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Seasonal variation in the Water pollution of Amanishah Nallah by Industrial Effluents

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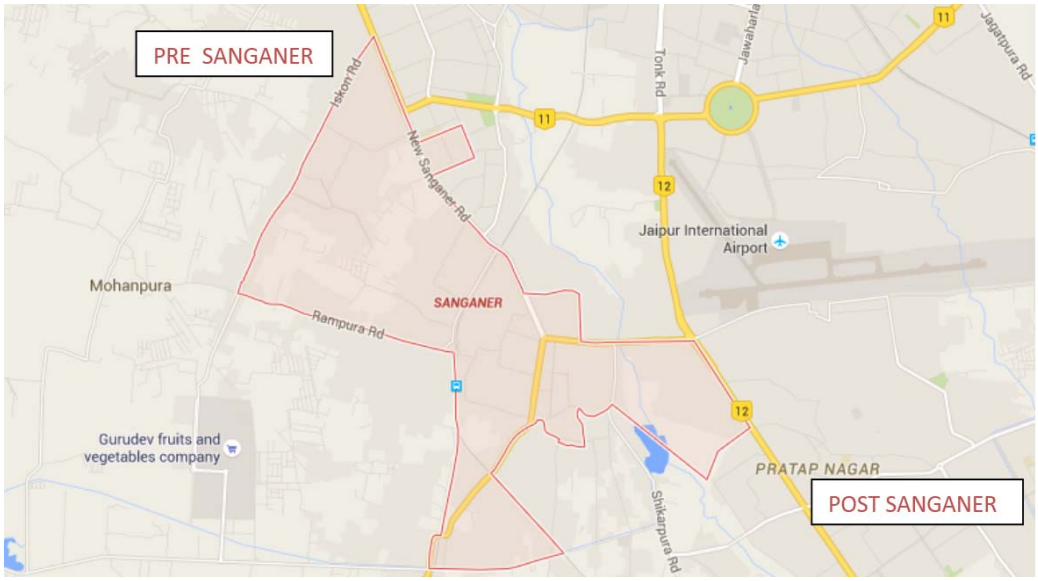
Abstract
In the present scenario due to vast level of industrialisation and rapid growth of industries, there has been tremendous increase in water pollution; especially pollution of water by industrial waste has increased immensely. For this study, effluent samples were collected from different sampling locations of Pre Sanganer, Sanganer and Post Sanganer and a comparative analysis has been studied for the Pre monsoon, monsoon and Post monsoon seasons. The collected samples were analysed for various Physico-chemical parameters. This was to identify major pollutants and their effect on water quality. Some parameters which gave evidence of pollution due to industrial effluent discharge were Temperature, pH, Electrical Conductivity (EC), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Hardness, Acidity, Heavy Metals like Lead, Chromium, Arsenic etc. and the results clearly indicate that the value of most of the parameters is higher for the pre monsoon season.

Keywords: Industrialisation, Industrial Effluents, Water pollution, Sanganer, Physico-chemical parameters.

1. Introduction
Industrialisation and urbanisation lead to the generation of large volumes of waste water from the industries. Waste Water from different industries usually contains harmful chemicals, like residues of reactive dyes, bleaching agents and various other organic and inorganic substances. In India a very large amount of water is getting polluted due to the discharge of industrial effluents into the surrounding water bodies. The water quality is estimated by knowing the physicochemical characteristics of waste water which includes pH, electrical conductivity, Total dissolved solids, alkalinity, acidity, Dissolved Oxygen, hardness etc. The waste water from these industries when disposed into the surrounding water bodies percolates into the ground water and poses a major threat to the ground water quality. In this study, Industrial effluents were collected from the various sampling locations in and around Amanishah Nallah, Sanganer Area, Jaipur (Rajasthan) in northern India. The objective of this work is to examine the contribution of effluents from different industries in water pollution, to study their properties and also to compare the quality of effluent water during Pre monsoon, monsoon and Post monsoon seasons.

Study Area
Sanganer is located between 26º 49' to 26º 51'N latitude and 75º 46' to 75º 51'E longitude. Three areas were selected for the collection of water samples i.e. area ahead of Sanganer town (Pre Sanganer), Sanganer and area after Sanganer town (Post Sanganer). These areas have many large and small scale industries nearby which release their effluents in Amanishah Nallah (formerly known as Dravyavati river basin) and pollute the water body thereby affecting the lives of the people residing in nearby areas.



2. Materials and Methods

The water samples were collected from the different sampling locations. Six sites were selected for the collection of samples; out of them two sites were in the Sanganer area, two were from the post Sanganer regions and remaining two were from the pre Sanganer regions. The samples were stored in clean and sterilised bottles in a cold place. This sampling is done for all the seasons i.e. for pre-monsoon, monsoon and post monsoon and were analysed for various Physico-chemical parameters including heavy metals.

