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WATER QUALITY MONITORING OF KHAM RIVER, AURANGABAD, MAHARASHTRA, INDIA: A STUDY

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ABSTRACT: A study was undertaken to monitor the water quality of Kham River in Aurangabad city. Kham River is one of the major rivers in the city. Study area of 8 km's was selected and 8 sampling stations were located. The study was carried out from July 2016 to January 2018 for 3 month interval. The parameters studied were pH, Dissolved oxygen, Biochemical oxygen demand, Total dissolved solids and Total suspended solids. From this study it was observed that the Kham River is heavily polluted due to presence of untreated sewage in the downstream side of study area. It is concluded that the quality of water is not at all suitable as per prescribed standards for domestic purpose in the downstream of study area.

General Terms: Water quality Monitoring

Keywords: Water quality Monitoring, Kham River, Urban River, Pollution, Urbanization

1. INTRODUCTION

"The progress of rivers to the ocean is not as rapid as that of man to error."- Voltaire. Rivers were the firm place for human civilization from decades. Humans exploited rivers for their survival. The accelerated urbanization leads to urban river pollution causing damage to River ecosystem. However, with accelerated development the river pollution problems are becoming more and more critical [1]

1.1 Study Area

Aurangabad city is major city in Maharashtra and capital of Marathwada region. It spreads over 139 Sq.Kms with more than 1 million population (2011). It is situated on the banks of Kham River in latitude 19° 54' 59'' North and Longitude 75° 21' East. The city stands in the Dudhana valley between Lakenvara range on north and Satara range on south.

Kham River originates at Jatwada hills and flows through Aurangabad city to Godawari River near Yesgavhan. The study area of 8 Kms was selected from downstream of Harsul Lake to Chavani Bridge.

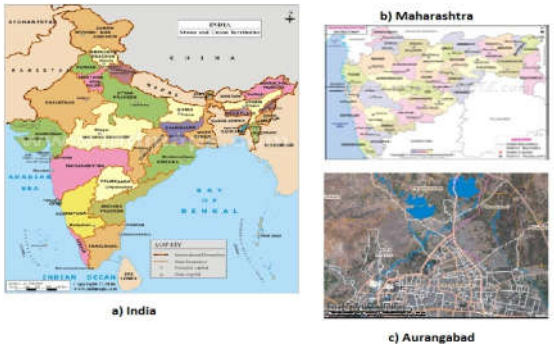
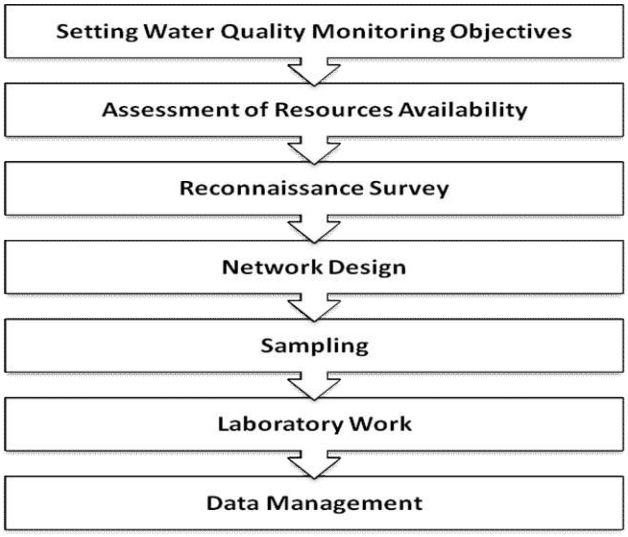


Figure No 1 : Study Area

2. METHODOLOGY

Table No 1: Methodology of Monitoring



2.1 Sampling Stations

Reconnaissance survey was carried out, accessibility for sampling and Pollution point sources were identified and 8 sampling stations were selected.

