



Physico-Chemical Analysis of Some Dam Water Samples of Lakhundar Dam of Palsawad Son, District-Shajapur, MP, India

Bodane Arun Kumar

Department of Chemistry, B.S.N. Govt. P.G. College, Shajapur, M.P., INDIA

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Abstract

The present investigation reveals the quality of water of Lakhundar dam; this dam is constructed in village Palsawad Son, and District-Shajapur, India. The present studies based on physico-chemical parameters likes pH, total hardness, calcium, alkalinity, chloride, magnesium, fluoride, dissolve oxygen, nitrate and C.O.D. Results obtained from the study revealed that water quality during each season is well within the permissible limit and the dam water is safe for drinking and human consumption. The present study of dam water will also helpful to minimize pollution of dam water..

Keywords: Dam water, drinking water, physico-chemical characteristics, seasonal variations.

Introduction

Water is the principal source of drinking water in our country and indispensable source of our life. Life is not possible on this planet without water¹. Water is a basic and primary need of all vital processes and it is now well established that the life first arose in aquatic environment. Very small amount of water i.e. less than 1% is fit for human consumption which signifies the importance of this essential commodity on the earth. Water is also essential raw material for photosynthesis and therefore it is important for irrigation². Almost 70% of water in India has become polluted due to the discharges of domestic sewage and industrial effluents in to natural water sources³.

The present study highlights the physical and chemical characteristics of Lakhundar dam water. Further, the information obtained from the study will be useful for local people. The Physicochemical characteristic of dam water determines whether the water is fit for human consumption or not. Approximate 15 nearest villages depending upon this dam for their domestic needs likes' cloth washing, domestic animal drinking, and irrigation purpose

Material and Methods

Study Area: Shajapur district is a district of Madhya Pradesh state of central India. The town of Shajapur is the district headquarters. Shajapur district is part of the Malwa Plateau. The district is situated in the northwestern part of the state and lies between latitudes 32°06' and 24° 19' North and longitudes 75° 41' and 77° 02' East.

The dam constructed across the river Lakhundar, a tributary of river Kalisindh in Chambal sub basin in Shajapur district of

Madhya Pradesh, to provide irrigation in an area of 6100 ha (CCA). The composite dam consists of 2385 m long earthen dam of height of 20.42 m. An ogee shaped weir of length 155 m designed to discharge 628 cumec of flood water on the right flank has been constructed. The right bank canal is of 27.5 km length with head discharge of 2.667 cumec with one branch canal and 13 minors to irrigate 3810 ha and the left bank canal is 31.5 km long with head discharge of 1.602 cumec with 16 minor to irrigate 2290 ha⁴.

Preparation of Water Samples: The study was conducted seasonally for a period of one year from July 2013 to June 2014. The 10 water samples were collected in clear pre-sterilized polythene bottles of 2.0 liters from different locations of the seasonally of Lakhundar dam without any air bubbles. The bottles were rinsed before sampling and tightly sealed after collection and labeled in the field. The temperatures of the samples were measured in the field itself at the time of sample collection.

Analysis of Water Sample: The physico-chemical characteristics were determined as per the standard methods⁵. pH, dissolve oxygen, magnesium, chloride, alkalinity, calcium, fluoride, nitrate, total hardness, and C.O.D. were determined in the laboratory.

Results and Discussion

pH: The value of pH was within maximum permissible limit in all samples. It was ranging from 7.11 to 7.70. The pH value of natural water changes due to biological activity and industrial contamination. pH has no adverse effects on health.



Figure-1
Original Location of Lakhundar Dam, Palsawad Son (Shajapur)

Alkalinity: The main source for alkalinity is due to weathering of rocks. Higher alkalinity value contributes sour and saline taste to water. It is important in calculating the dose of alum and the fluoride values of this investigation are too low and well within the standard permissible limits⁶. It was ranging from 209 to 275 mg/l

Calcium: The water above Calcium values 25 mg/l are classified as 'Calcium rich'. The present investigation shows that the concentration of calcium of the Lakhundar dam water is 13.42 to 15.21 mg/l.

Magnesium: The observed value of magnesium in dam water is maximum 4.56 mg/l. The present investigations shows that the magnesium content in majority of samples does not exceed the limit as prescribed by ISI as well as WHO.

