

Chambal River: -Chemical Analysis of water at selected point in Kota, Rajasthan.

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Abstract:- Chambal river is major source of potable water, the river is also ecologically very important as it harbors very rich biodiversity. Chambal River is only water source for Rajasthan and its water quality should be always checked at particular interval. Present study revealed that water quality parameters (pH, EC, Chloride, Fluoride, TDS, DO, COD, BOD etc) of some sample site showed contamination and depletion in quality of Chambal River in pre monsoon. The water quality was maintained in certain sample site and all parameters were found under limit. We should maintain quality of water because Chambal River is major source of drinking water for districts of Rajasthan.

Keywords:- water quality, Chambal River, chemical parameter

I. INTRODUCTION

Chambal River plays an important role in integrating and organizing the landscape, and moulding the ecological setting of a basin. It is the most significant water resource of the state of Rajasthan. It fulfills the water demands of a large number of cities and towns situated on its banks. Chambal river is major source of potable water, the river is also ecologically very important as it harbors very rich biodiversity (Crawford, 1969, Verma et al., 1993). Amit et al (2015) also revealed that the diversity and richness indices are an indication of moderate river health. The Chambal River is a tributary of the Yamuna River in central India, and forms part of the greater Gangetic drainage system. It is a legendary river and finds mention in ancient scriptures. The perennial Chambal originates from Mhow town, near Indore, Madhya Pradesh. The Chambal and its tributaries drain the Malwa region of north western Madhya Pradesh, while its tributary, the Banas, which rises in the Aravalli Range, drains south eastern Rajasthan. It ends a confluence of five rivers, including the Chambal, Kwari, Yamuna, Sind, Pahuj, at Pachnadanear Bhareh in Uttar Pradesh state, at the border of Bhind and Etawah districts. People along the river use water for many purposes. Water is the basic element for the life of all living creatures on earth, in Rajasthan; Chambal Rivers are the major sources of water where a large part of population of district and rural depends on them for their daily water requirement (Jayaraman et al. 2003, Patil et al. 2013).

Hussain et al., 2011 reported that Chambal River is considered pollution free and hosts an amazing riverine faunal assemblage including two species of crocodylians; the Mugger and Gharial, 8 species of freshwater turtles, smooth-coated otters, gangetic river dolphins, skimmers, black-bellied terns, sarus cranes and black-necked storks, amongst others. In this paper, an attempt has been made to assess the water quality on physio-chemical to study the extent of pollution in river Chambal in Kota district.

II. REVIEW OF LITERATURE

Chambal River is only perennial river of Rajasthan which is the main source of drinking water for Kota city as well as for the purpose of agriculture, and various other uses. The river Chambal flows through the Kota city. Water of Chambal River is getting contaminated from various points of drainage and directly dumps ground. Many researchers reported the water quality of Chambal River. Kota city lacks a particular system for treatment and drainage of wastewater, consequently leading the wastewater from household, industries etc. to the Chambal River (Kumar et al. 2017, Patil et al. 2012, Parashar et al. 2006).

Sarang et al. 2014 also revealed that organic matter content in river caused highly contamination of hazardous pathogen as well as other biological organisms. Discharge of large quantities of waste causes thermal pollution and it affects the ecology of the ecosystem of Kota Barrage Dam.

Chambal River is also major water source for wild life sanctuary of Madhya Pradesh. In national Chambal sanctuary, water quality revealed that most of aquatic fauna and flora maintain biodiversity of particular area and it indicated that the river water in the sanctuary area is pollution free and can serve as a good habitat for many aquatic animals including endangered species Saksena et al. 2008. Due to growing urbanization and industrialization of

kota, a natural resource are exploited. Waste material also dumped in river which directly affects the organic matter concentration in downstream of river (Jain et al. 2015). The study revealed that water management for conservation and proper quality checks before utilization are mandatory steps to have potable water in the area and ground water stations need to be protected from further contamination because Pollution in the area of study urbanization and industrial activities appears to be the cause of deterioration of water quality. Bacteriological analysis revealed that contamination increases in pre and post monsoon seasons and can become a cause for an epidemic in future, especially in pre and post monsoon seasons (Nupur et al. 2015).

