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Seasonal variation of some physic-chemical analysis of water in Ara block of Bhojpur District, Bihar

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ABSTRACT

The influence of seasonal changes (pre monsoon, during monsoon and post monsoon) on the Physico-chemical properties of the water in Ara, Bhojpur district (Bihar) was investigated. A total of sixty water samples from different sources (ie, bore wells, hand pumps, tap water) are taken. The experiment analyses its various Physico-Chemical parameters such as Temperature, Turbidity, pH, Electrical conductivity ,TDS,TH,TA,Ca^{2+},Mg^{2+},Cl^{-},No_3^{-} ,So_4^{2-},Fe,As,F^{-} content in water. Also maximum value of parameters in all seasonal changes results in Ara block of Bhojpur district, Bihar also compared with EOROPEAN, USPH, ICMR standards to investigate the level of water quality for all uses.

Keywords: Physico-chemical analysis, water quality, Seasonal variation, Ara (Bihar).

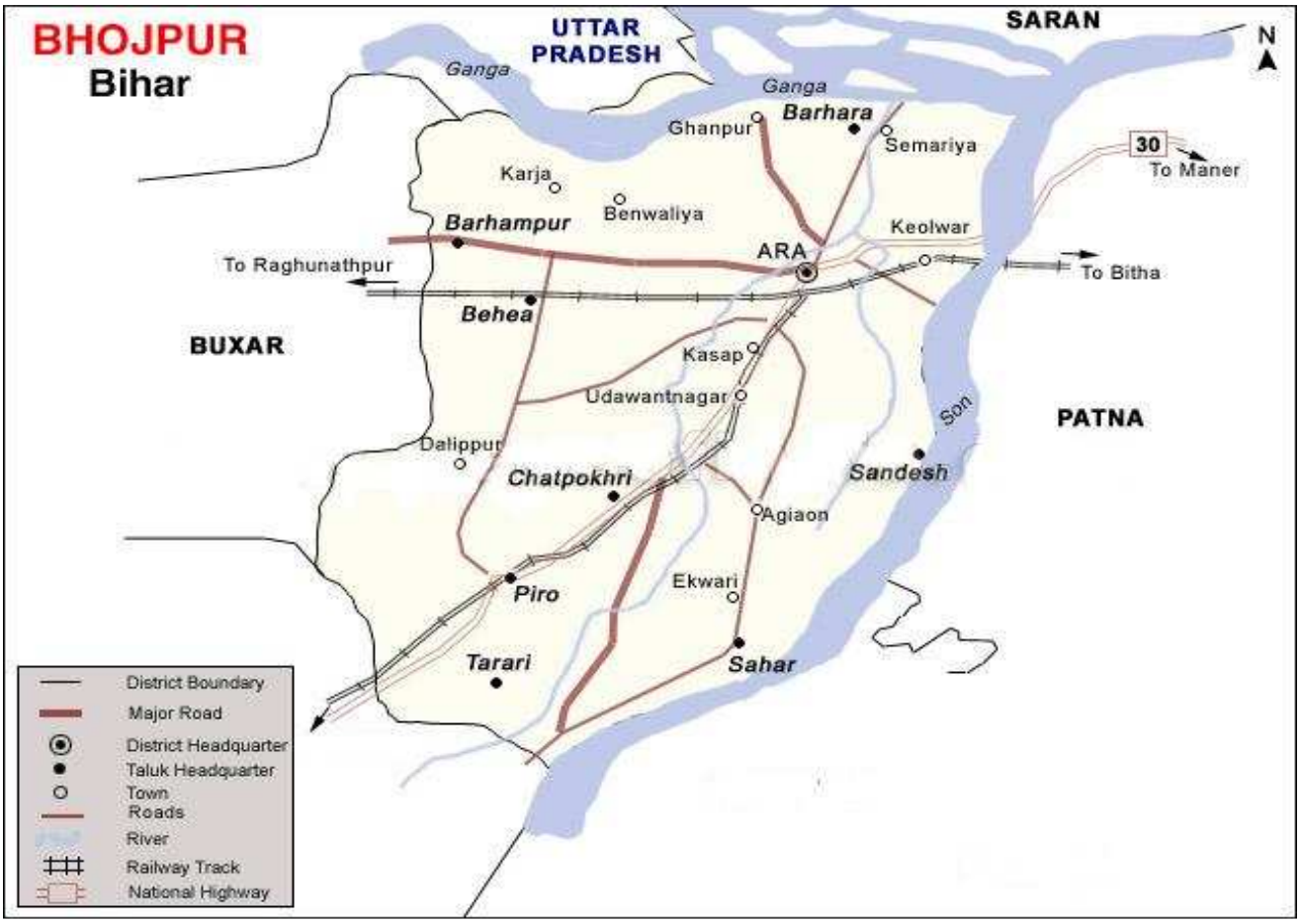
INTRODUCTION

Water is one of the most common yet the most precious resources on earth without which there would be no life on earth. Pollution is a serious problem as almost 70% of Indian water resources and a growing no. of its water reserves have been contaminated by biological, organic and inorganic pollutants. In south-Asian countries water pollution load discharge mainly by the urban activities. [1] Seasonal change in water quality with the passage of time has hydrological significance. The change water quality also varies due to a change chemical composition of the underlying sediments and aquifer. [2] Polluted water is the causes for the chronic diseases in human being. A large no. of people has to die because of water born diseases every year in our country. Bihar is no exception. In Bihar the population is mainly dependent mainly on the surfaces water and ground water sources to fulfill their daily need related to water and very few parts of Bihar have proper water supply system. Mostly the people of these areas are depending upon their own sources of water. Detailed information regarding the overall quality of water sources of the studied region is lack due to less education among the people. [3] This work examines the influence of seasonal variation on the physicochemical qualities of water from this area.

MATERIALS AND METHODS

