Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 06, pp.51668-51673, June, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

CORRELATION-REGRESSION ANALYSIS FOR PHYSICO-CHEMICAL CHARACTERISTIC OF PAVANA RIVER IN PIMPRI-CHINCHWAD CITY (PUNE) OF MAHARASHTRA STATE (INDIA)

***Mr. Lakhanpal S.Kendre and Prof. Sagar M.Gawande**

Department of Environment, PG student, Anantrao Pawar, College of Engineering & Research, Parwati, Pune-411009, India

ARTICLE INFO

Article History:
Received 09th March, 2017
Received in revised form
12th April, 2017
Accepted 16th May, 2017
Published online 20th June, 2017

Key words:

Pavana River, Physico-Chemical, Parameters, Results, Characteristics, Water quality, correlation analysis, Regression analysis.

ABSTRACT

The study was aimed to know water quality from analysis of physico-chemical characteristics of Pavana River, Pune from September 2016 to February 2017. Due to the increase in population and industrialization, there shall be a necessity to understand the present status of Pavana River. The study was also aimed to find strong correlation between two parameters in three seasons. The experiment was carried out for three season i.e. Monsoon, Post-monsoon and Pre-monsoon. The water sample is collected from river as the depth changes. The physicochemical parameters such as pH, DO, COD, BOD, Alkalinity, TDS, TSS, TS, Turbidity, Temperature has been studied during analysis. A correlation study has been carried out among the all possible pairs of 10 physico-chemical parameters of river water quality. All the correlations indicate that different parameters are strongly interrelated to each other. A correlation coefficient and regression provides an excellent tool for calculating of various water quality parameters within reasonable degree of accuracy.

Citation: Mr. Lakhanpal S.Kendre and Prof. Sagar M.Gawande, 2017. "Correlation-regression analysis for physico-chemical characteristic of pavana river in pimpri-chinchwad city (Pune) of Maharashtra state (India)", *International Journal of Current Research*, 9, (06), 51668-51673.

INTRODUCTION

General

Nowadays, water pollution is a major global problem. It is an acute problem almost in all major rivers and dams in India. Water pollution is increasing and becoming severe day-by-day and posing a great risk to human health and other living organisms. Water pollution can be defined as 'The contamination of water bodies by physicochemical and biological pollutants into the water making it unfit for drinking and use in other purposes'. Point source pollution refers to contaminants that enter a waterway from a single, identifiable source, such as a pipe or ditch while non-point source pollution refers to diffuse contamination that does not originate from a single discrete source. The change water quality also varies due to a change in chemical composition of the underlying sediments and aquifer. About one third of the drinking water requirement of the world is obtained from surface sources like rivers, dams, lakes and canals. In urban areas, the careless disposal of industrial effluents and other wastes in rivers and lakes may contribute greatly to the poor quality of river water.

******Corresponding author:* **Mr. Lakhanpal S.Kendre,**
Department of Environment, PG student, Anantrao Pawar, College of Engineering & Research, Parwati, Pune-411009, India.

Pollution of river in India has now reached to a point of crisis due to unplanned urbanization and rapid growth of industrialization.

Pavana River

It is a fact that good water quality produces healthier humans than one with poor water quality. Pavana River is life line of Pimpri-Chinchwad city and its water is used for domestic and agriculture purposes. Therefore, effective maintenance of water quality is required through appropriate measurements. Physico-chemical and micro-biological characteristics may describe the quality of water. Therefore, this study was carried out for the actual status of Pavana River from literature survey. In addition, with increasing number of industries and stakeholders of the river, the concern over the quality has also grown up and hence warranted for the present investigation. The Pavana River originates from the Western Ghats, about 6 km South of Lonavala. Flowing eastwards initially, it becomes southbound and passes through the suburbs of Dehu, Chinchwad, Pimpri and Dapodi before it's confluence with the Mula river near Sangvi. An earthfill gravity dam forms the Pavana reservoir. The dam, constructed in 1972, is 1,329 m (4.360 ft.) long and 42.37 m (139 ft.) high, with a gross storage capacity of 30,500 km^3.

