

EVALUATION OF SEASONAL VARIATIONS IN CHEMICAL AND BIOLOGICAL PARAMETERS OF VISHWAMITRI RIVER WATER IN VADODARA CITY, GUJARAT, INDIA

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ABSTRACT

Vishwamitri River water sample has been analyzed for the parameter of pH, BOD, DO, COD, Phosphate, Conductivity and Total Coliform Organisms. River water samples were seasonally collected at Sama-Savil Road, Sayajibaug Road, Vinoba Bhav Road, Shankheshwar Parshwanath Marg and Vishwamitri Road locations. Chemical and Microbiological Test results does not classified the Vishwamitri river water in Class-A,B or C Category, hence it is recommended water treatment and disinfection process of river water before its use for drinking purpose.

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INTRODUCTION

Vishwamitri River is a seasonal river flows from east to west. Vishwamitri River originated from Pavagadh hill and flows through Vadodara city and ends at Gulf of Khambath. Presented Research paper focus on Vishwamitri river water quality in Vadodara city. In order to estimates the water quality ,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, COD, DO, Phosphate, Conductivity and Total Coliforms organisms. Analytical test results of Physico chemical and Biological parameters was compared with the CPCB Classification of River water (CPCB, 1994)⁷ and Understand the Status of the Vishwamitri river water quality in Vadodara Region.

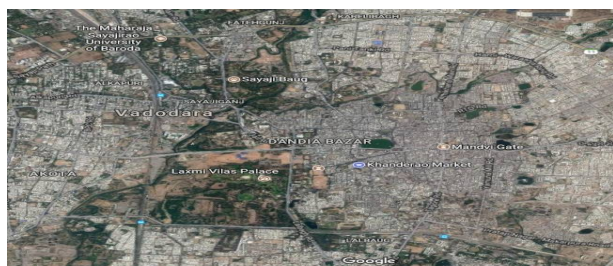


Fig 1 Vishwamitri River water Flow in Vadodara City.

Table 1 Sampling Site Location and GPS Identification

Location	Area	GPS Identification
1	Sama-Savil Road	22°20'17.2"N 73°12'14.5"E
2	Sayajibaug Road	22°19'03.8"N 73°11'24.7"E
3	Vinoba Bhav Road	22°18'29.6"N 73°11'20.4"E
4	Shankheshwar Parshwanath Marg	22°17'54.8"N 73°10'57.9"E
5	Vishwamitri Road	22°17'07.6"N 73°10'16.7"E

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 tracked with GPS identifications. Water sample were collected and analyzed as per IS 10500(2012) specifications. Water quality was evaluated as per specifications given in Indian Standard guideline IS 10500 (2012) and APHA

Table 2 Parameter and Method

Sr No	Test Parameter	Unit	Method
1	pH Value	NA	IS3025 Part-11
2	BOD	mg/L	IS 3025 Part-44
3	COD	mg/L	IS 3025 Part-58
4	DO	mg/L	IS 3025 Part-38
5	Phosphate	mg/L	APHA(22ndEdi)
6	Conductivity	µs/cm	IS 3025 Part-14
7	Total Coliforms organism	MPN/100 ml,	APHA(22ndEdi)

Sampling Time: Water sampling was carried out in the second week of March 2016, July 2016 and December 2016. Sampling schedule was morning 9.30 am to evening 5.30 pm.

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Sampling Process: In order to achieve accurate test results, sample preservation method is highly required. Sampling container and sampling technique also have an impact on Analytical test results. Indian standard method (IS) and APHA method was followed for sampling and preservation of water sample

RESULT AND DISCUSSION

Vishwamitri river water sample from Location 1 indicated pH value of water in the range of 6.8 to 7.1, calculated range of BOD value was 9.4 to 10.6 mg/L, COD value was obtained in the range between 4 to 6 mg/L, DO value was evaluated between 10.8 to 11.8 mg/L, estimated Phosphate value was found between 0.41 to 0.59 mg/l, river water conductivity was found in the range of 484 to 572 μ s/cm. Total Coliform organism MPN/100 ml was found >1600.

Analysis test result of Vishwamitri river water sample from Location 2 shows pH value of water between 6.8 to 7.1, BOD value was found between 9.1 to 9.8 mg/L, range of COD value was observed between 4 to 8 mg/L, DO value was estimated between 10.4 to 11.2 mg/L, Phosphate value was found in the range of 0.46 to 0.68 mg/l, Vishwamitri river water conductivity was evaluated between 511 to 592 μ s/cm. Total Coliform organism MPN/100 ml was found >1600.