Jain 2012 also reported that water quality of Chambal River depleted during 1997 -2010, due to heavy population and urbanization in kota district. Water is essential matter for human life and its quality should be maintained for human life. Nama et al. 2018 reported that ground water quality also depleted due to pollution in Chambal River. Kumar et al. 2018 reported that Chambal river water quality changes from upstream to downstream due to thermal effluent into river water.

III. MATERIALS & METHODS

3.1 Study Area:-

The district Kota lies between 24o25' and 25o51' North latitudes and 75o31' and 77o26' East longitudes with total area of 5767.97 Sq Kms. The district Kota ends with boundaries of Sawai Madhopur, Bundi and Tonk district in North West, Chittorgarh in West, Jhalawar in South and Baran in East. The temperature varies in between 6oC – 48oC; the average rain fall is about 880 mm and humidity annually ranges from 8 – 88%. We were collected water sample from major point of water contamination from various sources of pollutants.

Table: 1 Sample Collection Site

S.No	Sample Site	Sample Code
1	Chambal Garden Site	CWS 1
2	Railways station gate no 2	CWS 2
3	Kota barrage gate 1	CWS 3
4	Near bhadana	CWS 4
5	Nayapura bridge	CWS 5
6	Brijraj palace	CWS 6
7	From baltia	CWS 7
8	Ganwadi	CWS 8
9	Kota barrage gate 2	CWS 9
10	Chhoti samadh mandir	CWS 10

3.2 Sampling procedure

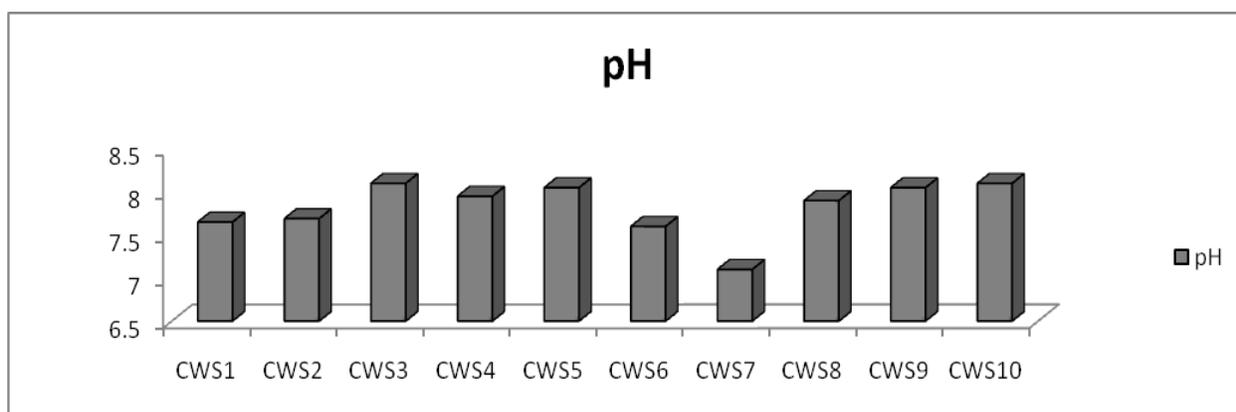
Water samples were collected for the present investigation from ten different experimental sites within a specific stretch of 5- 15 Kms of river Chambal in 2017-2018. The Samples were collected in screw capped Jerri-can (a polyethylene bottle) from midstream of the Chambal river. Sample bottles were thoroughly rinsed with distilled water for three times and then rinsed with river water before collecting samples. Caps of cans were closed tightly after filling up of can to avoid changes in physico-chemical characteristics. All respective water samples for testing were stored in a refrigerator at 4°C. The analysis of water samples was done according to the procedure prescribed by APHA 7, 8. The prescribed parameters were pH, Temperature, Turbidity, Total Dissolved solids, Total alkalinity, Total hardness, Chlorides, Nitrates, Sulphate, Fluoride, Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand.