MATERIALS AND METHODS

In order to analyze the effects of pollution, stretch of the river, starting from Pavana Dam to Dapodi various station points were selected for sampling. Samples must be taken from locations which are representative of the water from sources, treatment plants, storage facilities, distribution network and household connections. Samples were collected for three seasons i.e. Pre-Monsoon, Monsoon & Post-Monsoon. Monsoon sample was collected in first week of September 2016, Post Monsoon sample was collected in first week of November 2016 and Pre-Monsoon sample was collected in first week of February 2017. The samples were of Grab samples & collected in sterilized bottles using standard procedure (APHA 2012). Five samples from each site is collected, two from edge, one from center and two from intermediate of edge and center with measuring depth of each. All other procedure was followed according to APHA (2012). Water sample was collected from 6 stations and they were as following Station 1 (Dapodi), Station 2 (Sangvi), Station 3 (Sudarshan Nagar), Station 4 (Kasarwadi), Station 5 (Pimple Saudagar), Station 6 (Pimpri).

RESULTS

The results were taken in three seasons i.e. Monsoon, Post-Monsoon, Pre-monsoon season and shown in table 1, table 2 and Table 3 respectively.

Correlation and regression analysis

The most commonly used techniques for investigating the relationship between two quantitative variables are correlation. Correlation is the mutual relationship between two variables. Direct correlation exists when increase or decrease in the value of one parameter is associated with a corresponding increase or decrease in the value of other parameter. Inter relationship between two parameters is quantified by a numerical measure, call as coefficient of linear correlation. The correlation coefficient measures the degree of association or correlation that exists between two variables, one taken as dependent variable. The correlation is said to be positive when rise in one parameter causes the rise in other parameter and it is negative when rise in the one parameter causes the fall in other parameter. The linear correlation coefficient (r) has a value between +1 to -1.A value of +1 represents a perfects positive correlation. A value of -1 represents a perfects negative correlation. The correlation between the parameter is characterized as strong, when it is in the range of +0.8 to +1.0 and -0.8 to -1.0, moderate when it is having value in the range of +0.5 to +0.8 and -0.5 to -0.8 and weak when it is having value in the range of 0.0 to +0.5 and 0.0 to -0.5.

Correlation for Monsoon season

In Monsoon, the highest positive correlation(r = 0.931) is found between Total Suspended Solids (T.S.S.) and Turbidity, highest negative correlation (r = -0.698) is found between Temperature and Turbidity. The distribution of pH was significantly correlated (r > 0.50) with C.O.D. The distribution of Total Dissolved Solids (T.D.S.) was significantly correlated (r > 0.60) with Total Solids (T.S.). The distribution of Dissolve Oxygen (D.O.) was significantly correlated (r = -0.537) with Total Suspended Solids (T.S.S.). Very poor positive correlation was observed or almost no correlation was observed between Temperature and Total Dissolved Solids (T.D.S.) (r = 0.022), Temperature and Total Solids (T.S.) (r = 0.025), Depth and Total Solids (T.S.) (r = 0.026), Chemical Oxygen Demand (C.O.D.) and Total Dissolved Solids (T.D.S.) (r = 0.030), Turbidity and Alkalinity (r = 0.046), Total Dissolved Solids (T.D.S.) and Alkalinity (r = 0.050), Biochemical Oxygen Demand (B.O.D.) and Turbidity (r = 0.060), Total Dissolved Solids (T.D.S.) and Turbidity (r = 0.073). The poor negative correlation is found between Total Solids (T.S.) and Turbidity (r = -0.008), Temperature and Alkalinity (r = -0.055), Depth and Turbidity (r = -0.057), Dissolved Oxygen (D.O.) and Chemical Oxygen Demand (C.O.D.) (r = -0.058), Depth and Total Dissolved Solids (T.D.S.) (r = -0.065), Depth and pH (r = -0.095). A value of the correlation coefficient close to +1 indicates a strong positive linear relationship (i.e. one variable increases with the other).