Station A – Downstream of Harsul Lake
Station B – Wankhede Nagar
Station C – Near Himayat Baug
Station D – Barapula Gate
Station E – Mehmood Gate
Station F – Makai Gate
Station G – Before Chavani Bridge
Station H – After Chavani Bridge

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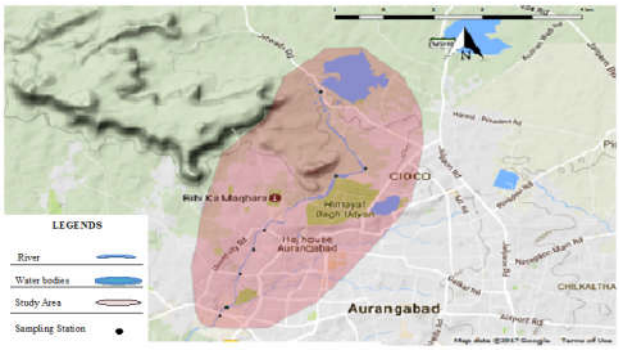

Figure No 2: General view of Study Area

The network design consists of selecting sampling locations such that these sampling location should cover entire study area. The sampling stations were selected such that the variation of water quality can be obtained from the upstream to downstream of study area and at the major polluting sources.

2.2 Sampling

The method prescribed by Maharashtra Pollution Control Board was studied, based on the recommendation the sampling techniques were selected. 8 sampling stations were selected along the stretch of river in study area. Plastic buckets as sampling containers and plastic bottles of 1 liter were used to store the sample. The samples were collected for water quality analysis from July 2016 to January 2018 for period of 18 months with 3 months interval. The samples were collected in morning hours from 6.00 AM to 8.00 AM. The parameters such as pH, Dissolved oxygen, Biochemical oxygen demand, Total dissolved solids and total suspended solids were analyzed. The parameters including Dissolved oxygen and Total dissolved solids were tested at the sampling station and pH, Biochemical oxygen demand and Total suspended solids were analyzed in the MIT college Laboratory. Standard method for testing prescribed by the Indian Standard Code 10500 was followed for testing purpose.

3. RESULTS AND DISCUSSION

The studied parameters are compared with the standards prescribed by the World health organization; FEPA and Central Pollution Board of India are listed (Table 2, 3, 4 & 5)

Table No 2: Standard Permissible Limits

Standards	WHO	FEPA	CPCB
Parameters			
DO	6.5 – 8.5		2.0 – 5.0
BOD	10	10	2.0 - 30
pH	6.5 – 8.5	6.0 – 9.0	6.5 – 9.0
TSS	50	30	25
TDS			500

Table No 3: Mean of Laboratory Test Results in Rainy Season

Sample	DO	BOD	pH	TDS	TSS
Station A	7.60	16.50	7.89	1264.40	315.60
Station B	7.70	16.50	8.03	1284.80	321.20
Station C	6.70	19.50	7.33	1172.80	293.30
Station D	7.50	13.50	7.72	1235.20	308.20
Station E	7.20	40.50	7.51	1201.60	300.40
Station F	6.70	22.50	7.59	1214.40	303.60
Station G	6.90	46.50	7.24	1158.40	289.60
Station H	6.80	40.50	7.38	1180.80	295.20

Table No 4: Mean of Laboratory Test Results in Winter Season

Sample	DO	BOD	pH	TDS	TSS
Station A	6.20	17.10	7.97	584	285.20
Station B					
Station C	2.12	32.30	7.63	991	257.20
Station D	2.31	28.90	7.21	782	266.90
Station E	2.33	59.60	7.47	818	248.10
Station F	2.38	50.20	7.87	785	251.80
Station G	1.98	61.10	7.43	849	221.70
Station H	1.92	54.30	7.39	702	231.50

Table No 5: Mean of Laboratory Test Results in Summer Season

Sample	DO	BOD	pH	TDS	TSS
Station A	5.94	17.90	7.10	354	168.10
Station B					
Station C	1.32	35.60	7.33	834	216.90
Station D	1.52	32.40	7.62	646	233.80
Station E	1.16	62.10	7.18	631	213.10
Station F	1.01	48.70	7.67	605	226.21
Station G	1.11	63.40	7.82	624	201.30
Station H	1.04	59.60	7.78	614	219.70