Study Area- Ara is a block and administrative headquarter of Bhojpur district. It is a part of Patna Division. Bhojpur district (Plate I) falls within 25^0 00'' to $25^0$30'' N and $84^0$15" to 84^0 45''E, the area is bounded by river Son in the east, Dharmawati-Gangi rivers in west and river Ganga in the the North. Its area spread over a total geographical area of 33.95 sq/Km. Ara block having 203395 population and this adopts tropical monsoon climate.[4] People of Ara block are mainly work in agricultural activities. The main sources of water supply in the area is hand pumps , bore holes and manually operated hand pumps, dug wells. The precipitation which is the sole source of ground water recharges in the study area is very low due to rain fall.

Figure 1- Location of Ara Block in Bhojpur district



Water Sampling - In present investigation sixty water samples taken from different sources are collected. The water samples were collected in polythene bottles which were cleaned with acid water, followed by rinsing twice with distilled water. The water samples are chemically analyzed. [5] The analysis of water was done using procedure of standard methods.

Methodology- The pH and EC were measured by using Eutech-cybernetics PH meter and EC scan meter. [6] Total hardness, calcium, magnesium were measured by EDTA titration methods. [7] Total alkalinity was determined by volumetrically by silver nitrate titrametric methods using potassium chromate as indicator. [8]. Sulphate was determined nepthalometrically using ELICO-52 Nepthalometer. [9] Fluoride content in water was measured by ELICO-52 Spectrophotometer. The Physico-chemical analysis was carried out according to standards methods. [10, 11, 12] Temperature, turbidity and TDS were observed with thermometer, turbidity rod and with the help of digital water kit. [13] Nitrate and arsenic was observed by phenol dysphonic acid method and colorimetric methods. [14, 15] Iron was determined by spectrophotometer. [16]

RESU LTS AND DISCUSSION

The water from the study area of has no colour, odour and low turbidity. Taste of the water of the water sample in most of the locations pleasant in taste. The result of the chemical analysis of water in the present study in Table-1, so it is necessary to a make a comparison of water given by USPH, EUROPEAN and ICMR standards. Theses parameters showed in Table-2. The data of chemical parameters showing consider variations due to seasonal changes which reflect the chemical composition. The pH of water shows variation in its ranges. It indicates that they are in range of water quality parameter permissible limits. The EC of water samples shows wide variation in Ara block. Water of studied block is found moderate soft in all seasonal changes. The Ca^{2+} was beyond the accepted limits. TA within the limits. Chloride content in water is low, the fluoride content in water is low due to this dental problem arises in the study area. All results indicate that all parameters do not change in seasonal change.