Correlation in Post-monsoon season

In Post-Monsoon, the highest positive correlation (r = 0.935) is found between Total Dissolved Solids (T.D.S.) and Total Solids (TS), highest negative correlation (r = -0.554) is found between Temperature and pH. The distribution of COD was significantly correlated (r = 0.911) with TSS. The distribution of Total Dissolved Solids (T.D.S.) was significantly correlated (r = 0.769) with Turbidity. The distribution of TDS was significantly correlated (r = 0.675) with Turbidity. Correlation between BOD and TDS was r = 0.554. Very poor positive correlation was observed or almost no correlation was observed between Temperature and DO (r = 0.029), BOD and COD (r = 0.038), BOD and TSS (r = 0.051), pH and TS (r = 0.057), Depth and Turbidity (r = 0.061), pH and COD (r = 0.064), COD and TDS (r = 0.073). The poor negative correlation is found between Temperature and COD (r = -0.001), Turbidity and Alkalinity (r = -0.014), Temperature and Alkalinity (r = -0.018), pH and TDS (r = -0.036), Temperature and TSS (r = -0.088), DO and Alkalinity (r = -0.095).

Correlation in Pre-monsoon season

In Pre-Monsoon, the highest positive correlation (r = 0.734) is found between COD and TSS, highest negative correlation (r = -0.463) is found between Depth and Temperature. The distribution of Temperature was significantly correlated (r = 0.622) with TS. The distribution of Temperature was significantly correlated (r = 0.609) with Alkalinity. The distribution of TSS was significantly correlated (r = 0.553) with TS. Very poor positive correlation was observed or almost no correlation was observed between pH and TS (r = 0.008), DO and Alkalinity (r = 0.010), BOD and Alkalinity (r = 0.039), BOD and TSS (r = 0.058), COD and Turbidity (r = 0.062), COD and TDS (r = 0.080), BOD and TDS (r = 0.093).
The poor negative correlation is found between TDS and Turbidity (r = -0.007), Turbidity and Alkalinity (r = -0.011), TSS and Alkalinity (r = -0.026), Depth and DO (r = -0.026), Depth and TDS (r = -0.027), BOD and COD (r = -0.051), Temperature and TSS (r = -0.057), Temperature and pH (r = -0.098).

Regression Analysis

The regression analysis explored the pattern of the relationship between the variables and the subsequent application of correlation analysis determined the extent to which the variables are related. The different dependent characteristics of water quality were calculated using the regression equation and by substituting the values for the independent parameters in the equations. The linear regression analyses have been carried out for the water quality parameters which are found to have better and higher level of significance in their correlation coefficient, the regression equations obtained from the analysis are given below. The greater the value of regression coefficient, the better is the fit and more useful the regression variables. Let x and y be only two variables (water quality physico-chemical parameters in the present study) and (Xi, Yi) be n pairs of observed value of these variables. (i = 1, 2, 3-----, n). Then the correlation coefficient between the variables X and Y is given by well-known relation.

-------------(1)

Where the summations are taken over 1 to n. (n = Number of observations). Thevalues of empirical parameters ‘a’ and ‘b’ were calculated with the help of eq. (2) and (3).

-------------------(2)

-------------------------- (3)

Where,

and----------------- (4)

Keeping the above observations in mind, a linear relationship is proposed as

------------------------- (5)

Here,

r= Regression Coefficient from graph

r^2= Regression Coefficient from mathematics

‘a’ and ‘b’= Empirical parameters.

The regression equation obtained from Monsoon season between TSS and Turbidity (r = 0.931) is

Table 1. Physico-chemical characteristics of Pavana river at various sampling station in monsoon season in year 2016

