



INVESTIGATION OF PHYSICO-CHEMICAL PARAMETERS OF WATER SAMPLES FROM SIDHMUKH FEEDER CANAL, HARYANA, INDIA: A COMPARATIVE STUDY

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Abstract

The study on physico-chemical parameters has been carried out on Sidhmukh feeder canal to check the quality of the water samples. This is done to know the status of the water whether it is suitable for irrigation and drinking purposes and to create the awareness among people. A comparative study on the pre and post monsoon for physico-chemical parameters viz. pH, colour, temperature, EC, TDS, DO, BOD, Chloride, Bicarbonates, Sulphate, Total Alkalinity, Total Hardness, Sodium, Magnesium, Calcium and Potassium have been made to observe the changes. The results obtained by the analysis that the parameters have been found within the permissible limits.

Keywords: Sidhmukh feeder canal, Irrigation, metals, anions, physical parameters.

Introduction:

The life on earth is totally dependent on water. One cannot imagine life on Earth without water. Water is our basic need for survival. As we know, 70% of our body is made up of water. Water is essential for plants, animals and man, without water life on earth would not exist, hence it has been referred to as a universal solvent (Ravikumar, et al., 2006)¹. The physical nature of water is colourless, tasteless and odourless. It can dissolve almost

everything as its dielectric constant is very high. In India, for the purpose of irrigation and drinking surface water is used. (Kankal, et al., 2012)². The assessment of physical and chemical parameters is essential to know the effect on life whether it is in lake, ponds and all water bodies. Metal ions also interfere with the normal functioning of the living organisms.³⁻⁹

Water is a necessity for our healthy life. Rivers are lifeline for the human society and it plays an important role in day-to-

day life. All man-made changes obstruct the natural process of ecosystems that has been formed trans mutative. These changes mostly cause to mortification of the natural, human, environment. The impact of man-made activities on water bodies has been affected in huge amount so that they have lost their self-purification capacity in bulk amount. Water quality parameters are basic judgment for applications and enhance existing conditions. The never-ending seasonal assessment of water parameter and quality is very necessary to find for particular pollution of rivers. In seasonal changes there are three main seasons-summer, winter, monsoon.

Haryana is the state where a major population is dependent on agriculture. Sidhmukh feeder canal supplies a lot of water in this region in almost all seasons. As a lot of area depends on the irrigation from Sidhmukh feeder canal so the physical and chemical parameters were analysed to create awareness among common people. Therefore, the present research has been summary with the objectives to estimate and assess the seasonal variations also water quality status based on some physical-chemical characteristics of Sidhmukh feeder canal. For existing study seven sites have been chosen to examine the effect of canal Front Development on the water quality, impact on human activities, pollution status which is done by various industrial zone and seasonal changes assess by physicochemical properties.

Experimental (Materials and Methods):

For the present study the samples are collected in pre monsoon, monsoon and post monsoon season. The samples are collected from different sites and are analyzed using different methods. Thermometer is used to check Temperature. pH meter is used for pH. Total hardness is determined by EDTA Complexometric method. Titrimetric

method is used for determination of Total Alkalinity.

EC is estimated using Conductivity meter. Titrimetric method is used to determine Dissolved Oxygen. BOD meter will determine BOD. Titrimetric (Mohr' method) is used for chloride determination. Sodium, potassium and magnesium are estimated with the help of Atomic Absorption Spectrometer. Calcium and potassium are observed under flame of Nitrous oxide/ acetylene and Air/acetylene respectively.

Results and Discussion

After the analyses of water samples from seven sites, observations were made for the parameters we studied and are summarized in tables 1-5. A comparative study of all the parameters have been graphically represented in figures from 1 to 14.

The colour of water samples were observed dark yellow in most of the sampling sites before monsoon while pH were slightly more alkaline in most of the sites after monsoon season. There was no such temperature variations recorded in both the seasons. The values of electrical conductivity were found higher in the sampling sites from 1-4 during pre-monsoon while from sites 5-7 the values were recorded comparatively low during pre-monsoon season.

