

Physico-Chemical Assessment of Pavana River in Pimpri Chinchwad Area (Pune) in Maharashtra (India)

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Abstract: A Physico Chemical Parameters monitoring of Pavana Rivers in Pimpri Chinchwad area pune. In Pune city there are three major rivers named Pavana, Mula and Mutha. For this assessment sampling points were selected from Chinchwad to Ravet and the samples were collected along the course of rivers. The analysis was carried out for the parameters namely pH, Temperature, COD, BOD, DO, TDS, Turbidity in three season i.e Pre Monsoon, Monsoon and Post Monsoon. In many places the continuous discharge of industrial effluents and sewage are being discharged into the rivers; which probably exceeds the contamination in river water body. The results obtained in this investigations revealed that the discharge of untreated industrial effluents and sewage have contributed considerable pollution in the rivers Pavana; hence the water of these rivers is unsafe for consumption or human use and needs preventive action and it also effects on the aqua culture and environment.

Keywords: Pavana River, Physico chemical, COD, BOD

1. Introduction

A. General

The population of Pimpri Chinchwad increases day by day due to this pollution of water also increases. Pimpri Chinchwad divides the industrial area and Residential area. Industries flush effluents in the lifeline and the only source of water for Pimpri-Chinchwad. The pollution begins from Ravet, 10 km northwest of the industrial belt, where the water is used by the municipal corporation to supply to the cities. The river is polluted with mixing of untreated domestic sewage and industrial effluents from the more than 3,500 industrial units. As per research conducted by various institutes, 40 million liters a day (MLD) of untreated effluents is being discharged into Pavana. While the Pimpri Chinchwad area generates 277 MLD of effluents, the corporation at present is able to treat only 210 MLD. The analysis of Physico Chemical properties is help to identify the quality of water body. The water from Pavana River is used for the domestic means water supply purpose, industrial purpose and agricultural purpose. If the quality of water is not good it is not used for domestic, industrial and agricultural purpose.

B. Pavana River

Pune is the largest city in Maharashtra, India. In this city major rivers are flow Pavana River is one of them which is flow in Pimpri Chinchwad area. It originates from western ghat of lonawala and meet to Mula Mutha River. The total Length of Pavana River is 60kms. Now a days the Pavana River gets polluted because of the increasing population, industrialization and civilization. The analysis of Physico Chemical parameters are important for identifying the status of Pavana River.

2. Methodology

The water sample is collected in three season i.e monsoon (Month of September), pre monsoon (Month of February) and post monsoon (Month of November) at the section of Ravet to Chinchwad. The method of collection of sample is grab sampling method and the samples are collected in sterile bottles for the testing of parameters like Temperature, pH, TDS, DO, COD, BOD, Turbidity (AS PER APHA, 2012) Five sampling station are selected i.e Station 1 – Ravet Punawale Bandhara, Station 2 – Walhekar Wadi, Station 3 – Keju Bai Bridge, Station 4 – Thergaon, Station 5 – Chinchwad. Five samples are collected from each station one sample from center of river width, two from edges of river width and two from intermediate of center and edges.

3. Result and Discussion

The analysis taken in three season the values of parameters shown in Table No.1, Table No. 2, Table No.3

1) Temperature

The surface water temperature is recorded by using of thermometer on the site immediately after the collection of sample. Highest temperature observed is 30.1°C at station 4 in pre monsoon season and lowest temperature observed is 26.2° C at station 3 in monsoon season.

2) pH

The fluctuation of pH is observed throughout the study. pH is the negative concentration of hydrogen ions. If pH is less than 7 the sample is acidic in nature, if it is greater than 7 sample is basic in nature and if it is 7 sample is neutral. The permissible limit of pH is 6.5 to 8.5 as per

BIS. The highest value of pH 8.98 is observed at station 4 in pre monsoon season. The lowest value of pH 6.22 is observed at station 3 in pre monsoon season.

3) **DO**

Dissolved Oxygen is important parameter in water it is useful for the survival of aquatic life. Highest DO observed is 4.90mg/l at station 2 in monsoon season and lowest DO observed is 2.89mg/l at station 5 in post monsoon season.

4) **Turbidity**

The Turbidity means presence of suspended particulate matters which effects on the scatter of light passes into water. Highest turbidity observed is 31.82mg/l at station 5 in monsoon season and lowest temperature observed is 15.30 at station 4 in pre monsoon season.

5) **Total Dissolved Solid (TDS):**

The TDS means the particulates which is present in water in dissolved state. Highest TDS observed is 109mg/l at station 3 & 4 in monsoon season and lowest TDS observed is 43.1mg/l at station 1 in pre monsoon season.

6) **Chemical Oxygen Demand (COD):**

The COD is recorded by using of COD reflux meter in laboratory. Highest value observed is 151mg/l at station 2 in post monsoon season and lowest temperature observed is 91.5mg/l at station 3 in monsoon season.

7) **Biochemical Oxygen Demand (BOD):**

The BOD variations are observed throughout the season. Highest BOD observed is 45mg/l at station 5 in post monsoon season and lowest BOD observed is 33mg/l at station 3 in monsoon season.