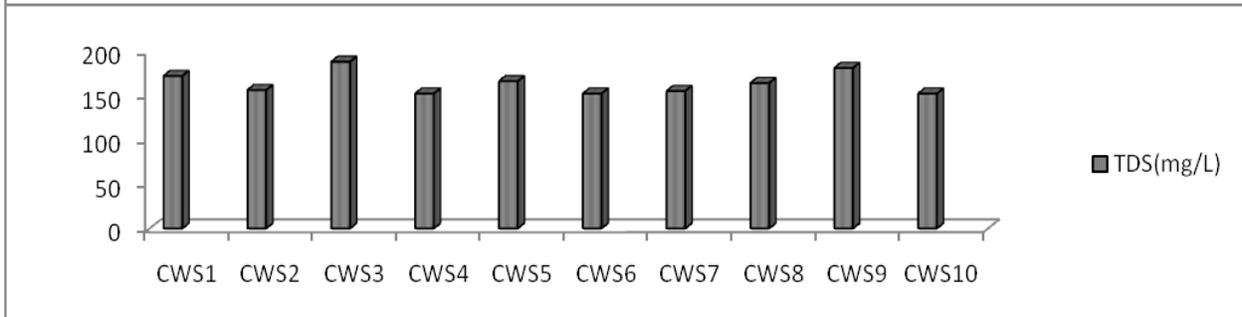
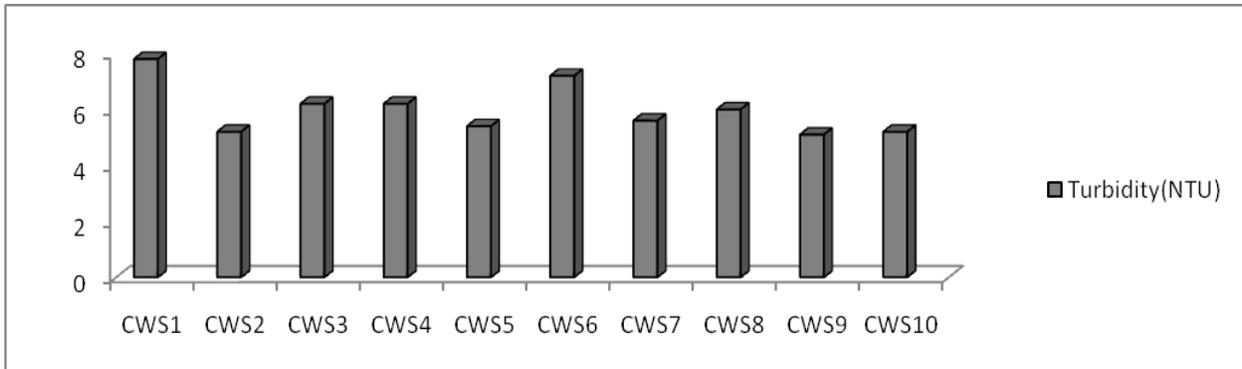
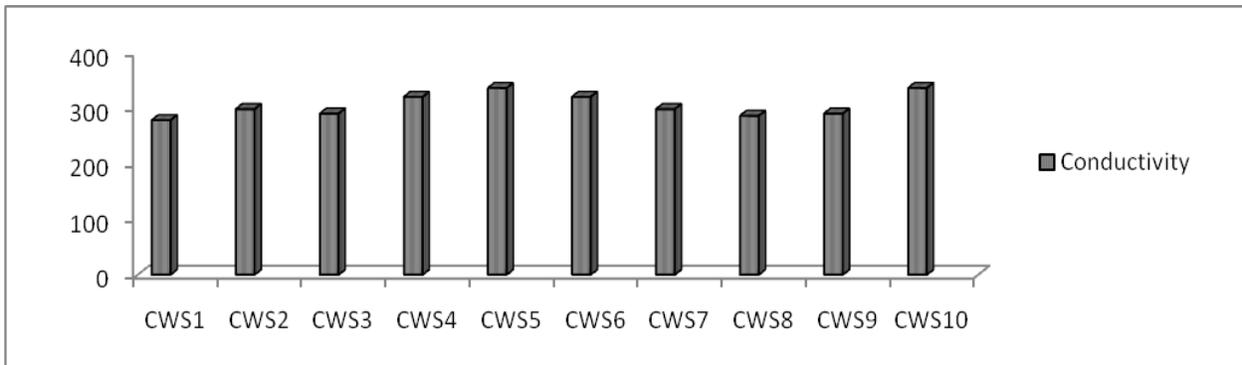
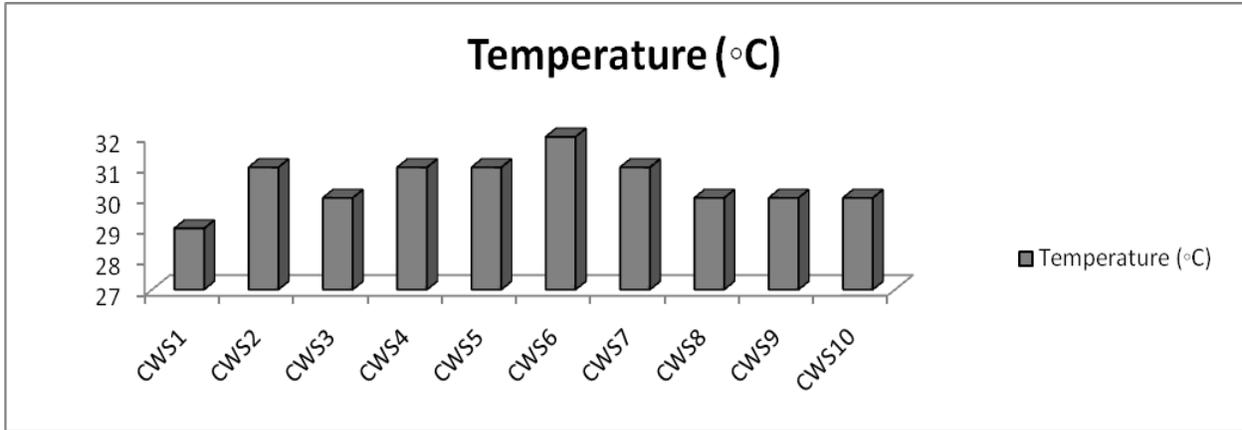
IV. RESULTS