Chloride: The main sources of chloride in water are discharge of domestic sewage, industrial effluents, and agricultural biocides in water. During present study the maximum average total alkalinity value recorded was 41.60 mg/l

Total Hardness: The total hardness of samples was ranging from 110.05 to 139.90. Hardness in water is primarily caused by the presence of calcium and magnesium salts and entry of

industrial and other domestic effluents into the water source⁷.

Fluoride: Fluoride is an essential element for human body. Most of fluoride enters into human body only during water consumption fertilizers. It is an indicator of organic pollution⁸. The average total chloride value 0.312 mg/l to 0.368 mg/l recorded.

Nitrate: Nitrate values are used to assess the self purification property of the water source. The main source of nitrate in water body is decaying plant and animal materials. The nitrate values of this investigation are well within the standard permissible limit⁶. During the study, the nitrate recorded is 0.00004 to 0.00012 mg/l for dam water.

Dissolved oxygen: During the study, the concentration of DO recorded is 2.03 to 2.22 mg/l for Lakhundar dam water.

COD: C.O.D. is the major of oxygen consumed during the oxidation of oxydisable organic matter present in the water. C.O.D. of dam water is in the range 2.06 to 2.16 mg/l COD of dam water is nearly same and below the permissible limit.

The results obtained are represented below in table 1 to 3.

Table-1
Rainy Season

Sr. No.	Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
01	pH	7.30	7.25	7.19	7.18	7.55	7.41	7.21	7.25	7.52	7.57
02	Alkalinity	215	235	209	215	245	233	210	225	212	219
03	Calcium	14.10	15.13	14.22	13.42	13.49	15.00	14.12	13.62	14.70	15.04
04	Magnesium	4.44	4.21	4.25	3.39	4.16	4.31	4.32	3.30	4.56	4.11
05	Chloride	37.89	40.22	38.99	39.45	37.80	40.70	38.32	39.41	37.90	40.72
06	Total Hardness	112.15	113.90	114.75	115.29	119.15	116.40	114.75	116.89	113.05	117.00
07	Fluoride	0.330	0.345	0.342	0.345	0.335	0.356	0.351	0.347	0.315	0.337
08	Nitrite	0.00008	0.00006	0.00010	0.00011	0.00005	0.00006	0.00010	0.00012	0.00005	0.00007
09	Dissolved oxygen	2.12	2.10	2.09	2.13	2.21	2.16	2.10	2.11	2.14	2.10
10	COD	2.10	2.12	2.09	2.13	2.11	2.10	2.15	2.13	2.11	2.07

Table-2
Winter Season

Sr. No.	Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
01	pH	7.12	7.28	7.32	7.45	7.53	7.41	7.71	7.45	7.42	7.22
02	Alkalinity	235	244	210	225	235	244	261	235	242	240
03	Calcium	14.00	14.10	14.27	13.82	14.40	15.21	14.33	13.82	14.40	15.20
04	Magnesium	3.46	4.01	4.72	3.50	4.26	4.11	4.42	3.30	4.36	4.13
05	Chloride	36.70	38.60	39.92	39.42	36.70	41.60	36.92	37.47	34.70	41.60
06	Total Hardness	110.05	116.90	115.75	115.89	117.05	117.90	118.75	122.89	139.05	139.90
07	Fluoride	0.312	0.346	0.331	0.349	0.333	0.356	0.321	0.348	0.335	0.351
08	Nitrite	0.00007	0.00004	0.00009	0.00010	0.00008	0.00007	0.00011	0.00007	0.00006	0.00010
09	Dissolved Oxygen	2.12	2.11	2.03	2.22	2.10	2.07	2.09	2.11	2.12	2.10
10	COD	2.09	2.10	2.08	2.02	2.15	2.17	2.06	2.10	2.14	2.14

