



## ESTIMATION OF SEASONAL VARIATIONS IN PHYSICOCHEMICAL AND BIOLOGICAL PARAMETERS OF TAPI RIVER WATER IN SURAT REGION. GUJARAT. INDIA

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BOD, DO, Tapi river, pH, Total Coliforms organisms.

### ABSTRACT

Tapi River water sample has been analyzed for the parameter of pH, BOD, DO, Conductivity and Total Coliform Organisms. River water samples were seasonally collected at the location of Savjibhai Korat Bridge, Kapodra – Utran Bridge, Amroli Bridge, Dabholi- Jahngirpura Bridge and Weir- Cum- Causeway Bridge. Physico chemical test parameters such as pH, BOD and Conductivity observed in increasing order from location 1 to location 5. Tapi river water does not complies the BOD and Total coliform Organism test parameters, hence Tapi river water does not corresponds with the CPCB classification of river water Class A, B or C Category.

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### INTRODUCTION

Tapi River is one of the major rivers in central India with the length around 724 km, Tapi river flows from east to west. Tapi River covers three states Madhypradesh, Maharastra and Gujarat<sup>1</sup>. Presented Research paper focus on Tapi river water quality in surat city. Total15 river water samples were collected from five locations and seasonal analysis was carried out in the month of March 2016, July 2016 and December 2016 for the parameter of pH, BOD, DO, Conductivity and Total Coliforms organisms. Analytical test results of Physico chemical and Biological parameters were identified and Analyzed with the CPCB Classification of River water (CPCB, 1994)<sup>8</sup> and evaluate the Status of the Tapi river water quality in Surat Region.

### MATERIAL AND METHOD

Total 15 River water samples were collected from five locations during the month of March-2016, july-2016 and December-2016. Sampling site was identified with using GPS Tracking. 10500(2012) specifications was followed for water sampling and analysis. Water quality was evaluated as per specifications given in GPCB guideline for river water<sup>8</sup>.

**Sampling Time:** Water sampling was carried out in the second week of March 2016, July 2016 and December 2016. Sampling was carried out between 10.0 am to evening 6.0 pm.



Fig 1 Tapi River water Flow in Surat City.

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**Sampling Process:** IS 3025: part 1 and IS 1622:1981(reaffirmed: 2009) was followed for sampling and

preservation of water for chemical and Microbiological analysis respectively.



Fig 2 Tapi river water flow at Savjibhai Korat Bridge.Surat.