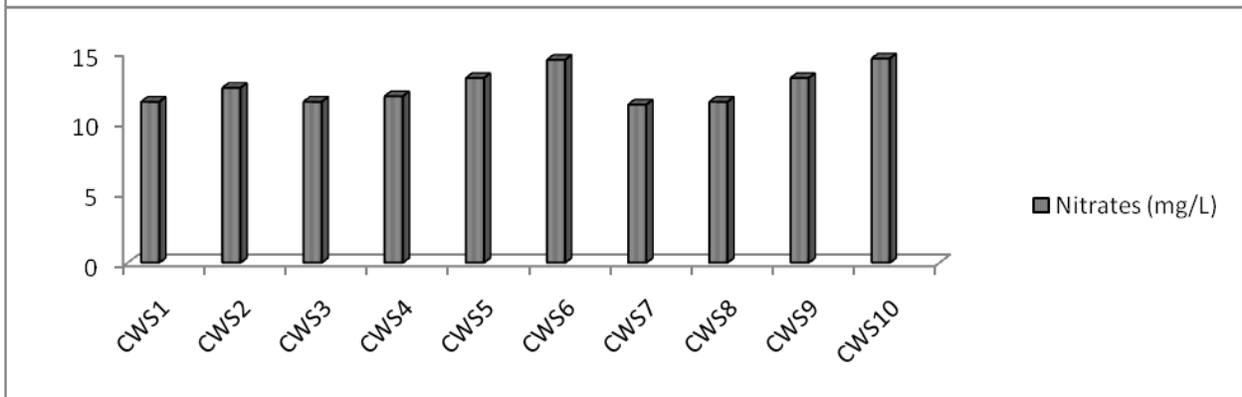
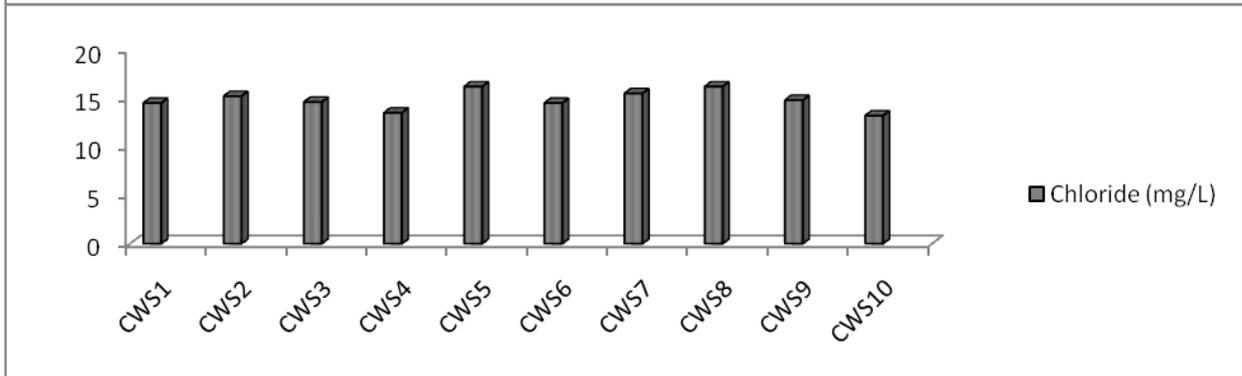
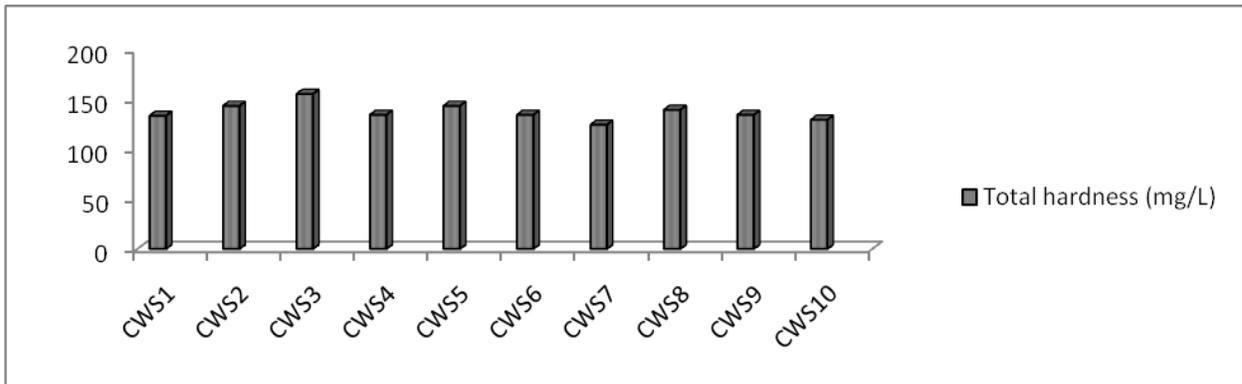