Physicochemical and Microbiological test parameter of Location 3 observed pH value between 6.9 to 7.3, BOD value was calculated in the range of 0.85 to 0.92 mg/l, COD value was obtained between 6 to 9 mg/L, DO value was obtained between 9.8 to 10.9 mg/L, Phosphate value was found between 5.1 to 7.2 mg/L, conductivity value of Vishwamitri river water was obtained between 544 to 613 μ s/cm. Total Coliform organism MPN/100 ml was estimated >1600.

Chemical and Microbiological test parameter of Location 4 shows the pH range between 7.1 to 7.3, BOD value was found between 8.1 to 8.8 mg/L, COD value was obtained between 7 to 9 mg/L, DO value was observed between 9.3 to 10.5 mg/L, Phosphate value was evaluated between 0.64 to 0.76 mg/l, Vishwamitri river water conductivity was obtained between 582 to 654 μ s/cm. Total Coliform organism MPN/100 ml was observed >1600.

Analysis of Vishwamitri river water sample at Location 5, observed pH value of water in the range of 7.2 to 7.3, BOD value was estimated between 8.5 to 9.4 mg/L, COD value was observed in the range between 7 to 8 mg/L, DO value was calculated between 9.8 to 10.7 mg/L, Phosphate value was evaluated between 0.69 to 0.82 mg/l, river water conductivity was observed in the range of 590 to 673 μ s/cm. Total Coliform organism MPN/100 ml was evaluated >1600

Table 3 Chemical and Biological test results of Location 1

Location		1					
Site		Sama-Savil Road					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.	
pH	7.1	6.9	6.8	7.1	6.9	6.8	
BOD(mg/L)	9.4	10.1	10.6	10.6	10.0	9.4	
COD(mg/L)	6	4	4	6	4.7	4	
DO(mg/L)	10.8	11.2	11.8	11.8	11.3	10.8	
Phosphate(mg/L)	0.59	0.53	0.41	0.59	0.51	0.41	
Conductivity(μ s/cm)	542	484	572	572	533	484	
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600	

Table 4 Chemical and Biological test results of Location 2

Location		2					
Site		Sayajibaug Road					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.	
pH	7.1	6.8	6.8	7.1	6.9	6.8	
BOD(mg/L)	9.1	9.5	9.8	9.8	9.5	9.1	
COD(mg/L)	8	5	4	8	5.7	4	
DO(mg/L)	10.4	10.8	11.2	11.2	10.8	10.4	
Phosphate(mg/L)	0.68	0.62	0.46	0.68	0.59	0.46	
Conductivity(μ s/cm)	563	511	592	592	555	511	
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600	

Table 5 Chemical and Biological test results of Location 3

Location		3					
Site		Vinoba Bhawe Road					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.	
pH	7.3	7.1	6.9	7.3	7.1	6.9	
BOD(mg/L)	8.5	8.7	9.2	9.2	8.8	8.5	
COD(mg/L)	9	7	6	9	7.3	6	
DO(mg/L)	9.8	10.4	10.9	10.9	10.4	9.8	
Phosphate(mg/L)	0.72	0.68	0.51	0.72	0.64	0.51	
Conductivity(μ s/cm)	597	544	613	613	585	544	
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600	

Table 6 Chemical and Biological test results of Location 4

Location		4					
Site		Shankheshwar Parshwanath Marg					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.	
pH	7.3	7.2	7.1	7.3	7.2	7.1	
BOD(mg/L)	8.1	8.4	8.8	8.8	8.4	8.1	
COD(mg/L)	9	8	7	9	8.0	7	
DO(mg/L)	9.3	9.7	10.5	10.5	9.8	9.3	
Phosphate(mg/L)	0.76	0.72	0.64	0.76	0.71	0.64	
Conductivity(μ s/cm)	610	582	654	654	615	582	
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600	

Table 7 Chemical and Biological test results of Location 5

Location		5					
Site		Vishwamitri Road					
Parameter	Summer	Winter	Monsoon	Max.	Avg.	Min.	
pH	7.3	7.3	7.2	7.3	7.3	7.2	
BOD(mg/L)	8.5	9.4	9.1	9.4	9.0	8.5	
COD(mg/L)	8	7	7	8	7.3	7	
DO(mg/L)	9.8	10.1	10.7	10.7	10.2	9.8	
Phosphate(mg/L)	0.82	0.74	0.69	0.82	0.75	0.69	
Conductivity(μ s/cm)	623	590	673	673	629	590	
Total Coliforms organism MPN/100 ml, Max	>1600	>1600	>1600	>1600	>1600	>1600	