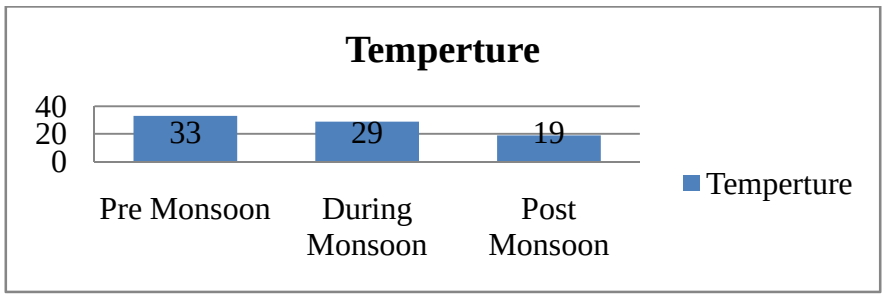
TABLE -1 Analyzed seasonal physico-Chemical status of water of Ara block

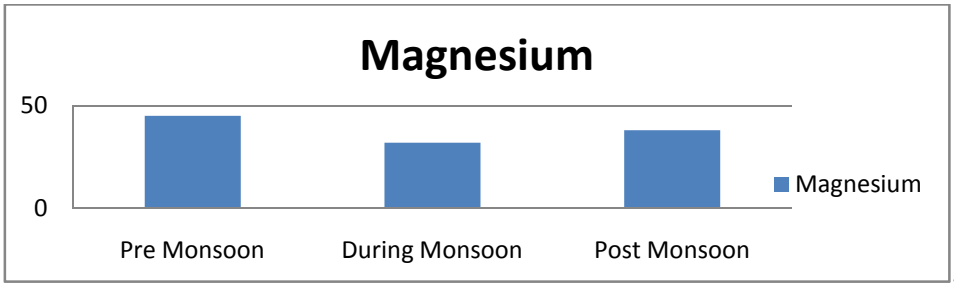
Sr. No.	Parameters	Pre-Monsoon	During -Monsoon	Post -Monsoon
1	Temperature	33	29	19
2	pH	6.2	6.3	7.0
3	So_4^{2-}	85.00	90.00	80.00
4	Nitrate	2.37	3.20	2.17
5	Chloride	19.00	21.00	21.00
6	Arsenic	0.005	0.001	0.006
7	Fluoride	0.48	0.54	0.60
8	Iron	0.40	0.30	0.45
9	Turbidity	1.10	1.00	1.05
10	Calcium	102.00	107.00	100.00
11	Magnesium	45.00	32.00	38.00
12	TH	290.00	246.00	280.00
13	TDS	872.00	530.00	570.00
14	Conductivity	0.65	0.55	0.57
15	Total Alkalinity	298.00	290.00	295.00