SITE	WIDTH	DEPTH	TEMPRATURE	PH	DO	BOD	COD	TDS	TSS	TS	TURBIDITY	ALKALINITY
1A	136.5	1.72	27.3	7.1	1.2	10	32	338	23.5	400	4.6	170
1B	136.5	1.71	27.3	7.09	0.83	10	32	360	24.25	334	5.3	170
1C	136.5	1.89	27.3	7.11	2.89	80	32	340	23.75	334	4.2	180
1D	136.5	1.77	27.3	7.1	1.03	50	32	356	24	367	5.8	200
1E	136.5	1.79	27.3	7.04	0.97	10	32	332	22.5	334	5.2	170
2A	51.88	0.19	27.5	6.99	0.09	60	28	346	41.75	400	5.9	190
2B	51.88	0.46	27.4	6.99	0.19	50	28	386	37.5	667	6	220
2C	51.88	0.51	27.3	6.97	0.11	50	28	438	48.5	800	6.6	220
2D	51.88	0.64	27.5	6.99	0.16	50	28	394	42.75	400	5.6	210
2E	51.88	0.23	27.4	6.99	0.18	30	28	414	52.25	634	6.2	220
3A	52.06	0.35	26.9	6.97	0.12	70	32	360	64	367	20.8	200
3B	52.06	1.01	26.9	6.97	0.16	10	32	382	58.5	434	16.4	190
3C	52.06	1.14	26.9	6.93	0.23	40	32	328	61.75	400	19	190
3D	52.06	1.23	26.9	6.95	0.17	30	32	362	57.25	334	22.4	210
3E	52.06	1.2	26.9	6.99	0.12	80	32	388	67.5	400	27.7	180
4A	44.89	1.39	27	7.02	0.09	90	24	392	134.75	533	31.6	210
4B	44.89	1.53	26.9	7	0.1	80	24	360	112.75	667	29.2	210
4C	44.89	1.56	26.9	7.06	0.13	40	24	362	128	433	43.3	200
4D	44.89	1.42	27	7.01	0.11	60	28	384	134.25	467	35.9	200
4E	44.89	1.45	26.9	7.04	0.1	80	24	400	140	567	41.4	210
5A	59.97	0.98	27.1	6.94	0.81	80	16	360	52.5	334	6.2	200
5B	59.97	1.14	27.1	6.95	0.8	120	16	320	48.25	467	9.1	190
5C	59.97	1.25	27.1	6.91	0.87	140	24	332	48	334	8	190
5D	59.97	1.18	27.2	6.98	0.9	100	16	340	51.75	434	8.5	180
5E	59.97	1.09	27.1	6.95	0.82	120	24	374	47.5	467	9.6	190
6A	83.39	1.72	27.1	6.88	0.78	20	20	390	9.25	734	4.4	210
6B	83.39	2.3	27.1	6.89	0.82	10	20	328	10.25	534	3.8	210
6C	83.39	2.61	27.1	6.9	0.81	100	20	240	13	467	6.1	190
6D	83.39	2.59	27.1	6.84	0.8	170	20	590	7.5	800	2.9	190
6E	83.39	1.53	27.1	6.89	0.8	10	20	300	11.75	400	2.7	270
		Min.	26.9	6.84	0.09	10	16	240	7.5	334	2.7	170
		Max.	27.5	7.11	2.89	170	32	590	140	800	43.3	270
		Avg.	27.13	6.98	0.57	61.67	26	366.53	53.30	474.76	13.48	199

Y = 0.2914X - 2.0542 or

Turbidity = 0.2914 (TSS) – 2.0542 ....(from fig. no. 1)

Similarly, regression equation obtained from Post-monsoon season between TDS and TS (r = 0.935) is,

Y = 1.1132X + 16.174 or

TS = 1.1132 (TDS) + 16.174 …….(from fig. no. 2)

regression equation obtained from Pre-monsoon season between COD and TSS (r = 0.734) is,

Y = 0.99X - 92.212 or

TSS = 0.99 (COD) - 92.212 ..….(from fig. no. 3)

Table 2. Physico-Chemical characteristics of pavana river at various sampling station in post-monsoon season in year 2016