It has been observed that Total Dissolved Solids values were recorded lower in all the sampling sites of Sidhmukh Feeder Canal during post monsoon season. The dissolved oxygen concentrations have been found higher in the sampling sites 2 and 7 while observed lower in the sampling sites 1, 3, 4, 5 and 6 during post monsoon. The values of Biological Oxygen Demand were recorded higher in

all the sampling sites except site 1 after the monsoon season.

Huge variations have been noticed in the total alkalinity concentrations. The values were recorded comparatively lower in the sampling sites from 1 and 2 while the values of total alkalinity were found much higher during post monsoon season in the sampling sites from 4-7.

The total hardness has been recorded higher in all the sampling sites except site 1 during post-monsoon.

The Sodium, Potassium and Magnesium metal contents have been found higher in all the sampling sites of Sidhmukh Feeder Canal during post monsoon season while very slightly higher Calcium contents were reported in all the sampling sites during post monsoon.

During post monsoon season, the bicarbonates and sulphate concentrations were also found higher in all the sampling sites.

In contrast, drastic changes have been seen in the chloride contents. The contents have recorded approximately half in all the sampling sites during post monsoon season.

All the parameters at sampling site 1 have been observed lower values as compare to all other sites in both pre and post monsoon seasons.

Conclusion

As per the findings, the values of most of the parameters have been found higher in post monsoon season. However, the values of all the physical and chemical parameters have been found within the

permissible limits, hence, we concluded that the water of Sidhmukh feeder canal is safe for drinking purposes as well as for irrigation purposes.

Acknowledgement

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Table 1: BIS Drinking Water Standards (IS:10500-2012)

Parameter	Acceptable limit (mg/L)	Permissible limit (mg/L)
Colour	Colourless	Colourless
pH	6.5-8.5	No Relaxation
Temperature	-	-
EC	1500	3000
TDS	500	2000
DO	3.5	5.0
BOD	NA	NA
Chloride	250	1000
Bicarbonates	244	732
Sulphate	200	400
Total Alkalinity	200	600
Total Hardness	200	600
Sodium	-	-
Magnesium	30	100
Calcium	75	200
Potassium	-	-

Table 2: Physical Parameters values of Pre Monsoon Water Samples collected from the sampling sites of Sidmukh Feeder Canal

Sampling sites	PARAMETERS MONITORED								
	Colour	pH	Temperature (°C)	Electrical Conductivity ($\mu\text{S}/\text{cm}$)	Total Dissolved Solids (ppm)	Dissolved Oxygen (ppm)	Biological Oxygen Demand (mg/l)	Total Alkalinity (ppm)	Total Hardness (ppm)
Site 1	Pale yellow	7.20	27	372	212	4.00	23.0	324.6	512.8
Site 2	Yellow	7.79	27	383	238	1.00	14.5	320.1	399.0
Site 3	Dark Yellow	7.86	27	323	210	3.25	13.8	200.2	345.1
Site 4	Dark Yellow	8.00	28	360	234	2.45	12.5	79.0	245.1
Site 5	Yellow	8.12	28	289	242	2.38	17.5	100.0	272.7
Site 6	Dark Yellow	7.20	28	290	180	1.08	18.6	322.0	299.8
Site 7	Dark Yellow	7.89	29	296	198	1.00	14.2	387.0	345.8

Table 3: Chemical Parameters values of Pre Monsoon Water Samples collected from the sampling sites of Sidmukh Feeder Canal