Table 1: Characteristics of Pavana River at Various sampling stations in Pre Monsoon Season 2016

Sites	Temperature (°C)	pH	DO	Turbidity (NTU)	TDS (mg/l)	COD (mg/l)	BOD (mg/l)
1A	29.2	7.98	3.21	25.10	43.2	119	36.2
1B	30.0	8.12	3.33	23.90	53.8	106	38.6
1C	29.7	7.88	3.10	23.80	52.6	111	35.0
1D	28.0	8.09	3.50	19.80	54.2	119	36.9
1E	29.4	8.0	3.05	17.50	21.9	125	36.0
2A	27.3	8.12	4.31	20.80	74.1	135	43.1
2B	28.0	8.06	4.21	19.00	81.5	139	37.3
2C	28.7	8.11	4.39	22.30	45.6	128	38.5
2D	28.3	8.21	4.75	17.80	70.5	118	39.0
2E	29.0	8.18	4.38	20.50	66.8	130	41.0
3A	29.3	6.22	3.24	20.10	70.3	110	41.9
3B	28.0	7.03	3.32	19.80	60.2	103	43.1
3C	28.9	6.87	3.31	19.50	59.2	117	42.0
3D	28.5	6.93	3.10	21.10	59.8	119	41.6
3E	28.4	6.98	3.28	23.60	71.3	123	39.8
4A	29.2	8.98	4.25	16.70	80.3	129	39.3
4B	30.1	8.64	4.15	15.30	50.2	128	35.6
4C	29.5	8.38	3.99	17.90	63.8	121	38.0
4D	28.9	8.83	4.34	17.90	60.1	130	41.3
4E	29.4	8.89	3.89	18.50	53.9	143	41.3
5A	29.8	8.13	3.82	21.10	75.9	121	40.0
5B	30.0	8.22	3.81	18.90	79.3	125	44.0
5C	29.7	8.56	3.58	26.50	66.5	119	44.5
5D	29.4	8.68	3.98	20.10	47.3	133	41.8
5E	29.4	8.79	3.93	19.80	58.2	137	41.9

Table 2: Characteristics of Pavana River at Various sampling stations in Monsoon Season 2016

Sites	Temperature (°C)	pH	DO	Turbidity (NTU)	TDS (mg/l)	COD (mg/l)	BOD (mg/l)
1A	26.6	8.62	3.28	28.0	44.8	110	35
1B	27.1	8.56	3.10	27.45	56.3	98	36
1C	27.2	8.36	3.33	26.40	54.3	101	33
1D	26.7	8.52	3.80	23.80	55.2	103	35
1E	26.9	8.40	3.30	21.50	54.2	112	36
2A	26.9	8.37	4.81	28.50	80.1	123	41
2B	27.3	8.42	4.54	23.60	90.3	120	36
2C	26.8	8.54	4.72	29.60	51.3	112	35
2D	26.7	8.57	4.81	21.10	79.4	97	37
2E	26.8	8.52	4.90	28.90	72.5	104	36
3A	26.9	7.18	3.13	26.20	109	98.3	42
3B	27.1	7.21	3.24	25.30	99.7	91.5	42
3C	26.2	7.21	3.20	25.60	99.1	101	41
3D	26.7	7.16	3.11	27.20	98.3	110	39
3E	27.5	7.20	3.11	27.30	103	113	38
4A	27.0	8.32	4.80	24.91	109	121	36
4B	26.9	8.40	4.83	24.98	70.8	123	33
4C	26.7	8.56	4.42	25.21	95.0	118	36
4D	27.0	8.60	4.66	25.38	89.3	121	38
4E	27.2	8.58	4.18	25.71	80.6	138	39
5A	26.8	8.18	4.21	29.40	93.6	119	38
5B	26.5	8.32	4.32	27.63	96.5	118	43
5C	26.7	8.36	4.30	31.82	77.4	109	44
5D	27.0	8.17	4.29	23.84	67.8	123	41
5E	27.1	8.41	4.24	26.34	89.2	121	40

Table 3: Characteristics of Pavana River at Various sampling stations in Post Monsoon Season 2017

Sites	Temperature (°C)	pH	DO	Turbidity (NTU)	TDS (mg/l)	COD (mg/l)	BOD (mg/l)
1A	26.5	8.10	2.98	26.70	43.8	138	39
1B	26.1	7.86	3.33	26.10	55.3	119	40
1C	26.0	7.56	3.56	24.80	53.8	123	39
1D	26.1	8.11	3.80	20.80	53.9	134	38
1E	26.3	8.15	3.24	18.20	52.5	141	37
2A	25.3	7.95	4.19	24.50	75.3	140	44
2B	25.1	8.10	3.97	21.00	83.2	151	42
2C	26.0	8.32	4.05	25.60	49.9	138	41
2D	26.1	7.84	4.53	18.90	72.5	128	40
2E	26.2	7.69	4.23	24.50	67.1	140	43
3A	26.5	7.11	3.06	21.30	85.1	115	43
3B	26.4	7.31	3.10	20.50	71.3	109	45
3C	25.8	7.14	3.00	20.60	70.5	131	42
3D	26.1	6.98	2.98	23.80	73.8	129	44
3E	25.3	6.56	2.91	24.20	82.9	133	43
4A	26.5	8.66	4.10	18.90	85.3	134	41
4B	27.1	8.87	3.98	19.20	56.8	132	39
4C	26.2	8.66	3.88	21.30	67.2	124	41
4D	26.3	8.91	4.11	20.80	69.8	136	42
4E	26.8	8.79	3.67	22.60	63.3	148	42
5A	26.5	8.10	3.28	17.30	80.5	129	41
5B	26.1	8.32	3.14	16.10	83.9	131	44
5C	26.0	8.35	3.01	24.50	68.8	128	45
5D	26.1	8.19	2.89	18.30	51.9	145	43
5E	26.3	8.53	3.21	19.50	63.4	141	42

4. Conclusion

The analysed some Physico Chemical parameters are exceeds permissible limit. It is not directly use for drinking purpose. The treatment is required for river water.

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