Site	Width	Depth	Temprature	PH	DO	BOD	COD	TDS	TSS	TS	Turbidity	Alkalinity
1A	136.5	1.72	22.3	7.01	0.6	20	80	300	15	400	4.8	230
1B	136.5	1.71	22.3	7.05	3.01	10	28	320	12.5	367	5.2	230
1C	136.5	1.89	22.4	7	0.17	30	60	300	22.5	400	4.3	240
1D	136.5	1.77	22.3	7.04	0.92	20	44	340	19.5	400	4.9	230
1E	136.5	1.79	22.4	7.05	0.79	20	68	300	20.25	434	4.7	240
2A	51.88	0.19	22.6	6.88	0.81	60	60	340	32	334	5.1	210
2B	51.88	0.46	22.8	6.92	0.8	10	40	340	24.5	400	5.2	200
2C	51.88	0.51	22.8	6.89	0.59	40	64	320	27.5	334	5.6	230
2D	51.88	0.64	22.7	6.91	2.4	20	48	300	7.5	300	5.5	200
2E	51.88	0.23	22.8	6.91	0.62	30	208	340	265	534	5.4	180
3A	52.06	0.35	22	6.96	1.72	10	68	300	45	400	5.5	170
3B	52.06	1.01	22	6.93	0.65	40	80	320	30	334	5.5	240
3C	52.06	1.14	22.2	6.93	0.68	20	72	300	38	400	5.2	190
3D	52.06	1.23	22.1	6.95	0.7	20	80	340	36.25	367	4.9	180
3E	52.06	1.2	22.2	6.95	0.68	30	64	300	41.5	334	5.4	220
4A	44.89	1.39	21.9	7.01	0.8	50	84	520	88.25	600	12	210
4B	44.89	1.53	21.9	7.02	0.81	40	72	480	79.5	567	7.4	220
4C	44.89	1.56	21.9	7.02	0.79	10	80	520	81	567	9.1	220
4D	44.89	1.42	21.9	7.02	0.79	20	80	560	95	634	8	210
4E	44.89	1.45	22	7	0.79	40	88	580	100	634	10	210
5A	59.97	0.98	22.5	6.84	0.92	40	56	520	22.5	600	6.7	230
5B	59.97	1.14	22.5	6.85	0.6	70	56	540	17.5	600	6.8	210
5C	59.97	1.25	22.5	6.83	0.88	50	60	520	19.25	634	7.3	220
5D	59.97	1.18	22.5	6.83	0.81	60	56	500	20.75	567	7.1	210
5E	59.97	1.09	22.5	6.85	0.86	50	60	540	24	634	6.6	210
6A	83.39	1.72	22.4	6.88	0.89	30	56	320	9.5	334	5.7	200
6B	83.39	2.3	22.3	6.88	0.81	10	64	260	5	300	5.8	190
6C	83.39	2.61	22.3	6.89	0.74	10	64	260	5	267	6.5	190
6D	83.39	2.59	22.4	6.89	0.74	30	52	280	7.5	267	5.4	200
6E	83.39	1.53	22.3	6.85	1.5	20	56	300	5	300	5	210
		Min.	21.9	6.83	0.17	10	28	260	5	267	4.3	170
		Max.	22.8	7.05	3.01	70	208	580	265	634	12	240
		Avg.	22.32	6.93	0.929	30.33333	68.26667	382	40.55833	441.4333	6.22	211

Table 3. Physico-Chemical Characteristics of Pavana River At Various Sampling Station in Pre-Monsoon Season in year 2017