Sampling sites	PARAMETERS MONITORED						
	Sodium (ppm)	Potassium (ppm)	Magnesium (ppm)	Calcium (ppm)	Bicarbonates (ppm)	Sulphates (ppm)	Chlorides (ppm)
Site 1	1.78	0.49	2.11	10.00	52.98	19.63	672.48
Site 2	6.54	1.02	14.32	25.40	71.68	30.08	622.13
Site 3	5.78	0.87	15.85	30.10	67.98	32.18	602.85
Site 4	8.00	1.00	14.85	28.42	71.93	38.25	612.70
Site 5	9.86	2.25	18.78	31.02	98.15	40.90	645.50
Site 6	9.78	2.08	17.76	32.41	110.19	41.30	625.68
Site 7	6.00	1.00	14.78	25.98	78.22	32.20	578.00

Table 4: Physical Parameters values of Post Monsoon Water Samples collected from the sampling sites of Sidmukh Feeder Canal

Sampling sites	PARAMETERS MONITORED								
	Colour	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (ppm)	Biological Oxygen Demand (mg/l)	Total Alkalinity (ppm)	Total Hardness (ppm)
Site 1	Light yellow	7.12	27	292	190	3.14	20.40	158.4	452.12
Site 2	Light Yellow	8.00	27	302	187	2.22	22.40	230.7	452.12
Site 3	Light Yellow	8.10	28	252	168	2.18	25.62	244.5	433.70
Site 4	Yellow	7.80	28	277	165	1.18	27.50	377.1	392.50
Site 5	Yellow	7.82	27	282	145	0.78	29.45	412.0	372.20
Site 6	Yellow	7.95	28	380	177	0.58	32.60	480.0	340.10
Site 7	Yellow	8.02	27	325	170	1.08	34.40	462.0	370.80

Table 5: Chemical Parameters values of Post Monsoon Water Samples collected from the sampling sites of Sidmukh Feeder Canal

Sampling sites	PARAMETERS MONITORED						
	Sodium (ppm)	Potassium (ppm)	Magnesium (ppm)	Calcium (ppm)	Bicarbonates (ppm)	Sulphates (ppm)	Chlorides (ppm)
Site 1	2.90	0.80	3.00	10.05	63.00	23.63	300.15
Site 2	7.45	1.68	18.42	26.54	82.62	38.62	345.24
Site 3	6.95	1.22	16.79	30.25	74.31	35.04	285.08
Site 4	8.42	2.62	20.05	28.78	89.12	43.04	245.07
Site 5	10.8	3.15	21.55	31.22	118.0	47.89	222.40
Site 6	11.1	3.25	24.05	32.55	125.8	50.00	259.40
Site 7	7.48	1.72	18.22	26.89	83.45	39.12	230.10