Fig 3 Tapi River water flow at Kapodra – Utran bridge.Surat



Fig 4 Tapi River water flow at Amroli Bridge. Surat



Fig 5 Tapi River water flow at Dabholi-Jahangirpura Bridge. Surat

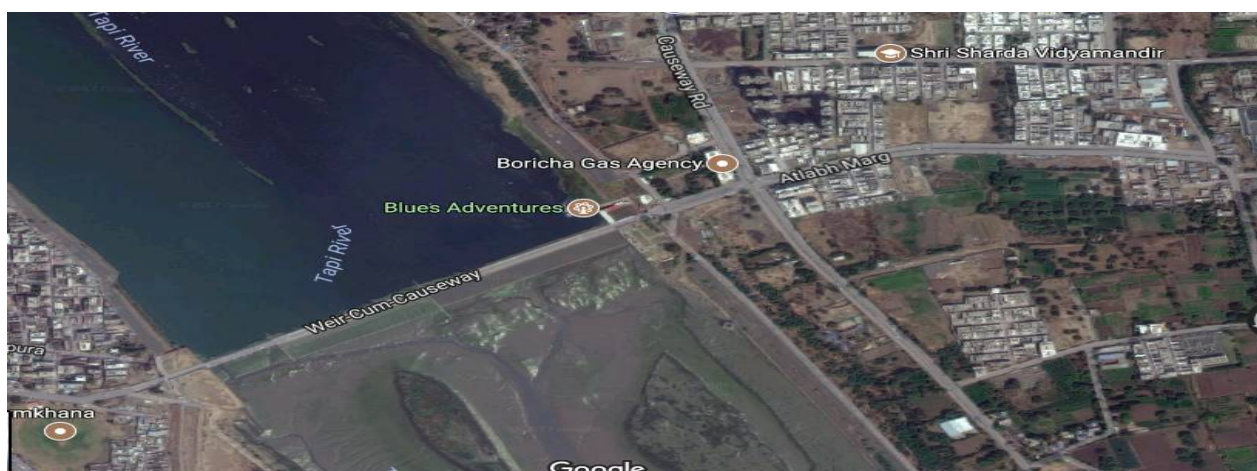


Fig 6 Tapi River water flow at Weir Cum Causeway Bridge. Surat

Table 1 Sampling Site Location and GPS Identification

Location	Area	GPS Identification
1	Savjibhai Korat Bridge	21°14'00.2"N 72°53'32.7"E (Jal Drasan Society)
2	Kapodra – Utran bridge	21°13'16.3"N 72°51'58.3"E (Anand Nagar, Kapodra)
3	Amroli bridge	21°14'01.2"N 72°50'33.7"E (Old GIDC , Patel Nagar)
4	Dabholi-Jahangirpura Bridge	21°13'57.5"N 72°48'04.4"E (Dabholi)
5	Weir- cum – Causeway	21°13'04.1"N 72°48'04.2"E (Rander)

Table 2 River water classification as per GPCB guideline

Grade	Description
A	Drinking water source without conventional treatment but after disinfections
B	Outdoor bathing Organized
C	Drinking water source with conventional treatment followed by disinfections
D	Propagation of wildlife, fisheries
E	irrigation, industrial cooling, controlled waste disposal

Table 3 Characterization of River water quality based on CPCB guideline.

Sr. no	Characteristics	A	B	C	D	E
1	Dissolved oxygen (DO), mg/l, Min	6	5	4	4	-
2	Biochemical oxygen demand (BOD), mg/l, Max	2	3	3	-	-
3	Total Coliforms organism MPN/100 ml, Max.	50	500	5000	-	-
4	pH Value	6.5-8.5	6.5-8.5	6-9	6.5-8.5	6.5-8.5
5	Electrical Conductivity, Micromhos.cm, Max	-	-	-	-	2250

Table 3 Parameters and Standard methods.

Sr No	Test Parameter	Unit	Method
1	pH Value	NA	IS3025 Part-11
2	BOD	ppm	IS 3025 Part-44
4	DO	ppm	IS 3025 Part-38
5	Conductivity	µs/cm	IS 3025 Part-14
6	Total Coliforms organism MPN/100 ml,	MPN/100 ml,	APHA(22ndEdi)

## RESULT AND DISCUSSION

Tapi river water sample from Location 1, Indicated pH range of water between 7.1 to 7.7, BOD value was observed between 2 to 3 ppm, DO value was evaluated between 9.3 to 11.3 ppm, river water conductivity was observed between 458

to 526 µs/cm. Total Coliform organism MPN/100 ml was found >1600.

Analysis of Tapi river water sample from Location 2, Evaluated pH range of water between 7.3 to 7.8, BOD value was Calculated between 2 to 3 ppm, , DO value was obtained between 11.3 to 12.6 ppm, , Tapi river water conductivity was obtained between 394 to 587 µs/cm. Total Coliform organism MPN/100 ml was found >1600.

Physicochemical and Biological test parameter of Location 3, observed pH range between 7.5 to 7.8, BOD value was estimated between 2 to 3 ppm, DO value was observed between 9.6 to 11.8 ppm, Tapi river water conductivity was obtained between 463 to 516 µs/cm. Total Coliform organism MPN/100 ml was estimated >1600.

chemical and Microbiological test parameter of Location 4, observed pH range between 7.6 to 8.2, BOD value was found between 2 to 3 ppm, , DO value was observed between 11.4 to 12.3 ppm, Tapi river water conductivity was obtained between 397 to 588 µs/cm. Total Coliform organism MPN/100 ml was observed >1600.

Analysis of Tapi river water sample from Location 5, observed pH value of water between 7.8 to 8.4, BOD value was Calculated between 2 to 4 ppm, DO value was obtained between 9.7 to 11.6 ppm, , river water conductivity was obtained between 410 to 634 µs/cm. Total Coliform organism MPN/100 ml was evaluated >1600

Table 4 Chemical and Biological test results of Location 1

Location	1					
Site	Savjibhai Korat Bridge					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.
pH	7.7	7.3	7.1	7.7	7.4	7.1
BOD(ppm)	3	2	2	3	2	2
DO(ppm)	9.3	10.6	11.3	11.3	10.4	9.3
Conductivity(µs/cm)	458	485	526	526	490	458
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600

**Table 5** Chemical and Biological test results of Location 2

Location	2					
Site	Kapodra – Utran bridge					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.
pH	7.8	7.5	7.3	7.8	7.5	7.3
BOD(ppm)	3	2	2	3	2	2
DO(ppm)	11.3	11.8	12.6	12.6	11.9	11.3
Conductivity(µs/cm)	412	394	587	587	464	394
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600

