

# Deterioration of Water Quality of Chambal River Due To Discharge of Open Drains

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**Abstract-** A study was carried out for evaluating the water quality of open drains and the effect of open drains of Kota city on the water quality of Chambal River by measuring various physicochemical and biological water quality parameters as the wastewater from open drains fall into the Chambal River. The sewerage system of Kota city was also studied during the study. Chambal is the only perennial river of Rajasthan which originates from Madhya Pradesh and flows through Kota district. Total eleven sampling stations were selected for collecting the wastewater samples. The important parameters such as dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD) and Total dissolved solids (TDS) were analyzed for three months during pre monsoon, monsoon and post-monsoon season in months of June to August 2017. From the results, it was found that there is a significant increase, especially in the post-monsoon season, in all the physico-chemical parameters of open drains and Chambal River. The observed results were compared with permissible limits of BIS. It is concluded that measured parameters are beyond the permissible limits. The direct discharging of open drains in the river is creating an alarming situation to the quality of the water of Chambal River.

**Keywords-** Physico-chemical parameters, water quality, sewerage system, Chambal River, open drains

## I. INTRODUCTION

In these years, due to growth in population, industrialization and the waste disposals, the rate of discharge of the pollutants into the In recent years, due to growth in population, industrialization and the waste disposals, the rate of discharge of the pollutants into the environment is higher than the rates of their purification. Wastewater is defined as, the flow of used

water discharged from residential, industrial, and commercial activities which are discharged to treatment plants by a carefully designed and engineered network of pipes. When water is used by public, it becomes polluted with various pollutants. This wastewater becomes the main cause of

waterborne diseases. Taking an example, organic matter can cause oxygen depletion in lakes and rivers. This biological decomposition of organics is very harmful for aquatic life. Including this, there are various pollutants that could exhibit toxic effects on aquatic life and the public. So, it is required to remove the wastewater pollutants to save the environment and to protect public health. Waterborne diseases are also removed through proper wastewater treatment.

Chambal is the only perennial river of Rajasthan and the main source of Kota city as well as the district for the purpose of drinking water, agriculture, and various other uses. It is getting polluted day by day by direct discharging of sewerage and improper sewerage system. The study was carried out for evaluating and analysis of sewerage system of Kota and to know about the effect of open drainage system on the water quality of Chambal River.

## II. STUDY AREA

The study has been carried out in Kota formerly known as Kotah, situated on the banks of Chambal River, is the 25th largest district in the northern Indian state of Rajasthan and it is the third most populous city of Rajasthan after Jaipur and Jodhpur and 47th most populous city of India. It is located 240 kilometers south of Jaipur.

Kota is famous for its coaching institutes for engineering and medical entrance examinations. It is also called "Education City of India". It became a separate princely state in the 17th century. Apart from the several monuments that reflect the glory of the town, Kota is also known for its palaces, parks and gardens.

## III. METHODOLOGY

### Plan, Sampling and Collection

To carry out the study various research papers were studied and information regarding study was collected from various functioning To carry out the study various research papers were studied and information regarding study was

collected from various functioning bodies like Nagar Nigam, UIT, RUIDP, Municipal Corporation etc. Sample locations were decided for collection of samples along the river Chambal where open drains are directly discharging their wastewater into it. The major locations from where we collected the samples are given in table 1.

Table 1: Sample Locations and Sample Codes

S. No.	SAMPLE LOCATION	SAMPLE CODE
1.	Drain near Godavari Temple	S1
2.	Chambal river at Chambal garden	S2
3.	Drain near Dadabari Circle	S3
4.	Jawahar nagar petrol pump drain	S4
5.	Drain Infront of RAC office	S5
6.	Chambal river at Bhitriya Kund	S6
7.	Drain near by St. Paul School	S7
8.	Sajidhera drain	S8
9.	Drain near Ram Dass Circle	S9
11.	Drain near Bhitriya Kund	S10
13.	Chambal river at Station	S11

### Sampling of Wastewater

The sampling and experimental work has been done during the months June 2017 to August 2017. We used plastic buckets and plastic bottles of 1 and 2 liters to collect samples. Bottles and bucket were properly sterilized and rinsed. Samples were collected from different open drains and some locations along Chambal River.