Site	Width	Depth	Temprature	PH	DO	BOD	COD	TDS	TSS	TS	Turbidity	Alkalinity
1A	136.5	1.72	24.9	6.8	1.1	30	116	496	2	364	4.5	240
1B	136.5	1.71	24.9	6.84	0.89	30	56	334	2.5	380	4.2	250
1C	136.5	1.89	24.9	6.86	0.23	40	124	248	1.25	394	4.2	250
1D	136.5	1.77	24.8	6.82	0.48	60	120	324	3.1	400	4.6	240
1E	136.5	1.79	24.9	6.84	0.92	40	108	340	2.2	367	4.2	250
2A	51.88	0.19	25.4	6.88	0.59	50	132	284	11.25	500	4.8	230
2B	51.88	0.46	25.3	6.84	0.16	60	124	360	9.5	467	4.6	230
2C	51.88	0.51	25.4	6.81	0.35	50	120	270	7.25	430	5	230
2D	51.88	0.64	25.4	6.87	0.1	80	132	388	8.5	414	4.3	230
2E	51.88	0.23	25.3	6.91	0.68	70	116	372	162.75	550	4.8	250
3A	52.06	0.35	24.3	6.92	0.52	60	140	344	16.75	407	5.6	230
3B	52.06	1.01	24.1	6.86	1.26	40	112	328	7	327	4.5	220
3C	52.06	1.14	24.3	6.83	1.01	30	120	310	5.8	334	4.9	230
3D	52.06	1.23	24.2	6.89	0.81	40	124	332	6.6	400	5.2	230
3E	52.06	1.2	24.3	6.9	0.84	50	120	332	8.5	367	4.7	220
4A	44.89	1.39	24.1	6.93	0.58	30	140	300	40.5	367	5.1	190
4B	44.89	1.53	24.1	6.94	0.61	70	136	324	24.25	367	5.3	200
4C	44.89	1.56	24.1	6.88	0.6	50	140	316	38	334	5.6	210
4D	44.89	1.42	24	6.89	0.51	40	144	310	33.75	324	5.7	200
4E	44.89	1.45	24	6.99	0.4	80	132	320	20.5	364	5.6	220
5A	59.97	0.98	24.4	6.76	0.22	60	120	314	59.5	374	7	230
5B	59.97	1.14	24.5	6.79	0.12	70	128	368	41.25	380	6.9	240
5C	59.97	1.25	24.4	6.8	0.19	60	120	344	47.5	367	6.9	240
5D	59.97	1.18	24.4	6.79	0.23	70	124	338	52	400	7.1	230
5E	59.97	1.09	24.4	6.78	0.23	40	124	324	54.25	334	7.5	240
6A	83.39	1.72	24.3	6.81	0.36	60	120	352	14.5	400	4.6	220
6B	83.39	2.3	24.2	6.77	0.29	30	132	302	16.75	380	4.5	220
6C	83.39	2.61	24.3	6.75	0.16	40	304	352	251.25	514	4.6	220
6D	83.39	2.59	24.3	6.8	0.38	30	108	320	40	354	4.4	220
6E	83.39	1.53	24.2	6.79	0.41	70	64	286	6.5	340	4.4	220
		Min.	24	6.75	0.1	30	56	248	1.25	324	4.2	190
		Max.	25.4	6.99	1.26	80	304	496	251.25	550	7.5	250
		Avg.	24.53	6.84	0.50	51	126.66	331.06	33.18	390	5.17	227.67

