



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2023; 9(6): 347-350
www.allresearchjournal.com
Received: 13-04-2023
Accepted: 19-05-2023

Asharam Yadav
Research Scholar Zoology,
Govt. Science P.G. College,
Rewa, Madhya Pradesh, India

Amit Tiwari
Professor & Head, Department
of Zoology, Govt. T.R.S.
College, Rewa, Madhya
Pradesh, India

Seasonal variation in water quality of a Sujara Dam, Tikamgarh District (M.P.)

Asharam Yadav and Amit Tiwari

Abstract

Physico-chemical analysis of water in Sujara dam located in the Tikamgarh district was done in order to assess the suitability of water for irrigation. The seasonal monitoring was done that involved pre and post monsoon months. A total of eleven different parameters viz. Temperature, pH, DO, BOD, COD, Total Alkalinity, Total Chlorides, TDS, TSS, Turbidity and Hardness were considered for this study. Differences in the unit values of various parameters were seen in the two seasons.

Keywords: Seasonal, water analysis, Sujara dam, water quality

Introduction

Water is a unique component of nature and plays vital role in various life processes. All living organisms need water for their survival and growth. Water bodies are very much precious as there are limited water resources available. Water is most important in shaping the land and regulating the climate. Rapid industrialization and population explosion is the key reason of deterioration of water quality of natural water bodies. In future, there could be scarcity of fresh water due to unplanned and excessive exploitation. There is increasing need for fresh water resources like portable water for residential area, irrigation water for agriculture, water for industrial usage in industries and water for aquaculture for rearing of aquatic organisms which in turn pressurize the available source of water bodies Jadhav *et al.* 2011 [1].

Water pollution is one of the major problems in India. Almost 70% of the available surface water and growing percentage of ground water are contaminated by biological, toxic, organic and inorganic pollutants Chandrasekhar and Kodarkar 1996 [2]. In many cases, sources are providing deteriorated quality of water which is unsafe for drinking and other purposes like irrigation Nigam *et al.* 2013 [3]. Fresh water lakes and rivers are fragile ecosystems that face the problem of water pollution. Assessment of biological properties along with physico-chemical properties provides a clear idea about trophic status and quality of water bodies. In India, several studies have been done on lentic and lotic limnology Kakvipure and Yeragi 2005 [4]; Gupte *et al.* 2009 [5]; Shinde *et al.* 2010 [6]; Jadhav *et al.* 2011 [1]; Waghmare *et al.* 2012 [7]; Naik *et al.* 2012 [8]; Bajpai 2012 [9].

In the current study, an effort was made to understand water quality of a dam that has been primarily used for irrigation of farms.

Study area

The coordinates of the dam site are 24°-37'-32.87" N and 79°-08'-22.91" E. The command area proposed to be irrigated for the project is 54,000 ha. The command area is plain and traversed by a number of small and big nallahs which form natural drainage of the area. Most of the stream and nallahs are non-perennial or seasonal in nature. Dhasan river is also a seasonal river. The command has good slopes and drainage capacity.

The Dam comprises of a masonry over flow gated structure located across Dhasan river flanked by earth dam in the main river Dhasan at Ban and Sujara village site. The maximum height of earthen dam is 21.33 m.

The research work comprises of the following main components:-

- Construction of a homogenous earth dam with concrete gated spillway of height 21.33 m.

Corresponding Author:
Asharam Yadav
Research Scholar Zoology,
Govt. Science P.G. College,
Rewa, Madhya Pradesh, India

- Length of dam shall be 1158.2 m
- Construction of a central gated spillway in 195 m length which will consist of 16 nos. of 12.2 m x 9.15 m size vertical gates.
- Water spread at FRL shall be 5201.71 ha with a gross storage capacity of 313.10 Mm³.
- About 935.11 ha of cultivable area, 57.49 ha of forest land and 4209.118 ha of other land including road, streams, river, etc. will be affected.
- Construction of left bank canal of 90 km in length with 22.35 km of distributaries

The total land required for various project components is of about 5886.97 ha. About 2935.11 ha of revenue/government land and 2894.37 ha of private land is to be acquired. In addition, about 57.49 ha of forest land is also to be acquired.



Fig 1: Showing map Sujara dam

2. Materials and Method

Water samples were collected into plastic or glass bottles as per the need. The samples were placed into thermocol box and were transported to lab within 2 hours from collection time. Samples were collected for 8 months out of which 4 months (February-May) were designated as pre monsoon and 4 months (October- January) were considered as post

monsoon months. At every month, samples were collected at specific time of a day to minimise the error.

A total of 10 parameters were considered for analysis. Details of methods used for every parameter are given in the table 1. The observations were interpreted by using standard provided by Bureau of Indian Standards (BIS). In case where BIS standards were not available, WHO/CPCB standards were considered for interpretation.