## IV. RESULTS AND ANALYSIS

### Physico-chemical Parameters

The following tables 2 and 3 shows the prescribed limits of different parameters for discharge of sewage/domestic and industrial wastewater into inland surface sources of water after proper treatment as per the Indian Standards.

Table 2: Tolerance Limits for Sewage Effluents discharged into Inland Surface Water (IS: 4764-1973)

S. No.	Characteristics	Tolerance limits
1.	Total suspended solids	Max. 30 mg /l
2.	BOD (5 day at 20°C)	Max. 20mg/l

Table 3: Tolerance limits for Industrial Effluents discharged into Inland Surface Water (IS: 2490-1981)

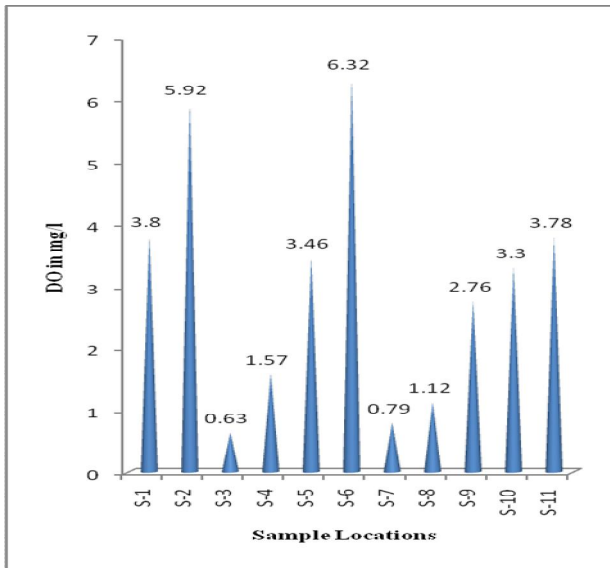
S.No.	Characteristics	Tolerance limit
1.	Total suspended solids	Max. 100 mg/l
2.	pH	5.5 to 9.0
3.	Temperature	Temperature of wastewater should not exceed 40° C in any section of the river within 15 meters downstream from the effluent outlet.
4.	BOD (5 day at 20°C)	Max. 30 mg/l
5.	Oil and grease	Max. 10 mg/l
6.	Sulphides (as S)	Max. 2.0 mg/l
7.	Total residual chlorine	1.0 mg/l
8.	COD	Max. 250 mg/l

The important parameters which were analyzed are dissolved oxygen, biochemical oxygen demand, chemical oxygen demand and total dissolved solids for the wastewater samples collected from locations mentioned as above in table 1, are shown in following table 4:

