Average Correlation and Regression Analysis of Water of River Pavana through the Section Flowing Between Bopodi to Pimpri Area

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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 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 as pH, DO, COD, BOD, Alkalinity, TDS, TSS, TS, Turbidity, Temperature has been studied during analysis. The objectives of this study is To analyze the characteristics of river water, To study and evaluate the pollutant severity, To identify the depth wise Dissolved Oxygen variation, To find possible effects on aquatic life due to variations, To make regression analysis of obtained results.***

Keywords: Pavana River, Physico-Chemical, Parameters, Results, Characteristics, Water quality, correlation, regression analysis

1. Introduction

A. General

Assessment of water resource quality of any region is an important aspect of developmental activities of the region, because rivers, lakes and manmade reservoirs are used for water supply to domestic, industrial, agricultural and fish culture. Good water quality resources depends on large number of physicochemical parameters and the magnitude and source of any pollution load; and to assess that, monitoring of these parameters is essential. Polluted water is the major cause for the spread of many epidemics and some serious diseases like cholera, tuberculosis, typhoid, diarrhea etc. Contamination of drinking water from any source is therefore of primary importance because of the danger and risk of water borne diseases. According to W.H.O, 1998, report there were estimated 4 billion cases of diarrhea and 2.2 million deaths annually. The availability of good quality water is an indispensable feature for preventing disease and improving quality of life. Domestic and industrial wastewater constitute as a constant polluting source, whereas surface runoff is a seasonal phenomenon mainly controlled by climate. Without adequate quantity and quality of fresh water sustainable development will not be possible. The healthy aquatic ecosystem is depended on the biological diversity and Physico-Chemical characteristics. The physicochemical properties will also help in the identification of sources of pollution, for conducting further investigations on the eco-biological impacts and also for initiating necessary steps for remedial actions in case of polluted water bodies. In India, many researchers have worked on physicochemical and biological characteristics of reservoirs and rivers. Although statistics vary, the World Health Organization (WHO) reports that approximately 36% of urban and 65% of rural Indian's were without access to safe drinking water.

Water is essential for the survival of all forms of life. Though 80% of earth's surface is covered by water, the fresh water supply has increasingly become a limiting factor because of various reasons. The expansion of industrialization and exploding population are the major once. Acute short fall of heavy rains, poor water shed management, abundant use of water for household and agricultural purposes have led to the overexploitation of the surface water sources especially from the river bodies. Many perpetual rivers become short-lived and even dried up.

Water quality characteristics of aquatic environments arise from a massive amount of physical, chemical and biological interactions. The water bodies such as rivers, lakes and estuaries are continuously subjected to a dynamic state of change with respect to their geological age and geo chemical characteristics. This dynamic balance in the aquatic ecosystem is upset by human activities results in pollution which in turn manifests dramatically as fish kill, bad taste of drinking water, offensive odors and unchecked growth of aquatic weeds etc. Quality of water is now a great concern for environmentalists as well as the common publics in all parts of the world. There are numerous sources of pollutants that could deteriorate the quality of water resources.

The surface water bodies become the dumping source for industrial effluent and domestic wastes. As a result, the naturally existing dynamic equilibrium among the environmental segments get affected leading to the state of polluted rivers. According to World Health Organization's (WHO) decision, water for the consumers should be free from pathogenic organisms and toxic substances. In spite of vast water resources in lakes and rivers and good monsoon, India faces perennial problems of floods and droughts and high pollution of fresh water resources.

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(WHO) decision, water for the consumers should be free from pathogenic organisms and toxic substances. In spite of vast water resources in lakes and rivers and good monsoon, India faces perennial problems of floods and droughts and high pollution of fresh water resources.

B. 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.

C. Why Pavana:

Samples must be taken from locations which are representative of the water from sources, treatment plants, storage facilities, distribution network and household connections.Due to the increased in the industrilization in Pimpri-Chinchwad city there was increased in population and more industries near the Pavana bank. Pavana river contain the large amount of waste water directly from the many industries. Shortly the percentage of industrial area near Pavana river was more than residential area. Also the area flowing through Pimpri to Bopodi shows the large amount of human activities and water hyacinth on water body. Figure 1 shows the slected sampling station of of Pavna river.