Table 1: Parameters Analysed

Parameter	Method used	Reference
Temperature	Thermometer	APHA 2005 ^[10]
pH	Digital pH meter	
DO	Wrinkler's method, Microbiological titration	
BOD	5 day incubation, Wrinkler's method, Microbiological titration	
COD	Open reflux	
Alkalinity	Volumetric Titration	IS 3025 (Part 23): 1986 ^[11]
Chlorides	Volumetric Titration	APHA 2005 ^[10]
TDS	Gravimetric Analysis	Howard 1933 ^[12]
TSS	Gravimetric Analysis	Howard 1933 ^[12]
Turbidity	Nephelometric using Digital turbidity meter	APHA 2005 ^[10]
Hardness	Volumetric Titration	

Table 2: Acceptable limit by BIS, CPCB and WHO

SN	Parameter	Unit	Desirable	BIS Permissible	CPCB	WHO
1	pH		6.5 to 8.5	-	6.5 to 8.5	-
2	Dissolved oxygen	mg/lit	4	6	6 or more	-
3	BOD	mg/lit	-	-	5 day 2 or less	5
4	COD	mg/lit	-	-	-	10

5	Total alkalinity	mg/lit	200	600	-	-
6	Total solid	mg/lit	-	-	-	-
8	TDS	mg/lit	500	2100	-	1000
9	Turbidity	NTU	1	5	-	-
10	Total hardness	mg/lit	200	600	-	-
11	Chlorides	mg/lit	250	600	-	-
12	Temperature	°C	-	-	-	15-35

3. Results and Discussion

During post monsoon season, temperature at Sujara dam varied from 18.8 °C to 22.9 °C while in pre monsoon season there was an average raise by nearly 5 °C. pH of water was in between 7.3 to 8.2 throughout the monitoring period. The value of pH was towards higher end during the pre-monsoon season. The amount of dissolved oxygen in Sujara dam was found to be in desirable amounts. It was seen that as the temperature increased in pre monsoon season the amount of dissolved oxygen in water also increased showing positive correlation. The biological oxygen demand was high during post monsoon season while it decreased in pre monsoon season. The chemical oxygen demand ranged in between 6 to 8. In pre monsoon season chemical oxygen demand of water was more. Alkalinity of the water was within limits for all the 8 months, however during post monsoon season alkalinity was relatively high. Similar trend of observation was seen for the chlorides. Value of total dissolved and total suspended solids in the water was relatively high during pre

monsoon season as compared to post monsoon season. In terms of turbidity water of Sujara dam was clear however, little turbidity was seen in the pre monsoon season mainly due to high amounts of total solids. Hardness of water was within limits for both seasons, but during pre-monsoon season the values of hardness almost reached acceptable limit. To have better understanding of average variation and deviation in monthly values; mean, standard deviation of each parameter were assessed. To understand the array of fluctuations maximum and minimum reading were noted. It was seen that, Mean temperature of water was around 23.8 °C while maximum and minimum temperatures noted were 29.8 °C and 18.8 °C respectively. The average pH was little alkaline with a standard deviation of 0.37. DO and COD levels in the water varied considerably during two different seasons while BOD values were more or less stable. Very high deviation of values was seen for five parameters viz. Alkalinity, Chlorides, TDS, TSS and Hardness, though values in each month were within acceptable ranges.

Table 3: Details of water parameters analysed during pre and post monsoon

Parameter	Post Monsoon			Pre Monsoon				
	October	November	December	January	February	March	April	May
Temperature	22.9	20.2	18.8	21.4	22.5	26.4	28.6	29.8
pH	7.5	7.3	7.4	7.3	7.7	8.1	8.2	8
DO	6.8	7.4	7.6	6.5	6.2	6.3	4.2	3.3
BOD	4.2	3.4	2.3	3.8	2.5	2	2.4	3
COD	6.6	5.8	6.5	6.4	7.3	7.5	8.1	8.4
Alkalinity	168	137	166	147	149	124	126	108
Chlorides	165	181	169	178	137	155	149	101
TDS	257	168	137	236	254	361	397	468
TSS	169	209	204	215	239	305	368	439
Turbidity	1	1	1	1	2	2	2	2
Hardness	161	166	168	178	197	195	198	202

Table 4: Mean, SD and Max-Min values of analysed parameters

Parameter	Mean	SD	Max	Min
Temperature	23.8	4.00	29.8	18.8
pH	7.7	0.37	8.2	7.3
DO	6.0	1.51	7.6	3.3
BOD	3.0	0.79	4.2	2
COD	7.1	0.90	8.4	5.8
Alkalinity	140.6	20.95	168	108
Chlorides	154.4	26.11	181	101
TDS	284.8	114.36	468	137
TSS	268.5	93.84	439	169
Turbidity	1.5	0.53	2	1
Hardness	183.1	16.69	202	161

All parameters at Sujara dam were within acceptable ranges for most of the period of monitoring. Only high TSS was seen in few months mainly due to human activities like swimming that causes disturbance in water. Other natural factors like wind too contributed in high TSS. Human activity near lake was less in post monsoon period mainly due to difficulties in accessibility as the road reaching the lake is not well built. Also, the need for water from the lake

in immediate post monsoon period is relatively less. Water for irrigation is required only after September month which is provided by local Panchayat through pipe lines. Though, anthropogenic pressure on the lake is relatively less, in Pre monsoon season the lake attracts many people mainly for leisure purpose. It can be concluded that the, Sujara dam has a good quality of water which is suitable for irrigation.