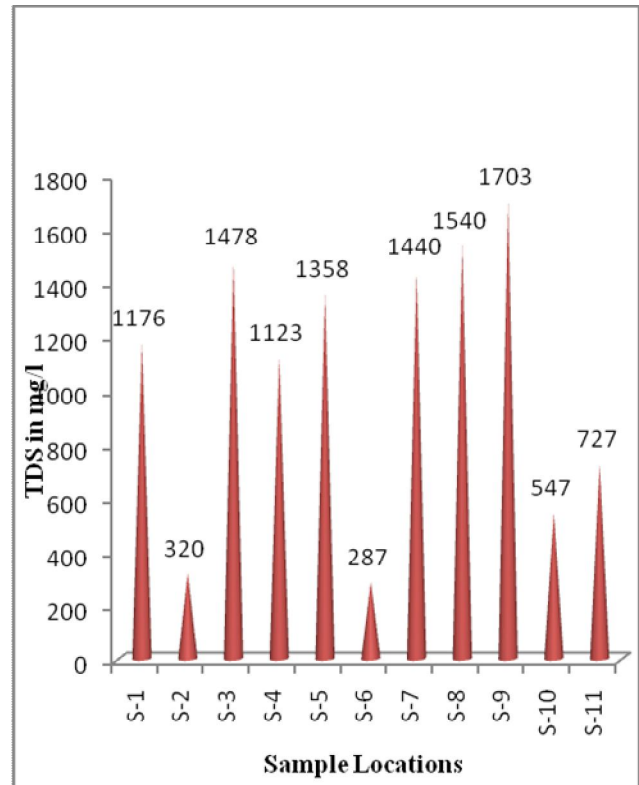
Table 4: Measured Parameters of Samples

Sample No.	Dissolved Oxygen (mg/l)	BOD (mg/l)	COD (mg/l)	TDS (mg/l)
S-1	3.8	254	652	1176
S-2	5.92	25	74	320
S-3	0.63	500	965	1478
S-4	1.57	305	848	1123
S-5	3.46	255	786	1358
S-6	6.32	20	46	287
S-7	0.79	407	1089	1440
S-8	1.12	326	879	1540
S-9	2.76	194	539	1703
S-10	3.3	117	294	547
S-11	3.78	82	185	727

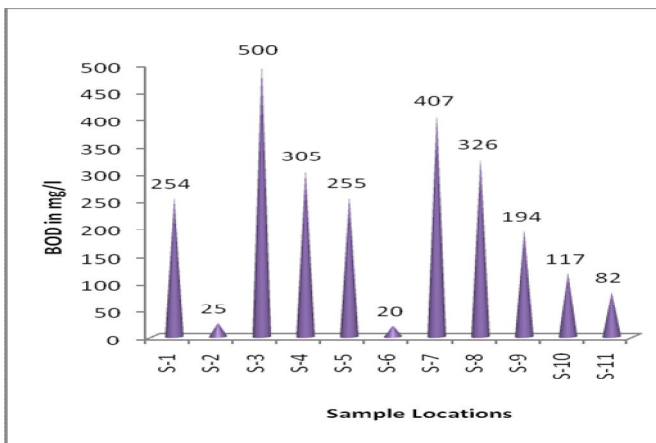
The results obtained as above are being presented in the form of graphs for different parameters, as follows:



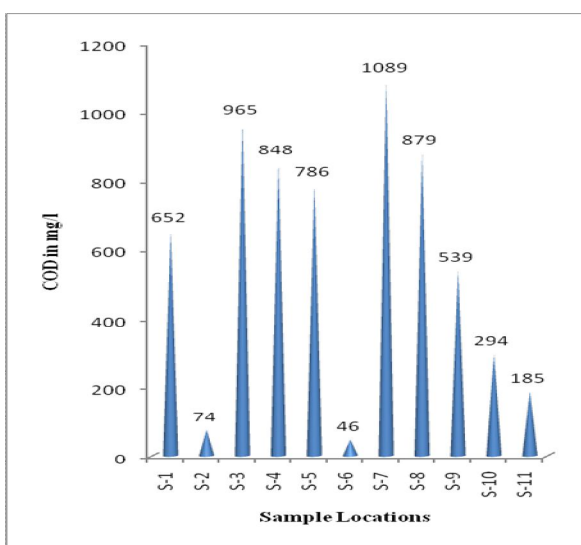
Graph 1: DO values for wastewater samples



Graph 6: TDS values for wastewater samples



Graph 2: BOD values for wastewater samples



Graph 3: COD values for wastewater samples

### V. CONCLUSION

The study of open drainage system and sewerage system of Kota city shows that there is lack of proper system for treatment and drainage of wastewater. It is very necessary to lay down sewer lines in the city as well as to connect the sewer lines with the sewerage system of the city so that the wastewater can be easily transported to the Sewage Treatment Plants (STP) for its treatment before dumping it into the river.

This study also highlights the fact that parameters viz., BOD, COD and TDS of all samples from various locations are beyond the prescribed limits by IS 4764:1973 and IS 2490:1981. These values which are above of their permissible limits may affect the life of aquatic plants and animals.

Therefore, there is an urgent need for some new STP's of deficit capacity in the city. Also there is a need of public and media participation in spreading awareness about it.

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