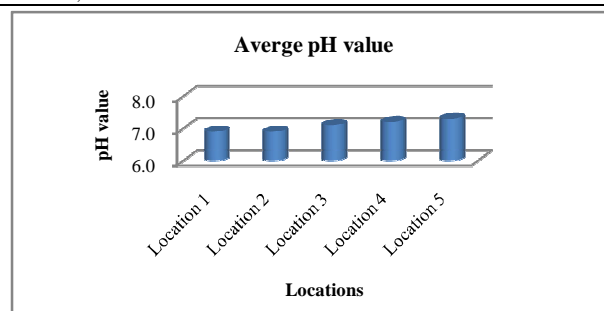


Fig 2 Observation of Average pH value

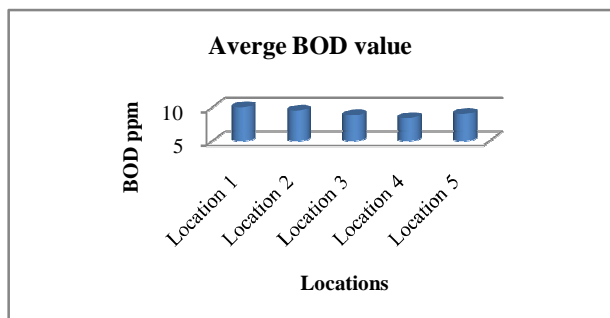


Fig 3 Observation of Average BOD value

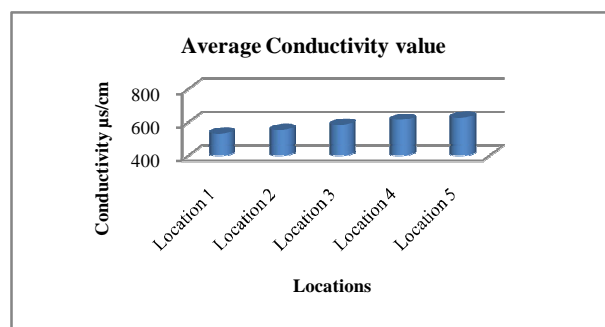


Fig 7 Observation of Average Conductivity value

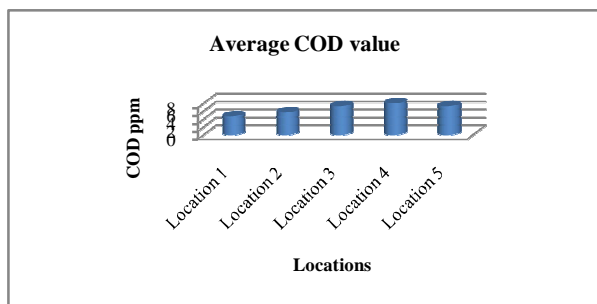


Fig 4 Observation of Average COD value

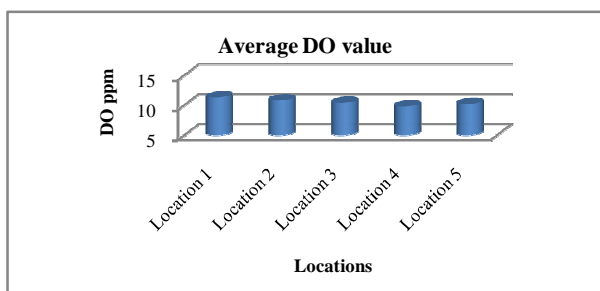


Fig 5 Observation of Average DO value

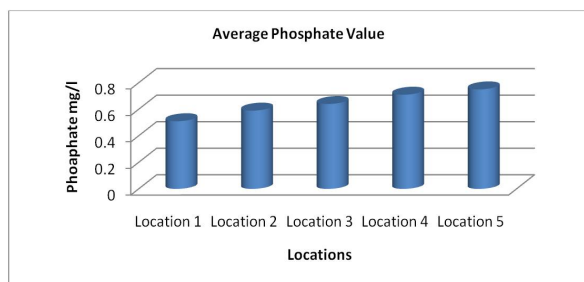


Fig 6 Observation of Average Phosphate value

CONCLUSION

Maximum value of pH, BOD, COD, DO, Phosphate and Conductivity were observed 7.3, 10.6 mg/L, 9.0 mg/L, 11.8 mg/L, 0.82 mg/l and 673 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 Vishwamitri 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 as a drinking purpose.

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