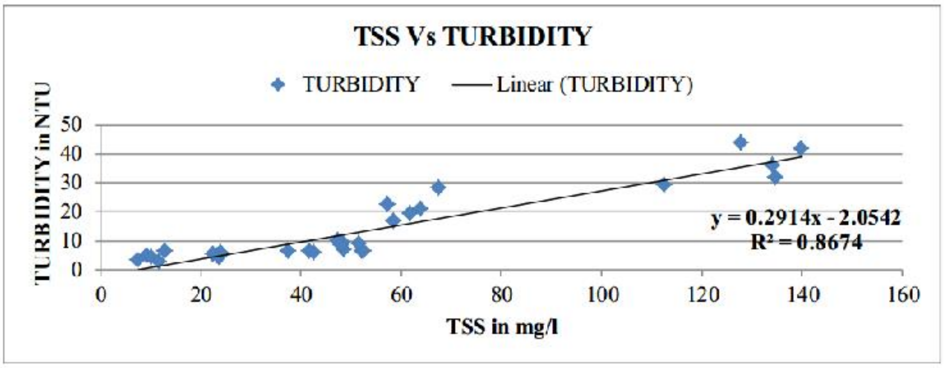

Figure 1. Correlation between TSS and Turbidity in Monsoon Season

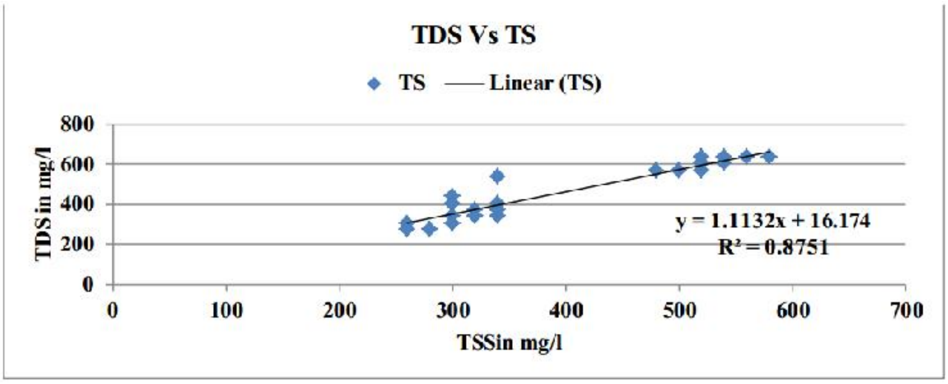

Figure 2. Correlation between TDS and TS in Post-monsoon season

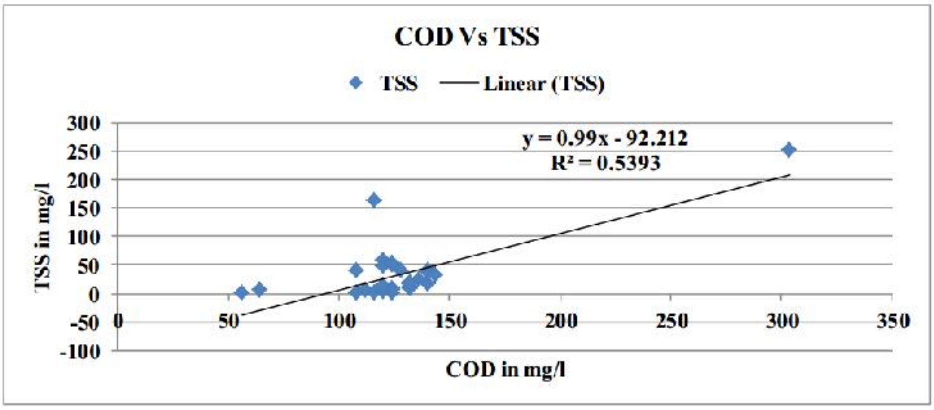

Figure 3. Correlation between COD and TSS in Pre -monsoon season

Conclusion

Based on the study carried out it be concluded that the poor water quality may be due to Civil industrial effluents in case of Pavana River. The correlation coefficients give the interrelationship between the parameter, therefore correlation coefficient was calculated. In monsoon season, strong positive correlation was found between TSS and Turbidity. In Post-monsoon season, two strong positive correlations were found. First one was between TDS and TS while second was between COD and TSS. In Pre-monsoon season slightly strong positive correlation was found between COD and TSS. Dissolved oxygen was found very critical at many places of these rivers and at some places it is below the detectable level causing a threat to aquatic life. High level of BOD and COD confirm excess of this oxygen demanding waste. It is cleared from the present findings that the aquatic environment Pavana river flowing through the Pimpri-Chinchwad city shows increasing load of pollution and lead remedial measure. There is a need to have proper collection and treatment of waste. As also to restore the river in wetland there is a need to regulate the flow and degrade the deposited material.

Acknowledgment

I am very thankful to the guide for providing me valuable information which is very useful for this paper. My thanks and appreciations also go to my project guide in developing the paper and people who have willingly helped me out with their abilities.

REFERENCES

Research Journal of Animal, Veterinary and Fishery Sciences Vol. 1(1), 11-16, February (2013) *Res. J. Animal, Veterinary & Fishery Sci.* The Seasonal Fluctuation of

Physico-Chemical parameters of River Mula- Mutha at Pune, India and their Impact on Fish Biodiversity Chandanshive Navnath Eknath Zoology Department, Fergusson College, Pune, MS, INDIA

International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 2, Issue 9, September 2013 Copyright to IJIRSET www.ijirset.com 4349 physico-chemical characteristics of river water of ganga in middle ganga plains Dr. LeenaSingh & Prof. (Dr.) S.K Choudhary Assistant Professor, Department of Chemistry, Galgotias College of Engineering. & Technology, Greater Noida, U.P, India Department of Botany T.M. Bhagalpur University, Bhagalpur, Bihar, India.