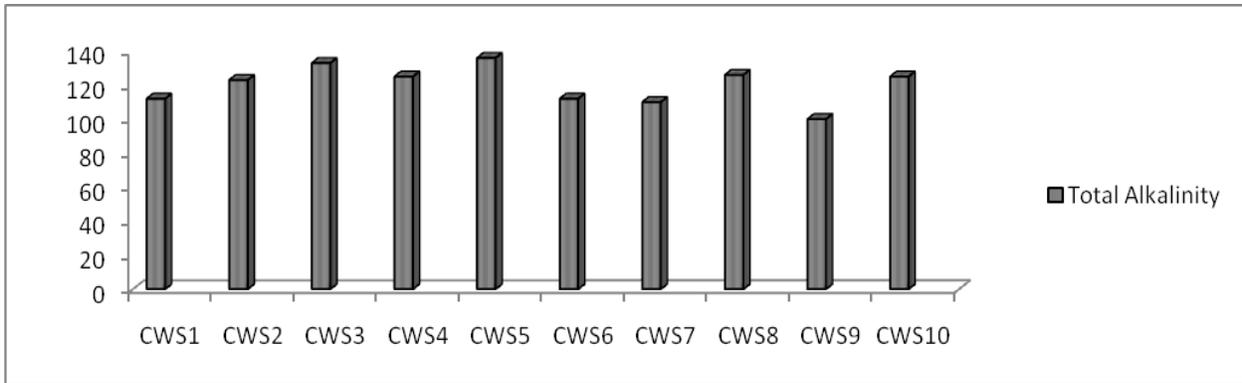
Table-2: Average values of Physico-chemical parameters of water sample from different location of kota district.