The pH meter, Digital Conductivity meter, Spectrophotometer, Digital Flame Photometer instruments were used to determine pH, electrical conductivity, Nitrate, Sulphate, Sodium, Potassium, and Phosphorus. Atomic Absorption Spectrophotometer was used to determine heavy metal concentration. While chloride, alkalinity, hardness, dissolved oxygen and Chemical Oxygen Demand were determined by using titrimetric methods, and gravimetric method was used to determine Total Dissolved Solids and Total Suspended Solids.

3. Results and Discussion

As the tables indicate that in the pre Sanganer area the value of pH ranged from 7.9 in pre-monsoon season to 8.3 in monsoon to 8.1 in post monsoon, while in Sanganer pH ranged from 7.1 to 7.5 and in post Sanganer region the pH was between 7.5 to 7.8. It is found that pH value is decreasing in most of the samples except for few. pH can help us determine the acidic and basic nature of water. The pH value of all the areas was under the permissible limit.

The value of electrical conductivity in the pre Sanganer area ranged from 1182µmho/cm in the pre monsoon season to 1105 µmho/cm in monsoon and 1142 µmho/cm in post monsoon season. In Sanganer the values are 1840 µmho/cm in pre monsoon to 1724 µmho/cm in monsoon to 1789 µmho/cm in post monsoon season while in the post Sanganer regions it is 1640 µmho/cm during pre monsoon to 1548 µmho/cm in monsoon to 1611 µmho/cm in post monsoon season. It is observed that the value of conductivity is higher during pre monsoon season in all the areas as water dilutes the ionic concentration and value is decreased during the monsoon and post monsoon periods.

Total dissolved solids in Pre Sanganer area was found to be 800mg/L during pre monsoon to 590mg/L in monsoon to 720mg/L in post monsoon season while in the Sanganer area the values are found to be 1270mg/L in pre monsoon to 1155mg/L in monsoon to 1224mg/L in post monsoon season while in the post Sanganer area the value is 1010mg/L in pre monsoon to 1002mg/L in monsoon to 1009 mg/L in post monsoon season.

Salinity i.e. chloride in the pre Sanganer area was 255 mg/L in pre monsoon, 240 mg/L in monsoon and 249 mg/L in post monsoon season while it is 400 mg/L in pre monsoon, 380 mg/L in monsoon to 388 mg/L in post monsoon in the Sanganer area whereas in the post Sanganer regions the values are 328 mg/L in pre monsoon to 284 mg/L in monsoon to 305 mg/L in post monsoon season. The value of hardness in the pre Sanganer region was found to be 256 mg/L in pre monsoon, 240 mg/L in monsoon, 250 mg/L in post monsoon season while it is 260 mg/L in pre and post monsoon season and 250 mg/L in monsoon.

In the pre Sanganer region the value of chemical oxygen demand was 162.3 mg/L in pre monsoon, 147.7 mg/L in monsoon while 140.4 mg/L in post monsoon. The value of fluoride was found to be 0.9 mg/L in pre monsoon while it was 1.1 mg/L in monsoon and post monsoon periods. Nitrate was 73 mg/L in pre-monsoon, 61 mg/L in monsoon and 67 mg/L in post monsoon season. Sulphate varied between 95 mg/L in pre-monsoon to 88 mg/L in monsoon to 89 mg/L in post monsoon season. Calcium ranged from 48 mg/L n pre monsoon to 39 mg/L in monsoon to 43 mg/L in post monsoon. Magnesium on the other hand was 37 mg/L in pre monsoon to 33 mg/L in monsoon to 34 mg/L in post monsoon. Iron was found to be 1.9 mg/L in pre monsoon to 1.5 mg/L in monsoon to 1.7 mg/L in post monsoon. Values for chromium are 0.10 mg/L in pre monsoon to 0.08 mg/L in monsoon to 0.11 mg/L during post monsoon while copper ranged between 0.12 mg/L in pre monsoon to 0.08 mg/L in monsoon to 0.11 mg/L in post monsoon. Values for potassium are found to be 9 mg/L in pre monsoon to 6 mg/L in monsoon to 8 mg/L in post monsoon. Dissolved oxygen was found to be zero during pre and post monsoon while it was 0.3 mg/L in monsoon because of the dilution. Sodium was found to be 170 mg/L in pre monsoon, 140 mg/L in monsoon to 150 mg/L in post monsoon season.