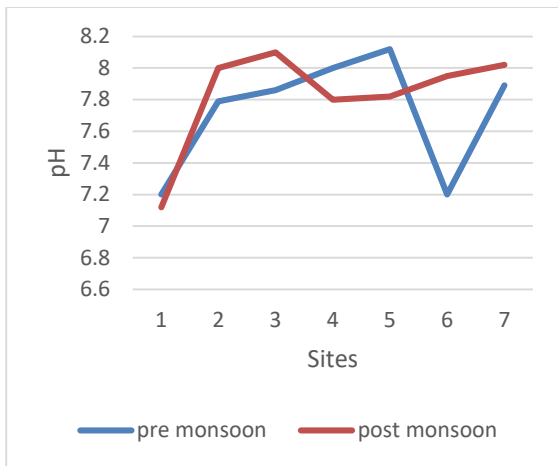


Figure 1. Comparison of pH values in Pre monsoon and Post monsoon season

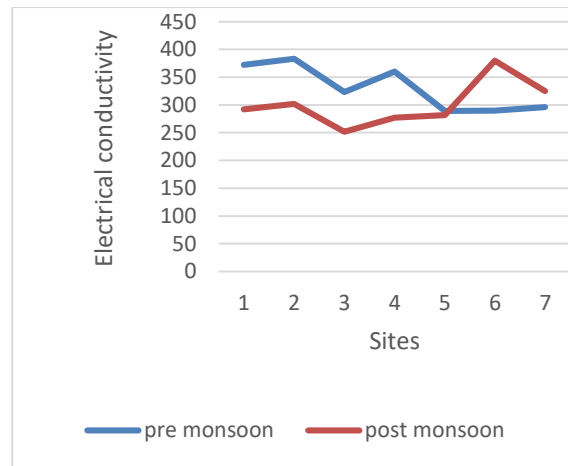


Figure 2. Comparison of EC values in Pre monsoon and Post monsoon season

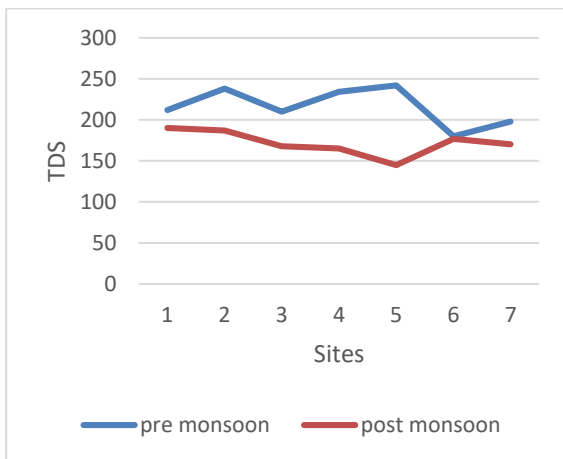


Figure 3. Comparison of TDS values in Pre monsoon and Post monsoon season

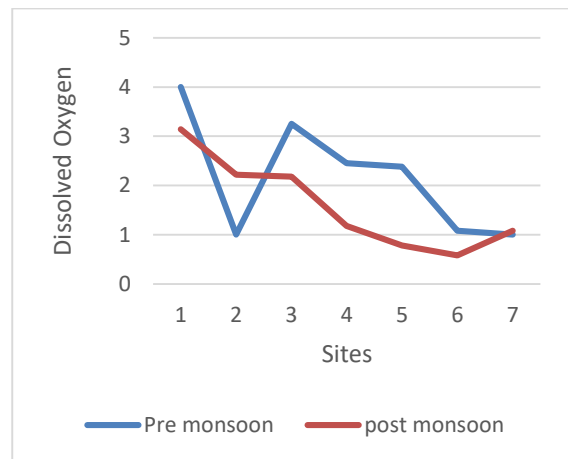


Figure 4. Comparison of DO values in Pre monsoon and Post monsoon season

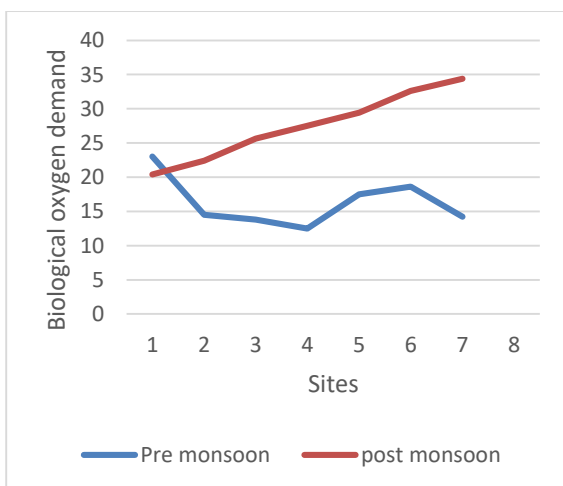