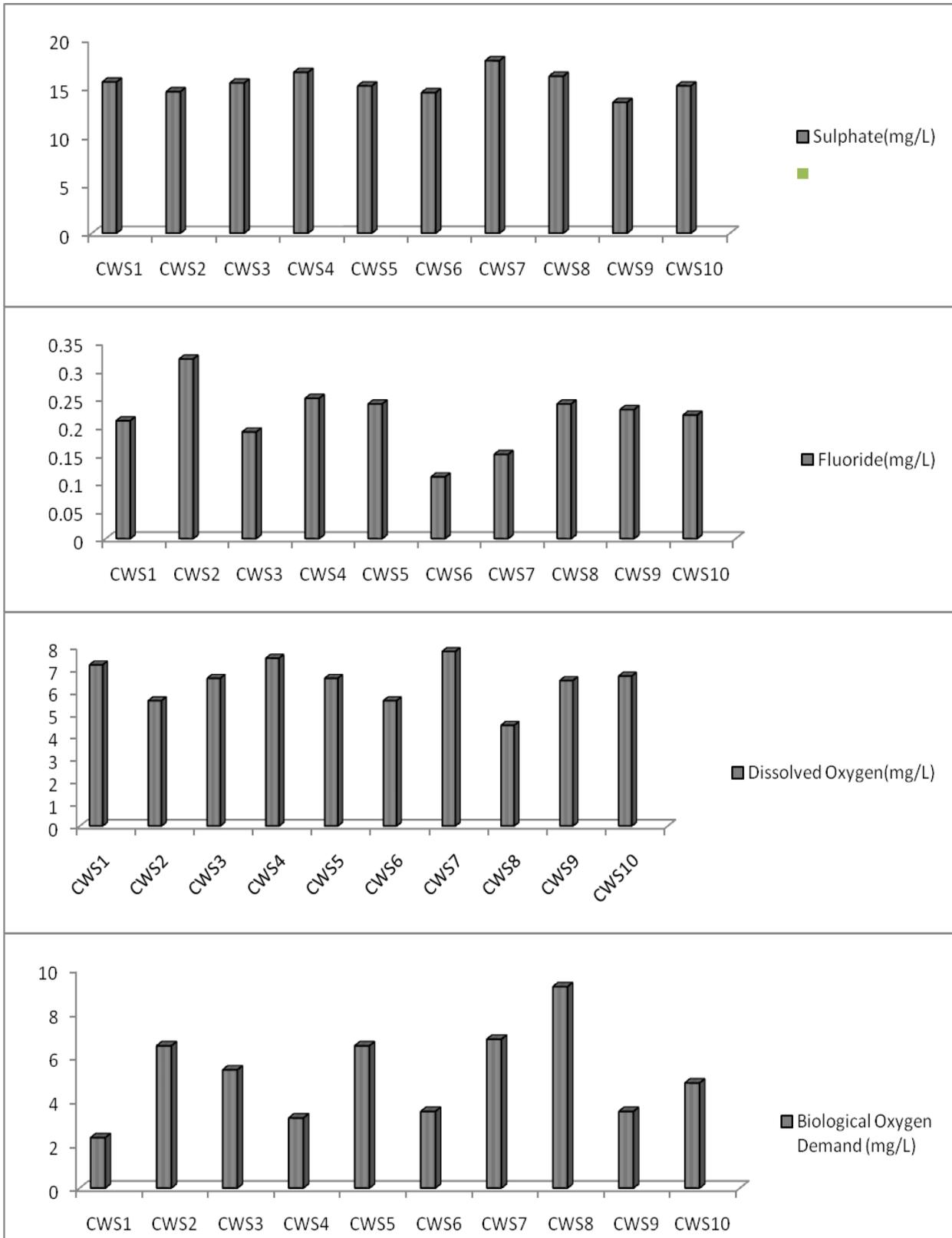
Parameter	Sample Name									
	CWS1	CWS2	CWS3	CWS4	CWS5	CWS6	CWS7	CWS8	CWS9	CWS10
pH	7.65	7.69	8.10	7.95	8.05	7.60	7.10	7.9	8.05	8.10
Temperature (°C)	29	31	30	31	31	32	31	30	30	30
Conductivity	278	298	290	320	336	320	298	286	290	336