In the Sanganer region the value of chemical oxygen demand was 280 mg/L in pre monsoon, 262 mg/L in monsoon while 268 mg/L in post monsoon. The value of fluoride was found to be 1.1 mg/L in pre and post monsoon while it was 0.9 mg/L in monsoon. Nitrate was 80 mg/L in pre monsoon, 72 mg/L in monsoon and 73 mg/L in post monsoon season. Sulphate varied between 140 mg/L in pre monsoon to 127 mg/L in monsoon to 131 mg/L in post monsoon season. Calcium ranged from 64 mg/L n pre monsoon to 60 mg/L in monsoon to 61 mg/L in post monsoon. Magnesium on the other hand was 35 mg/L in pre monsoon to 31 mg/L in monsoon to 32 mg/L in post monsoon. Iron was found to be 1.9 mg/L in pre monsoon to 1.4 mg/L in monsoon to 1.7 mg/L in post monsoon. Values for chromium are 0.15 mg/L in pre monsoon to 0.11 mg/L in monsoon to 0.12 mg/L during post monsoon while copper ranged between 0.53 mg/L in pre monsoon to 0.40 mg/L in monsoon to 0.45 mg/L in post monsoon. Values for potassium are found to be 16 mg/L in pre monsoon to 13 mg/L in monsoon to 14mg/L in post monsoon. Dissolved oxygen was found to be zero during pre and post monsoon while it was 0.1 mg/L in monsoon because of the dilution. Sodium was found to be 280 mg/L in pre monsoon, 250 mg/L in monsoon to 260 mg/L in post monsoon season.

In the post Sanganer region the value of chemical oxygen demand was 220 mg/L in pre monsoon, 195mg/L in monsoon while 205 mg/L in post monsoon. The value of fluoride was found to be 1.0 mg/L in pre monsoon while it was 0.8 mg/L in monsoon and 0.9mg/L in post monsoon. Nitrate was 73 mg/L in pre monsoon, 65 mg/L in monsoon and 70mg/L in post monsoon season. Sulphate varied between 120 mg/L in pre monsoon to 109 mg/L in monsoon to 112 mg/L in post monsoon season. Calcium ranged from 44 mg/L n pre monsoon to 40 mg/L in monsoon to 41 mg/L in post monsoon. Magnesium on the other hand was 35 mg/L in pre monsoon to 31 mg/L in monsoon to 33 mg/L in post monsoon. Iron was found to be 1.8 mg/L in pre monsoon to 1.5 mg/L in monsoon to 1.6 mg/L in post monsoon. Values for chromium are 0.11 mg/L in pre monsoon to 0.09 mg/L in monsoon to 0.10 mg/L during post monsoon while copper ranged between 0.16 mg/L in pre monsoon to 0.11 mg/L in monsoon to 0.14 mg/L in post monsoon. Values for potassium are found to be 11 mg/L in pre

monsoon to 9 mg/L in monsoon to 10 mg/L in post monsoon. Dissolved oxygen was found to be zero during all three seasons i.e. pre monsoon, monsoon and post monsoon. Sodium was found to be 220 mg/L in pre monsoon, 190 mg/L in monsoon to 200 mg/L in post monsoon season.

4. Conclusion

Physico chemical analysis of the effluent samples from the selected areas in the pre monsoon, monsoon and post monsoon seasons showed that the value of all the parameters are greater for the pre monsoon season in all the three regions selected. This is because the concentration of all ions and elements is maximum in summers while during the monsoon season because of the rain it dilutes the composition of the water body and the value of all the parameters decreases.

***** All the values in Table 1, 2 and 3 are in mg/L except EC and pH

Table 1: Physicochemical parameters in Pre-Sanganer Area

Parameters	Pre Monsoon		Monsoon		Post Monsoon	
	Site 1	Site2	Site1	Site2	Site1	Site2
pH	7.8	7.9	8.1	8.3	8.0	8.1
EC(µmho/cm)	1176	1182	1092	1105	1135	1142
TDS	790	800	630	590	700	720
Chloride	250	255	240	235	243	249
Hardness	256	260	230	240	245	250
COD	154.2	162.3	132.5	147.7	137.5	140.4
DO	0.0	0.0	0.3	0.2	0.0 0.0	0.0
Fluoride	0.8	0.9	0.9	1.1	1.1	1.1
Nitrate	70	73	60	61	65	67
Sulphate	90	95	86	88	88	89
Calcium	45	48	36	39	41	43
Magnesium	37	37	32	33	34	34
Iron	1.8	1.9	1.3	1.5	1.6	1.7
Chromium	0.10	0.11	0.06	0.08	0.09	0.11
copper	0.12	0.12	0.07	0.08	0.09	0.11
Potassium	8	9	5	6	7	8
Sodium	150	170	130	140	140	150