**Table 6** Chemical and Biological test results of Location 3

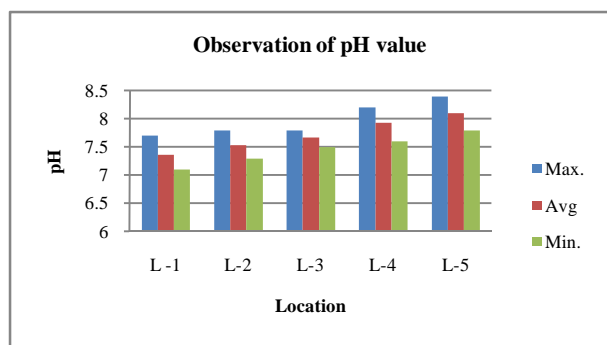
Location	3					
Site	Amroli bridge					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.
pH	7.8	7.7	7.5	7.8	7.7	7.5
BOD(ppm)	3	3	2	3	3	2
DO(ppm)	9.6	10.7	11.8	11.8	10.7	9.6
Conductivity(µs/cm)	463	471	614	614	516	463
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600

**Table 7** Chemical and Biological test results of Location 4.

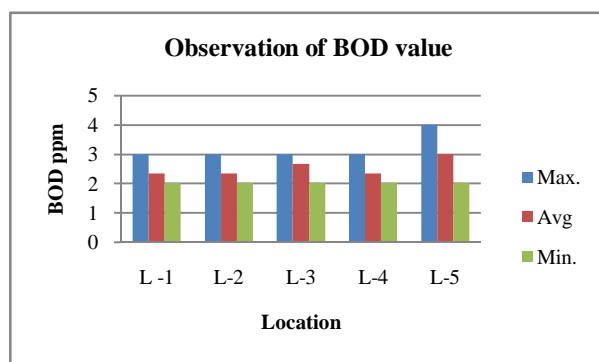
Location	4					
Site	Dabholi-Jahangirpura Bridge					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.
pH	8.2	8.0	7.6	8.2	7.9	7.6
BOD(ppm)	3	2	2	3	2	2
DO(ppm)	11.4	11.6	12.3	12.3	11.8	11.4
Conductivity(µs/cm)	397	421	588	588	469	397
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600

**Table 8** Chemical and Biological test results of Location 5.

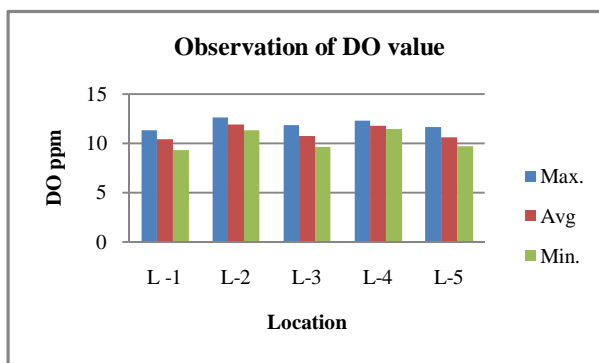
Location	5					
Site	Weir- cum –Causeway					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.
pH	8.4	8.1	7.8	8.4	8.1	7.8
BOD(ppm)	4	3	3	4	3	2
DO(ppm)	9.7	10.4	11.6	11.6	10.6	9.7
Conductivity(µs/cm)	425	410	634	634	490	410
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600



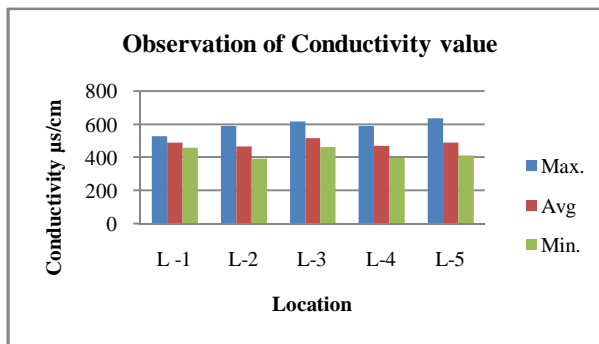
**Fig 7** Observation of pH value



**Fig 8** Observation of BOD value



**Fig 9** Observation of DO value



**Fig 10** Observation of Conductivity value

## CONCLUSION

Maximum value of pH, BOD, DO, and Conductivity were observed 8.4 ppm, 4 ppm, 12.6 ppm, and 636 µs/cm respectively, Total Coliform organism MPN/ 100 ml was estimated > 1600 in every locations. Seasonal analysis of physico chemical and Biological test parameters of Tapi River water sample does not compliance the Category A , B or C river water Classification given by GPCB which indicates the requirement of water treatment and disinfection process before use for drinking purpose.

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