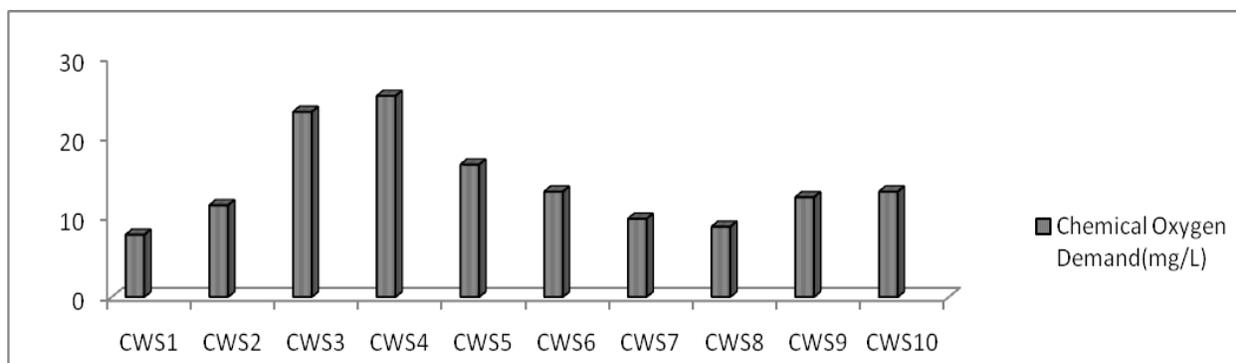
(μ S)										
Turbidity (NTU)	7.8	5.2	6.2	6.2	5.4	7.2	5.6	6.0	5.1	5.2
TDS (mg/L)	172	156	188	152	166	152	155	164	181	152
Total Alkalinity (mg/L)	112	123	133	125	136	112	110	126	100	125
Total hardness (mg/L)	134	144	156	135	144	135	125	140	135	130
Chloride (mg/L)	14.5	15.2	14.6	13.5	16.2	14.5	15.5	16.2	14.8	13.2
Nitrates (mg/L)	11.5	12.5	11.5	11.9	13.2	14.5	11.3	11.5	13.2	14.6
Sulphate (mg/L)	15.6	14.6	15.5	16.6	15.2	14.5	17.8	16.2	13.5	15.2
Fluoride (mg/L)	0.21	0.32	0.19	0.25	0.24	0.11	0.15	0.24	0.23	0.22
Dissolved Oxygen (mg/L)	7.2	5.6	6.6	7.5	6.6	5.6	7.8	4.5	6.5	6.7
Chemical Oxygen Demand (mg/L)	7.8	11.5	23.2	25.2	16.6	13.2	9.8	8.8	12.5	13.2
Biological Oxygen Demand (mg/L)	2.3	6.5	5.4	3.2	6.5	3.5	6.8	9.2	3.5	4.8