Table 2: Physicochemical parameters in Sanganer Area

Parameters	Pre Monsoon		Monsoon		Post Monsoon	
	Site 3	Site4	Site3	Site4	Site3	Site4
pH	7.1	7.2	7.4	7.5	7.2	7.3
EC(µmho/cm)	1830	1840	1711	1724	1780	1789
TDS	1240	1270	1130	1155	1159	1224
Chloride	390	400	370	380	384	388
Hardness	260	260	240	250	250	260
COD	270	280	255	262	265	268
DO	0.0	0.0	0.1	0.1	0.0 0.0	0.0
Fluoride	1.0	1.1	0.8	0.9	1.0	1.1
Nitrate	75	80	70	72	73	73
Sulphate	135	140	125	127	130	131
Calcium	62	64	58	60	60	61
Magnesium	34	35	30	31	32	32
Iron	1.8	1.9	1.3	1.4	1.5	1.7
Chromium	0.13	0.15	0.11	0.11	0.12	0.12
copper	0.49	0.53	0.37	0.40	0.42	0.45
Potassium	14	16	11	13	13	14
Sodium	270	280	230	250	240	260

Table 3: Physicochemical parameters in Post-Sanganer Area

Parameters	Pre Monsoon		Monsoon		Post Monsoon	
	Site 5	Site6	Site5	Site6	Site5	Site6
pH	7.6	7.7	7.8	7.8	7.5	7.6
EC(µmho/cm)	1620	1640	1519	1548	1590	1611
TDS	1004	1010	985	1002	990	1009
Chloride	310	328	280	284	290	305
Hardness	220	230	200	210	210	220
COD	210	220	190	195	200	205
DO	0.0	0.0	0.0	0.1	0.0 0.0	0.0
Fluoride	0.9	1.0	0.7	0.8	0.8	0.9
Nitrate	71	73	64	65	68	70
Sulphate	114	120	105	109	110	112
Calcium	42	44	38	40	41	41
Magnesium	33	35	29	31	32	33
Iron	1.7	1.8	1.4	1.5	1.6	1.6
Chromium	0.10	0.11	0.08	0.09	0.09	0.10
copper	0.14	0.16	0.11	0.11	0.12	0.14
Potassium	10	11	8	9	9	10
Sodium	210	220	180	190	190	200

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6. References

1. Sharma D. Seasonal variation in different physico-chemical characteristics in Makroda reservoir of Guna district (M.P.), Ecology Environment and Conservation, 2001; 7(2):201-204.
2. Singh KP, Mohan D, Sinha S, Dalwani R. Impact assessment of treated/untreated wastewater toxicants discharged by sewage treatment plants on health, agricultural and environmental quality in the wastewater disposal area. Chemosphere 2004; 55:227-255.
3. APHA, Standard Methods for the Examination of Water and Waste Water' American Public Health Association, Wahington D.C. 20th ed New York, 1998.
4. Agarwal R, Sharma SK, Jha U. Assessment of Industrial effluent and underground water during monsoon season 2007 in Sitapura Industrial Area, Jaipur, Current World Environ., 2009; 2(1):71-77.
5. Rabee AM, Kareem BMA, Aldhamin AS. Seasonal variations of some ecological parameters in Tigris river water at Baghdad region, Iraq. Journal of Water Resource and Protection. 2011; 3:262-267.
6. Venugopal T, Giridharan L, Jayprakash M, Periakali P. Environmental Impact Assessment and seasonal variation study of the ground water in the vicinity of river Adyar, Chennai, India. Environmental monitoring and assessment. 2009; 149(1-4):81-97.
7. Walakira P, Okumu JO. Impact of industrial effluents on water quality of streams in Nakawa-Ntinda, Uganda. Journal of applied sciences and environmental management. 2011; 15(2):289-296.

8. Adekunle AS, Eniola ITK. Impact of industrial effluents on quality of segment of Asa River within an industrial estate in Ilorin, Nigeria. New York Science Journal. 2008; 1(1):17-21.
9. Alqadi KA, Kumar L. Are there monthly variations in water quality in the Amman, Zarqa and Balqa regions of Jordan. Computational water, energy and environmental engineering 2013; 2:26-35.
10. Ewa EE, Iwara AI, Adeyemi JA, Eja EI, Ajake AO, Otu CA. Impact of industrial activities on water quality of Omuku Creek. Sacha journal of environmental studies. 2011; 1(2):8-16.
11. Hussain M, Prasad Rao TVD. Effect of Industrial Effluents on Surface Water Quality -A Case Study of Patancheru, Andhra Pradesh, India. Current world environment. 2013; 8(3):445-454.