2. Literature Review

Manohar G, Gavit Mohd et al, 2013 studied in some selected parts of Pavana River like Bopodi and Aundh and concluded the poor water quality in the area. Dissolved oxygen was found very critical at many places of these rivers and at some level it is below the detectable level causing a threat to aquatic life. The hardness of water is quite high.

Mane A.V., Pardeshi R.G. et al, 2013 have studied level of contaminants of surface water, ground water and sediment analysis of selected locations of Pavana river of Pimpri-Chinchwad area of Pune district. Researchers assess the water quality including pH, EC, TDS, DO, COD, BOD, Alkalinity and free CO2, hardness, phosphate (PO4), sediments analysis, heavy metal analysis in water, as well as in sediments samples, collected from the four sites of Pavana River, Pimpri-Chinchawad of Pune district. The study was carried out in the month of January 2012, and distance between each site was about 2 km. The sites Chinchwadgaon and Kalewadi Phata were observed to be polluted because of industries around and their discharges. It was also observed that the natural quality of water resources is getting deteriorated at faster rate. Ground water of this area showed higher values of hardness content as compared to surface water range (58 to 111.2 mg/l). The higher value of TDS (195.6 mg/l) in one area of water and in other site 65.12 mg/l. COD was observed by value of 120mg/l at surface water at one site, 33.8 mg/l at other site.

D.G. Kanase et al, 2005 studied the physicochemical characteristics of Major River in Pune city. They studied and analyzed the Pavana River along with Mula and Mutha River. The analysis was carried out for the parameters namely pH, Acidity, Alkalinity, Total Hardness, Calcium, Magnesium, Chloride, Nitrate, Sulphate and Phosphate. The data obtained by the analysis revealed that the COD is beyond the limit in Pavana River. The pH is between 7.5 & 8.6, DO, Chloride, Nitrate, Sulphate and Phosphate are within the desirable limits.

3. Materials and Methods

In order to analyze the effects of pollution, stretch of the river, starting from Pavana Dam toDapodi six 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).

4. Results and Discussion

The results which was taking in three seasons i.e. Monsoon, Post-Monsoon, Pre-monsoon season shown in table1, table2, table3 respectively.

1) Temperature

On the basis of three seasons, an average water temperature was 27.13, 22.32 and 24.53 ºC during Monsoon, Post-monsoon and Pre-Monsoon seasons, respectively.

2) Dissolved Oxygen (D.O.)

Dissolved oxygen (DO) is essential to aquatic life and plays an important role in biogeochemical processes in freshwater environments.Average Dissolved Oxygen content of the water samples were 0.57 mg/l, 0.93 mg/l and 0.50 mg/l in Monsoon season, Post-monsoon season and Pre-monsoon season respectively. The minimum concentration was recorded in Pre-monsoon season in almost all the sites.

3) pH (Hydrogen Ion Concentration)

pH fluctuated between 6.84 to 7.11, 6.83 to 7.05 and 6.75 to 6.99 in Monsoon season, Post-monsoon season and Pre-monsoon season respectively. Average Dissolved Oxygen content of the water samples were 6.98, 6.93 and 6.84 in Monsoon season, Post-monsoon season and Pre-monsoon season respectively.

4) Biochemical Oxygen Demand (B.O.D.)

Average seasonally BOD obtained was 61.67 mg/l, 30.33 mg/l and 51 mg/l in Monsoon season, Post-monsoon season and Pre-monsoon season respectively. Higher average value during Monsoon season might be due to biological as well as natural oxidation process with increase in temperature.

5) Chemical Oxygen Demand (C.O.D.)

This high average value of COD was recorded in Pre-monsoon i.e. 126.67 mg/l followed in Post-monsoon season was 68.26 mg/l and least in Monsoon season 26 mg/l. There is a wide variation in the values of chemical oxygen demand at different sampling station, different samples and between the seasons.

6) Total Dissolved Solids (T.D.S.)

The highest seasonal average value of TDS was recorded in Post-monsoon season i.e. 382 mg/l followed in Monsoon season was 366.53 mg/l and least in Pre-monsoon season 331.07 mg/l. The average values were below the limits as the suggested (TDS 500 mg/l).

7) Total Suspended Solids (T.S.S.)

The highest seasonal average value of TSS was recorded in Monsoon season i.e. 53.308 mg/l followed in Post-monsoon season was 40.55 mg/l and least in Pre-monsoon season 33.82 mg/l.