Table-3
Summer Season

Sr. No.	Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
01	pH	7.30	7.25	7.11	7.17	7.70	7.43	7.31	7.10	7.44	7.47
02	Alkalinity	231	240	219	224	247	253	210	215	275	265
03	Calcium	14.00	14.60	14.22	13.42	14.60	15.20	14.33	13.72	14.30	14.25
04	Magnesium	4.46	4.11	4.12	3.31	4.56	4.21	4.23	3.39	4.41	4.21
05	Chloride	36.71	40.50	39.92	40.47	38.70	41.60	39.92	38.48	37.65	40.49
06	Total Hardness	111.04	117.76	114.55	115.79	111.03	117.80	114.65	115.79	111.15	117.80
07	Fluoride	0.355	0.354	0.342	0.368	0.345	0.366	0.341	0.348	0.333	0.350
08	Nitrite	0.00005	0.00007	0.00010	0.00012	0.00005	0.00007	0.00010	0.00012	0.00005	0.00007
09	Dissolved Oxygen	2.17	2.10	2.09	2.13	2.16	2.10	2.09	2.13	2.11	2.10
10	COD	2.11	2.14	2.10	2.06	2.10	2.15	2.09	2.11	2.16	2.10

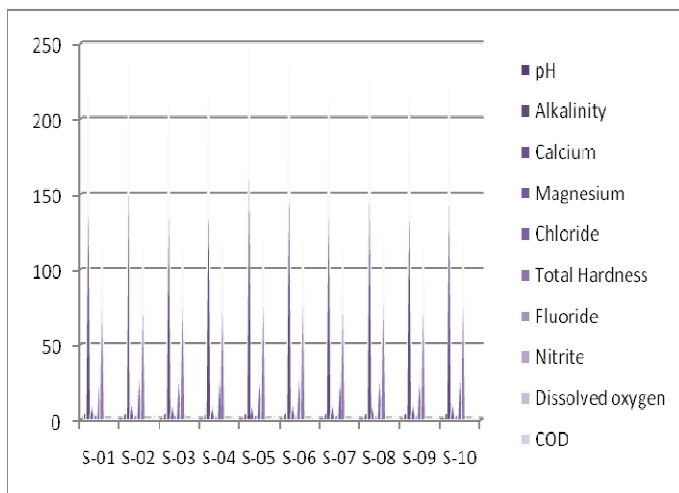


Figure-1
Graphical Presentation of table-1

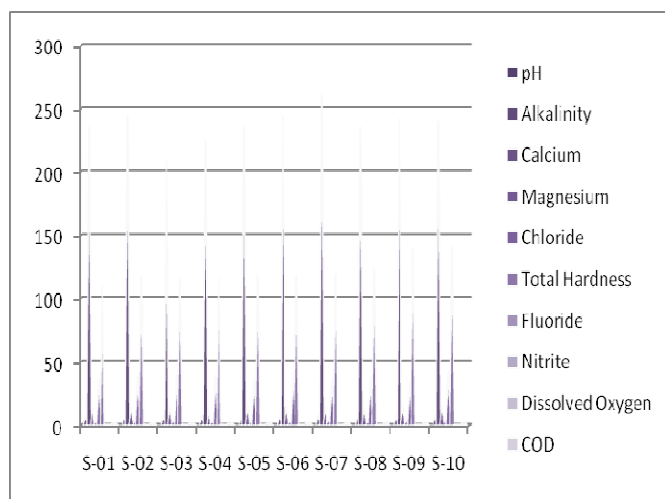


Figure-2
Graphical Presentation of table -2

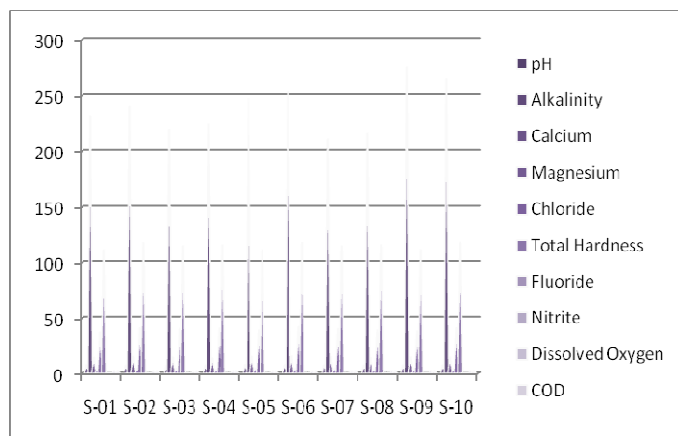


Figure-3
Graphical Presentation of table-3

Conclusion

The results obtained from this study clearly indicate usability of Lakhundar dam water for drinking and other domestic purposes. It is also helpful for a Shajapur and Palsawad Son peoples to understand the quality of drinking water. The present study will also help to minimize pollution of dam water.

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