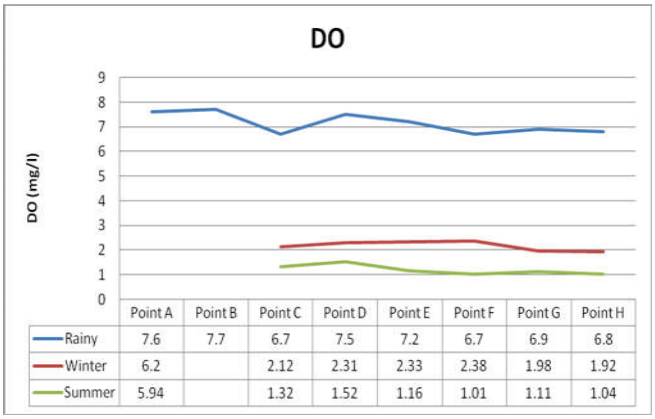

Figure No 3: Graph showing variation in Dissolved oxygen

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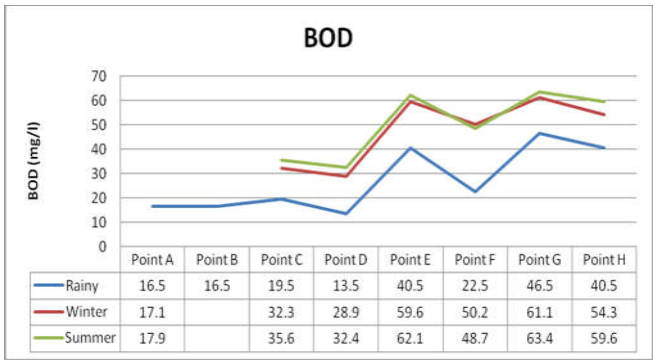

	Point A	Point B	Point C	Point D	Point E	Point F	Point G	Point H
Rainy	16.5	16.5	19.5	13.5	40.5	22.5	46.5	40.5
Winter	17.1		32.3	28.9	59.6	50.2	61.1	54.3
Summer	17.9		35.6	32.4	62.1	48.7	63.4	59.6

Figure No 4: Graph showing variation in Biochemical oxygen demand

The water quality is good in the upstream reach of the river as compared to the downstream reach. The DO of the water is more in rainy season as compared to winter and summer season, this is due to dilution of the sewage water in rainy season. The DO level depletes in summer as the water in the river is only the dry weather flow. The CPCB standard is hardly achieved in summer and winter due to less DO. The BOD level in the river is less in upstream as compared to downstream. Similarly the BOD increases in summer as there is only the dry weather flow in the river. The BOD level as per standard of CPCB should not exceed beyond 30 mg/l, but it is only achieved in the upstream, sampling station. The pH of the water is on basic side. The TSS level is more in rainy season and less in summer and winter as sediments are carried in the river during runoff. Similarly the TDS level in the river water is more in rainy season and less in summer and winter.

From the laboratory results, the pH the water samples ranged from 7.10 to 8.03. This directly implies that the water samples are basic in nature. The BOD values for the Station C to Station H ranges from 13.5 mg/l to 63.4 mg/l and this high value is due to waste discharge in the river.

4. CONCLUSION

The results of the study indicate that the Kham River is heavily polluted in the downstream part of study area. Aquatic life is observed at the upstream side of study area which is non -polluted. The River is polluted due to disposal of untreated sewage in the river at number of point sources. Illegal construction and sand excavation activities at various portions of river resulted into obstruction of flow of river and stagnation of water results into DO depletion. This pollution may result in adverse health impact on the residents along the vicinity of the river. Also it may lead to ground water pollution. It is indeed needed to undertake a program to monitor the water quality of Kham River and restrict the illegal practices along the river basin.

5. ACKNOWLEDGMENTS

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