V. DISCUSSION

The physicochemical parameter of surface water samples were analyzed from ten sampling sites of river Chambal along Kota City during pre-monsoon season of years 2017-2018 are shown in Table-2.

All the water samples analyzed in pre-monsoon season were found in acceptable limit of pH value. The average value of two years analysis was varied from 7.10 to 8.05. The permissible limit of pH value of drinking water is specified as 6.5 to 8.5. River water's temperature was ranged from 29°C to 32°C. Electric conductivity range varied from 278 μS to 336 μS . There is no significant changes were observed in temperature and conductivity which indicate that these parameters do not affect the quality of drinking water. Turbidity ranged from 5.1 to 7.2 NTU. Turbidity is due to organic matter decomposition in water and suspended matters such as clay also contribute to turbidity. Particles dispersed due to solid waste disposal also contribute to turbidity. Total Dissolved Solids were ranged from 152 to 188 mg/L showed hardness of some chemical dissolved in river during drainage. Total alkalinity in all the samples was varied from 100 to 136 mg/L showing the alkaline nature of river water. According to IS 10500 the maximum permissible limit of alkalinity for drinking water is 200 mg/L. Total hardness in present study was varied from 125 – 156 mg/L. Total hardness includes calcium and magnesium values of pre-monsoon season were due to presence of high dissolved minerals. Chloride gives a salty taste and some times higher concentration causes laxative effect in human beings. The chloride concentration was ranged from 13.2 to 16.2 mg/L. The values observed are within the specified limit of 250 mg/L as per IS 10500. Concentration of Nitrate ion is very important indicator of drinking water because if it found 45 mg/L it causes blue babies (methemoglobinemia) in children. The value of nitrates in the present study was varied from 11.5 to 14.6 mg/L. Higher concentration of organic matter in water is caused increase level of nitrate content. The sulphate ion is one of the major anion found in water produce cathartic effect upon human beings when it is present in higher concentration. The value ranged from 13.5 to 17.8 mg/L. The increase concentration of sulphate content may be contributed due to bio chemical, anthropogenic sources and industrial process etc. In present study fluoride concentration was found within the specified limit and ranged from 0.11 to 0.22 mg/L. Dissolved oxygen in water samples was ranged from 5.6 to 7.8 mg/L. It has been observed that lower concentration of dissolved oxygen content indicate the mild pollution of river water due to organic waste. Chemical oxygen demand was varied from 8.8 to 25.2 mg/L. Higher values of COD at some location indicate that river water was polluted with chemically oxidisable inorganic and organic substances. Biological oxygen demand which is an indicator of bi-oxidisable organic substances was varied from 2.3 to 9.2 mg/L. Analyzed values indicate that Chambal river water at certain location is moderately contaminated by organic wastes.

VI. CONCLUSION:

Water quality of Chambal is suitable for drinking purposes after proper treatment process. The Physico-chemical parameters indicated that the pollution level has under the limits of the set standards prescribed by BIS and WHO 16-17. The analyzed concentrations of various parameters showed alarming situation of contamination. If this situation persists consistently then it may create a problem to human life as well as biodiversity of River. Therefore we should check water quality every six months before monsoon and prepare plans to make the river water more potable for drinking purposes, irrigation and for healthy wild life.

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