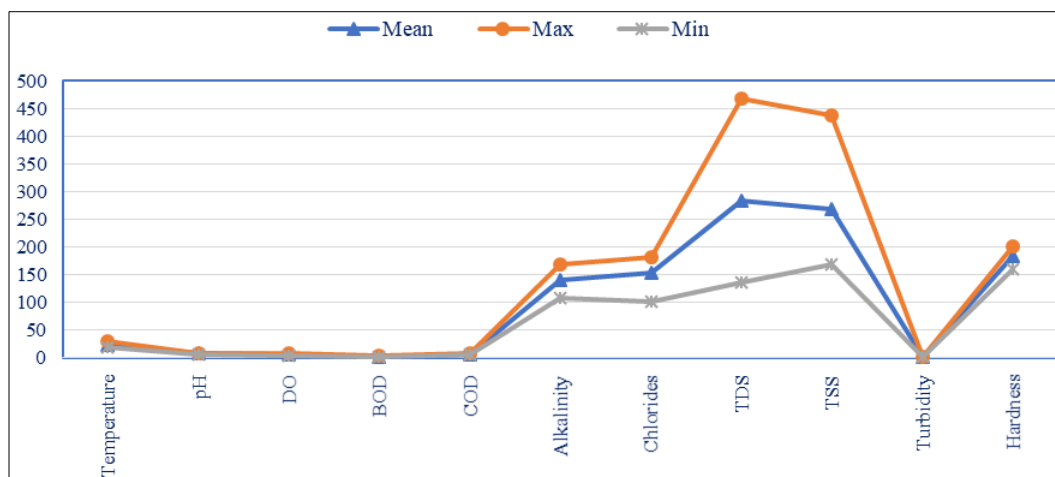


Fig 2: Graph analysis of water parameters

4. Acknowledgement

The authors are greatly indebted to Principal of Govt. Science P.G. College, Rewa (M.P.) who permitted to carry out this work.

5. References

- Jadhav S, Borde S, Jadhav D. Study of seasonal variations of some physico-chemical characteristics of Sina Kolegaon dam Osmanabad district (M.S.), International multidisc Res. Jour. 2011;1(12):19-20.
- Chandrashekar SVA, Kodarkar MS. Biodiversity of zooplankton in Saroor Nagar lake, Hyderabad, India, J Aqua. Biol. 1996;9(1-2):30-33.
- Nigam V, Sarsaiya S, Gour R, Gautam S, Mandloi GS. Technological up-gradation of grey water treatment system, Resource Book of ICWWH, 2013.
- Kakavipure DK, Yeragi SG. Seasonal variations of some physicochemical parameters of Khativali-Vehloli Lake, near Shahapur, Dist. Thane (M.S.). Environmental Degradation and Management. 2005;1:19-24.
- Gupte A, Shaikh N, Yeragi SG. Some physico-chemical aspects of Bhorpada Lake of Thane District, (M.S.). Proc. of the National level conference on "Impact of urbanization on Lake Ecosystem. (Causes, Consequences and Remedial measures, 2009, 11-15.
- Shinde SE, Pathan TS, Raut KS, More PR, Sonawane DL. Seasonal variations in physico- chemical characteristics of Harsool-Savangi dam, Dist Aurangabad, India. The EcSCAN. 2010;4(1):37-44.
- Waghmare NV, Shinde VD, Surve PR, Ambore NE. Seasonal variations of physico-chemical characteristics of Jangavan dam water of Hingoli District (M.S.) India, International Multidisciplinary Res. Jour. 2012;2(5):23-25.
- Naik TP, Ajayan KV, Lokesh GH. Physico-chemical characteristics of Kunigal lake in Tumkur Dist., Karnataka, India, Int. J Chem. Sci. 2012;10(2):655-663.
- Bajpai R. Comparative Analysis of Physicochemical Parameters of Hasdeo River Barrage & Arpa River Water Samples of Bilaspur Region, International Journal of Scientific and Research Publications. 2012, 2(9).
- APHA, Standard Methods for the Examination of Water and Wastewater, 21st Edition, American Public Health Association/American Water Works Association/Water Environment Federation, Washington DC, 2005.
- IS 3025 PART 23, Methods of sampling and test (physical and chemical) for water and wastewater, printed by the Manager, Govt. of India Press, Faridabad. 1986.
- Howard CS. Determination of total dissolved solids in water analysis, Ind. Engg. Chem. Anal. Ed., 1933, 5(4).