Figure 5. Comparison of BOD values in Pre monsoon and Post monsoon season

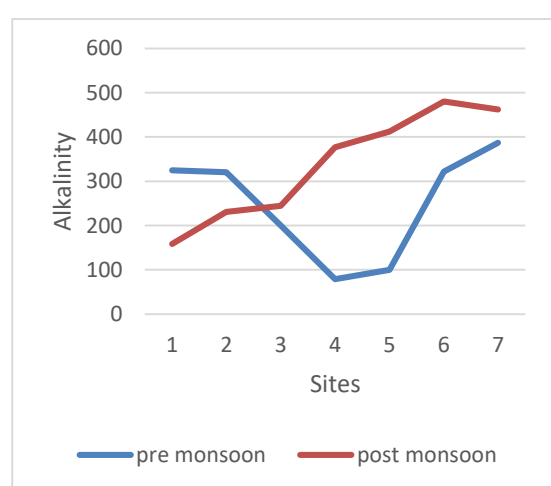


Figure 6. Comparison of Alkalinity in Pre monsoon and Post monsoon season

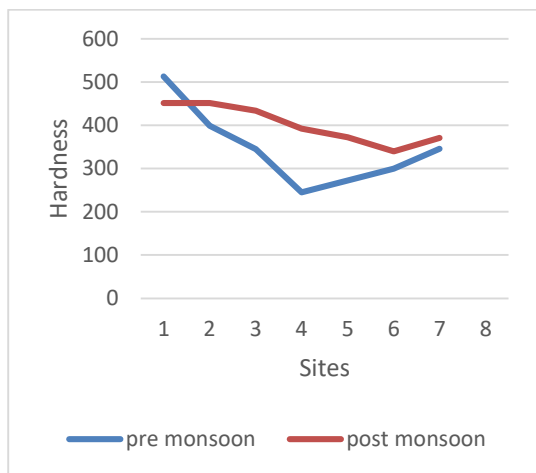


Figure 7. Comparison of Hardness in Pre monsoon and Post monsoon season

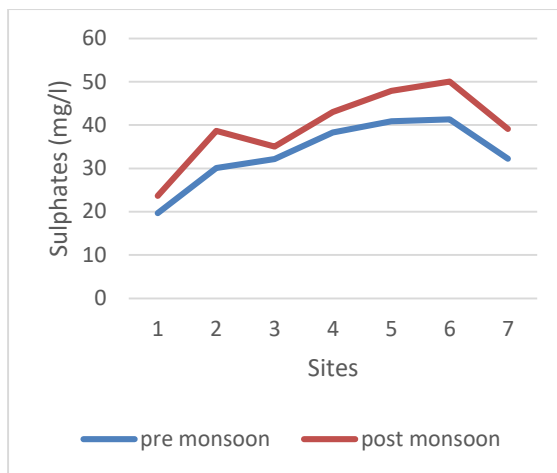


Figure 8. Comparison of Sulphates in Pre monsoon and Post monsoon season

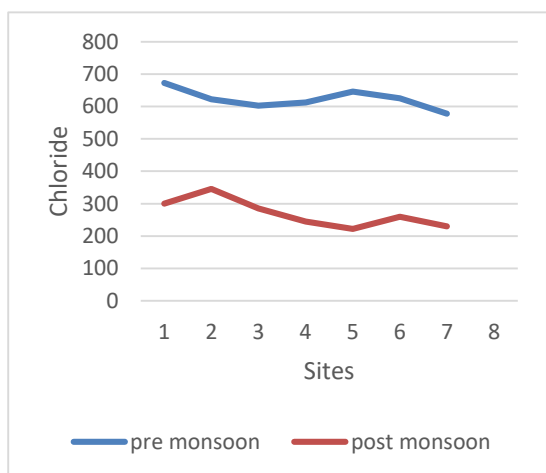


Figure 9. Comparison of Chlorides in Pre monsoon and Post monsoon season

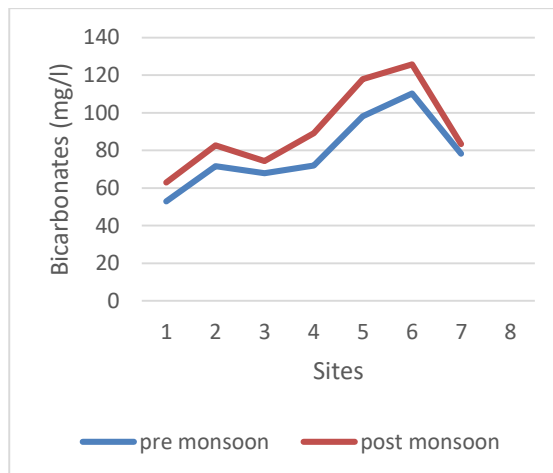