Physico-chemical assessment of water quality of river chambal in kota city area of rajasthan state (india) Nitin Gupta, S.M.Nafees, M.K.Jain and S. Kalpana Environmental Chemistry Laboratory, P.G. Department of Chemistry, Govt. College, Kota, Rajasthan.

Qualitative analysis of surface water of panchganga river (ms), india Sanindhar Shreedhar Gaikwad and Nitin Anandrao Kamble Department of Zoology, Shivaji University, Kolhapur- 416 004, (MS) India.

PHYSICOCHEMICAL ANALYSIS OF MULA MUTHA RIVER PUNE Pali Sahu1, Sonali Karad, Sagar Chavan and Sourabh Khandelwal Asst.Prof. Environmental Engineering, Civil Department, VIIT, Pune, India U.G. Student, Civil Department, VIIT, Pune, India.

Dr. Roohollah Behzad Department of Environmental Science. University of Pune Dr. Ravindra G. Jaynhaye Professor of the Department of Geography. University of Pune Dr. Praveen G. Saptarshi Retired Professor of the Department of Environmental. University of Pune Assessment of Water Quality in Manas Lake (Pune-India) With Reference to the Human Impact.

Hydrobiological Study of Algae of an Urban Freshwater River JAFARI, N G; GUNALE, V RDepartment of Environmental Sciences, University of Pune, India. Department of Botany, University of Pune, India.

Water quality and sediment analysis at selected locations of Pavana river of Pune district, Maharashtra Mane A. V., Pardeshi R. G., Gore V. R., Walave R. L., Manjrekar S. S. and Sutar G. N. Department of Environmental Sciences, Fergusson College, Pune Fergusson College, Pune Department of Chemistry, Fergusson College, Pune. (*Journal of Chemical and Pharmaceutical Research*, 2013, 5(8):91-102 Research Article ISSN: 0975-7384 CODEN (USA) : JCPRC5)

Comparative Review of Physico chemical Assessment of Pavana River River Nidhi Jain,2R.K. Shrivastava Department of Science and Humanity, Genba-Sopanrao Moze Institute of Technology, Pune University, India P.G. Department of Environmental Science, Government Model Science College, Center of Excellence (NAAC Accredited (‘A’ Grade, Jabalpur (M.P.), India. (*IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT),* e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 8, Issue 6 Ver. III (Jun. 2014), PP 25-30).

Kanase, D.G., S.D.Jadhav, R.W.Jawale, M.S.Kadam, A study on some physicochemical characteristics of flowing water of Major River in Pune city.

Patil. P.N, Sawant. D.V, Deshmukh. R.N “ Physico-chemical parameters for testing of water – A review” International Journal of Environmental Sciences Volume 3, No 3, 2012

Inderdeep Kaur and Deen Dayal Verma, “Physicochemical and Microbiological Study of River Water of Ganga and Yamuna in Allahabad” *Asian Journal of Science and Technology,* ISSN: 0976-3376 Vol. 5, Issue 11, pp.669-673, November, 2014

Manohar G. Gavit, Mohd. Shahnawaz, Manish K. Sangale, Halimabi A. Kureshi and Avinash Bade, (2013), *International Journal of Current Research*, 5(02), Page 232-235.

APHA 2012 EDITION.

Megha Agarwal *et al*. Linear Regression And Correlation Analysis of Water Quality Parameters: A Case Study Of River Kosi at District Rampur, India. *IJIRSET*, Volume 2, Issue 12, December 2013

Shivasharanappa *et al*, study on the physico-chemical characteristics of ground water of bidar city and its industrial area, *JACPT*, volume 3, issue 1, 2012.

Vijay Kumar K. *et al*. Correlation-regression model for physico-chemical quality of groundwater in the South Indian city of Gulbarga. *AJEST*, Vol. 6(9), pp. 353-364, September 2012.

NARKHEDE S. R. *et al*. Correlation and regression study on physicochemicalparameters of underground water indifferent wards of south zone of Bhusawal, Dist- Jalgaon. (M. S.). *Int. J. Chem. Sci*., 9(3), 2011, 1435-1440.

****