8) Total Solids (T.S.)

The highest seasonal average value of TS was recorded in Monsoon season i.e. 474.77 mg/l followed in Post-monsoon season was 441.43 mg/l and least in Pre-monsoon season 390 mg/l.

9) Turbidity

Turbidity is caused by particulate matter in suspension. The average seasonally turbidity for the rivers water observed was 13.48 NTU, 6.22 NTU and 5.17 NTU in Monsoon season, Post-monsoon season and Pre-monsoon season respectively. The maximum turbidity observed in Monsoon season was may be due to riverine condition. River water get started turbid after Pre-monsoon season. The turbidity is a striking characteristic to know the physical status of the river.

10)Alkalinity

Alkalinity is a measure of buffering capacity of water and is caused by calcium carbonate and bicarbonate and also to some extends due to phosphates and organic matter. Therefore, alkalinity analysis helps to know buffering capacity of water to adjust pH. The higher average values were observed 227.66 mg/l in Pre-monsoon season, Post-monsoon season (211 mg/l) and Monsoon season (199 mg/l).

Table No. 1, Table No. 2 and Table No. 3 is showing the Physico-Chemical Characteristics of water of Pavana River at various sampling station in Monsoon season 2016, Post-monsoon season 2016 and Pre-monsoon season 2017 respectively. Figure No. 2 shows the graph between D.O. Vs Depth data of all seasons.

5. 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.

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. Figure 3 showing the Strong positive correlation between COD and Alkalinity in all season. While figure 4 showing the Strong negative correlation between COD and TS in all season.

The average strongest positive correlation was found between COD and Alkalinity. In other word this is also called as perfect linear euation.

Y = 0.2847X + 191.58 ----- (1) (from fig. no. 3)

While average strongest negative correlation was found in betweenCOD and TS.

Y = -0.8444X + 499.589---- (2) (from fig. no. 4)

6. 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. 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.

Increasing Water pollution is a major problem in all the rivers. Contaminated water is the biggest health risk and continues to threaten both quality of life and public health. From analysis on Pavana River we concluded following points:

1) The analysis and result clearly shows that river water quality has deteriorated mainly due to domestic sewage and industrial effluents in case of Pavana River.
2) It is clear from the present analysis that the environment of the Pavana River showed increasing load of pollution. There is need to have proper collection and treatment of waste and need to regulate the flow.

The regrssion equations for the average values of all seasons are obtained between some parameters.
Hence application of water quality techniques for the overall assessment of the water body could be useful tool.

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Figure 1: Showing map of all sampling stations during project experimentation

Table 1: Showing Physico-Chemical Characteristics of Pavana River At Various Sampling Station in Monsoon Season in the 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
Minimum			26.9	6.84	0.09	10	16	240	7.5	334	2.7	170
Maximum			27.5	7.11	2.89	170	32	590	140	800	43.3	270
Average			27.13	6.98	0.57	61.67	26	366.53	53.30	474.76	13.48	199

Table 2: Showing 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
Minimum			21.9	6.83	0.17	10	28	260	5	267	4.3	170
Maximum			22.8	7.05	3.01	70	208	580	265	634	12	240
Average			22.32	6.93	0.929	30.33333	68.26667	382	40.55833	441.4333	6.22	211

Table 3: Showing 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
Minimum			**24**	**6.75**	**0.1**	**30**	**56**	**248**	**1.25**	**324**	**4.2**	**190**
Maximum			**25.4**	**6.99**	**1.26**	**80**	**304**	**496**	**251.25**	**550**	**7.5**	**250**
Average			**24.53**	**6.84**	**0.50**	**51**	**126.66**	**331.06**	**33.18**	**390**	**5.17**	**227.67**