Figure 10. Comparison of Bicarbonates in Pre monsoon and Post monsoon season

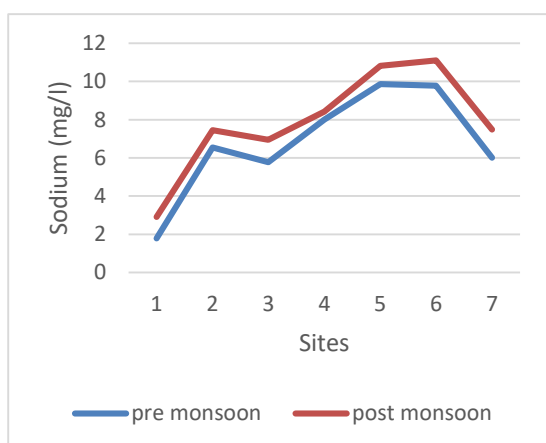


Figure 11. Comparison of Sodium in Pre monsoon and Post monsoon season

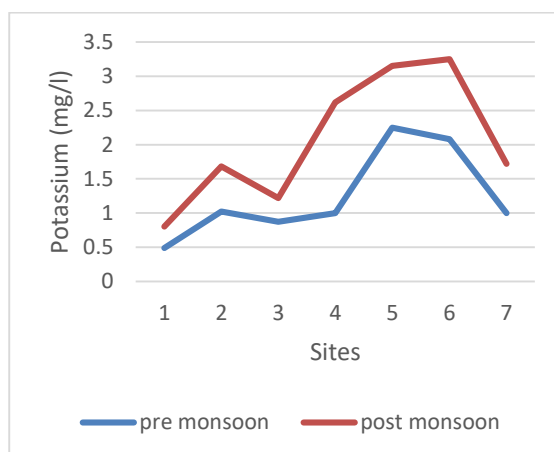


Figure 12. Comparison of Potassium in Pre monsoon and Post monsoon season

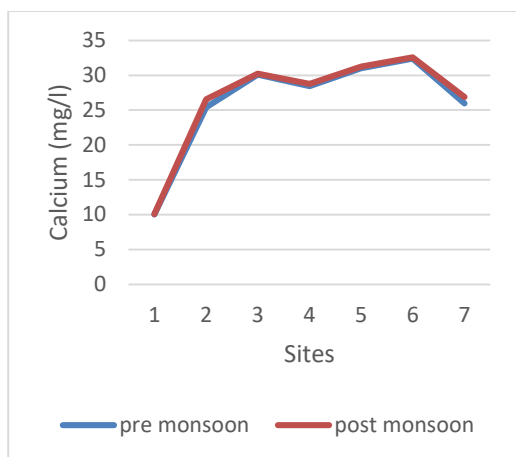


Figure 11. Comparison of Calcium in Pre monsoon and Post monsoon season

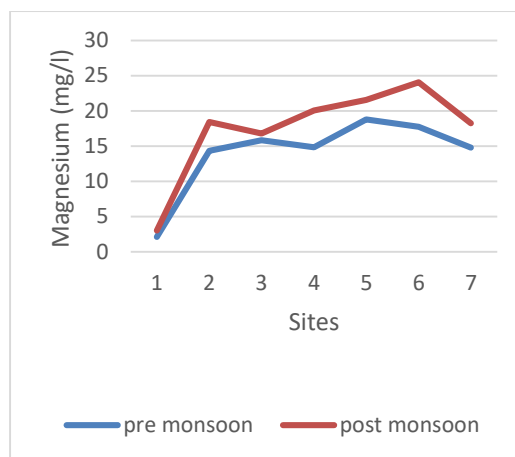


Figure 12. Comparison of Magnesium in Pre monsoon and Post monsoon season