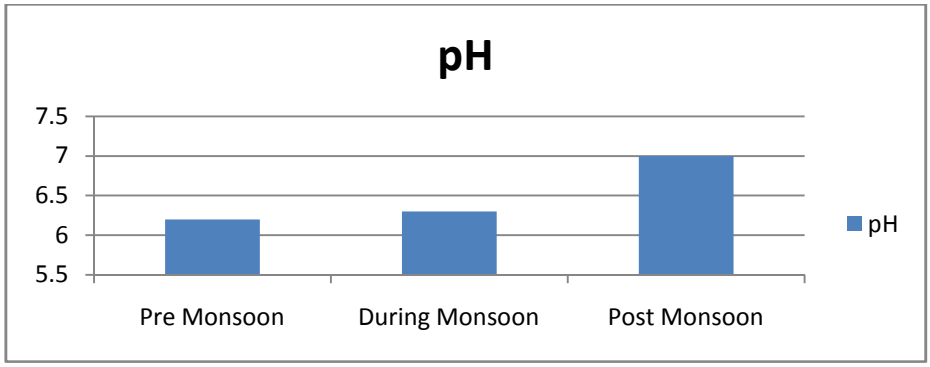
TABLE 2- COMPARISION WATER WITH DRINKING WATER QUALITY STANDARDS

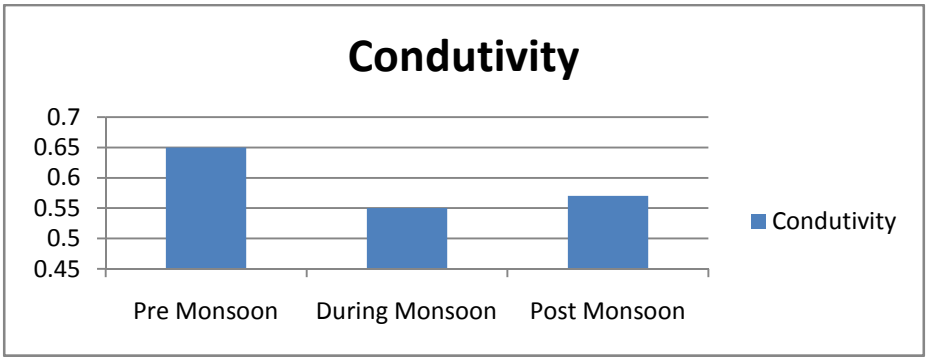
PARAMETER	MAX. VALUE	EUROPEAN	ICMR	USPH
pH	7.0	6.5-8.5	6.5-8.5	6.0-8.5
EC	0.65	400	400	300
TDS	782	500	500-1500	500
TH	290	500	300	500
TA	298	200	440	200
Ca^{2+}	107	100	75	100
Mg^{2+}	45.0	30	50	30
Fe	0.45	300	200	300
As	0.006	300	200	300
NO_3^-	3.20	30	45	30
Turbidity	1.10	10	10	5
Cl^-	21	250	250	250
So_4^{2-}	90	200	200	250
F^-	0.60	0.5-1.5	0.5-1.5	0.5-1.5