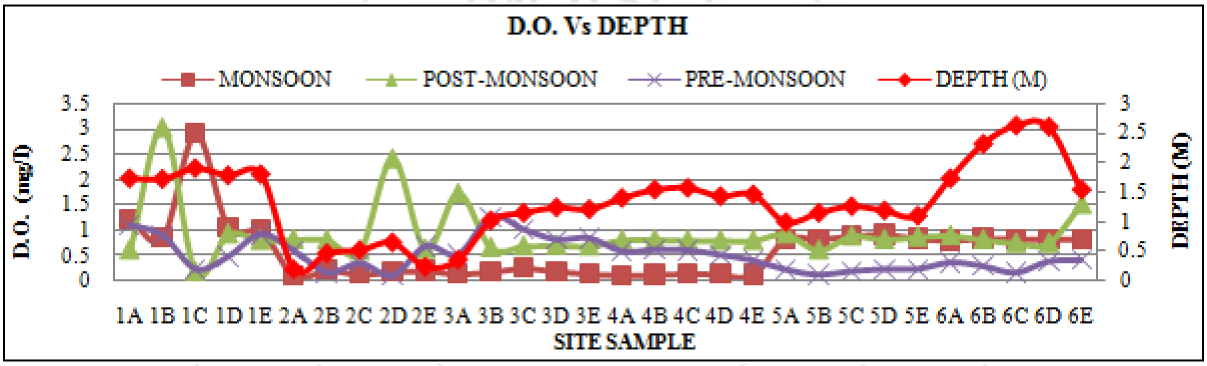

Figure 2: Showing D.O. Vs Depth data of all season

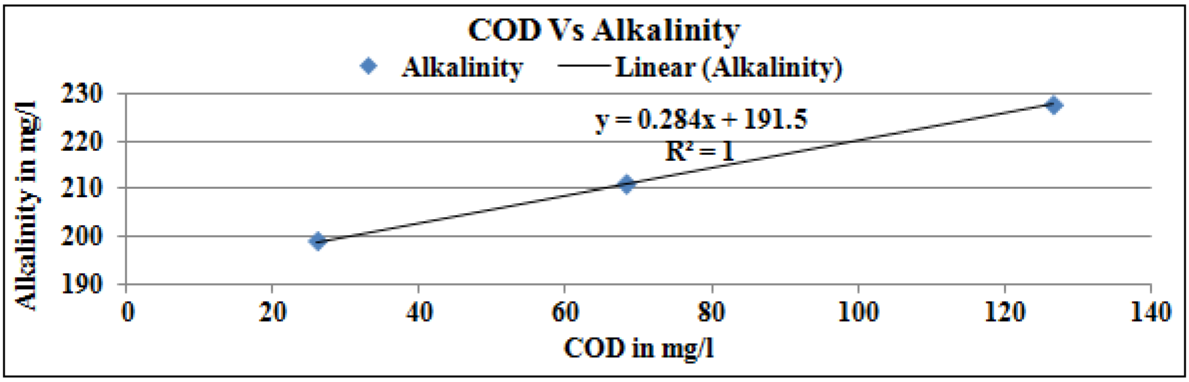

Figure 3: Strong positive correlation between COD and Alkalinity in all season

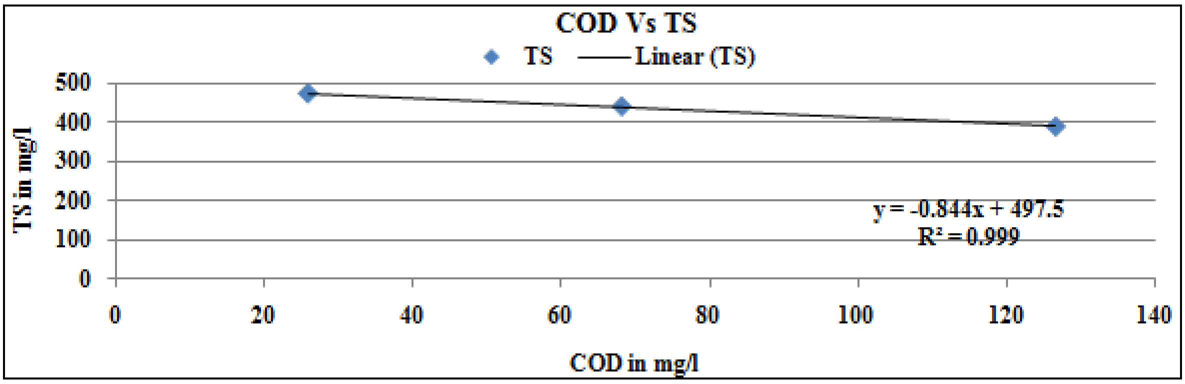

Figure 4: Strong negative correlation between COD and TS in all season

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