turbidity, as indicated by Acre and Boyd 1980 that the conductivity of water increases with concentration of solids in the water.

The pH of Rampur reservoir water was found alkaline during the study period; Verma and Shukla 1967 also reported that freshwater bodies remain alkaline in nature.

Total alkalinity showed higher values during summer and a deep fall during monsoon. Goldman and Wetzel 1963 and Sharma 1992 have reported similar results.

Dissolved Oxygen is very essential for metabolism of all aquatic organisms for aerobic respiratory biochemistry (Wetzel 1975). The present investigation showed minimum value of dissolved oxygen during September and maximum during May. The higher values of oxygen during summer are associated mainly with the higher phytoplanktonic population (Bhatt and Negi 1985).

Present results showed lower concentration of chloride (4.0-9.2 mg/L) throughout the year indicating that the water is unpolluted from artificial sources. The low chloride content in natural water 4-10 ppm only indicates the purity of water that is free from pollution (Shreenivasan 1965).

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