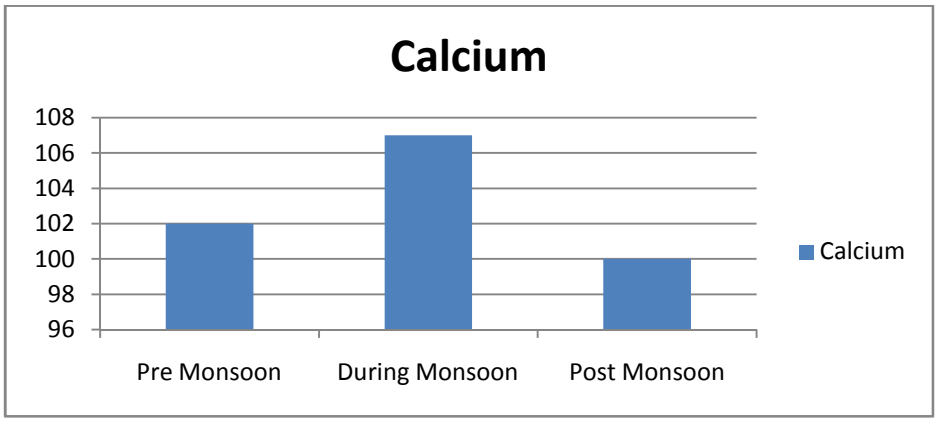
FIGURE 2- GRAPHS SHOWS THE VARIATION IN PARAMETRS DUE TO SEOSONAL CHANGES

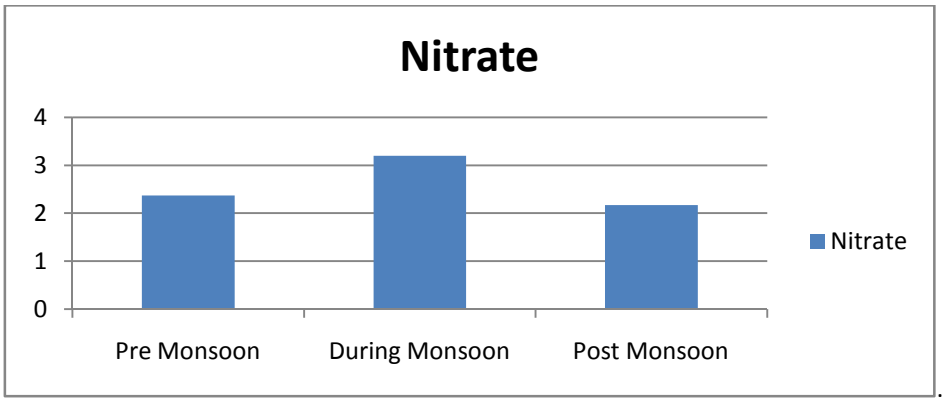


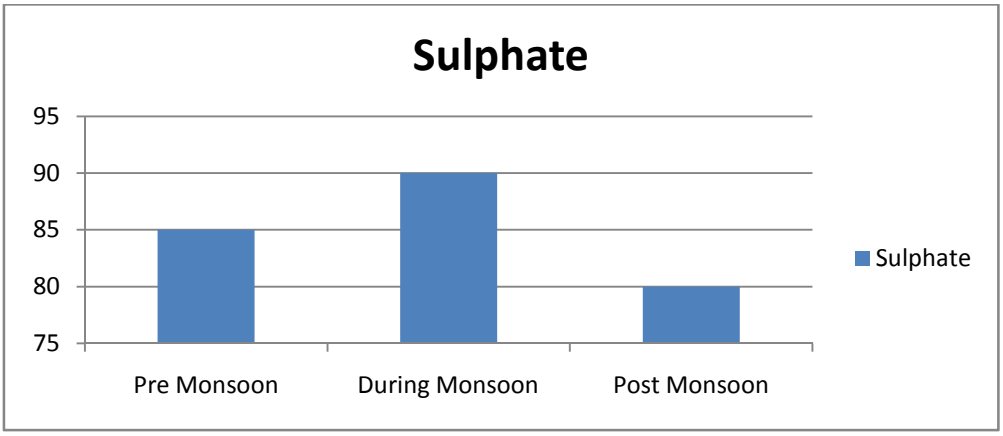


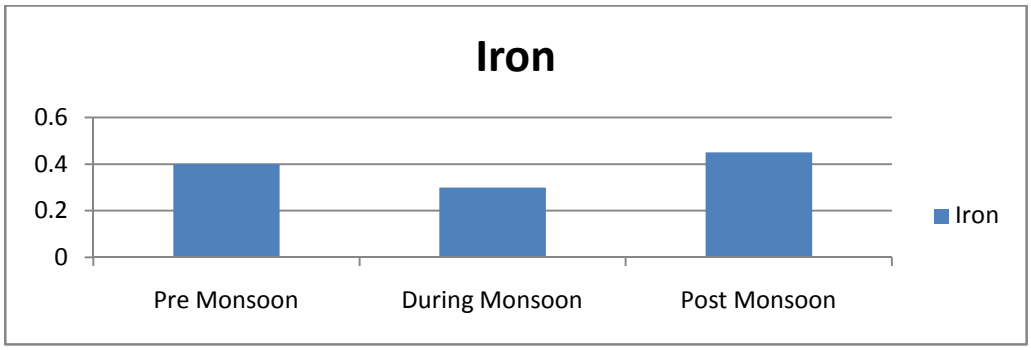

pH
7.5
7
6.5
6
5.5
Pre Monsoon
During Monsoon
Post Monsoon
pH

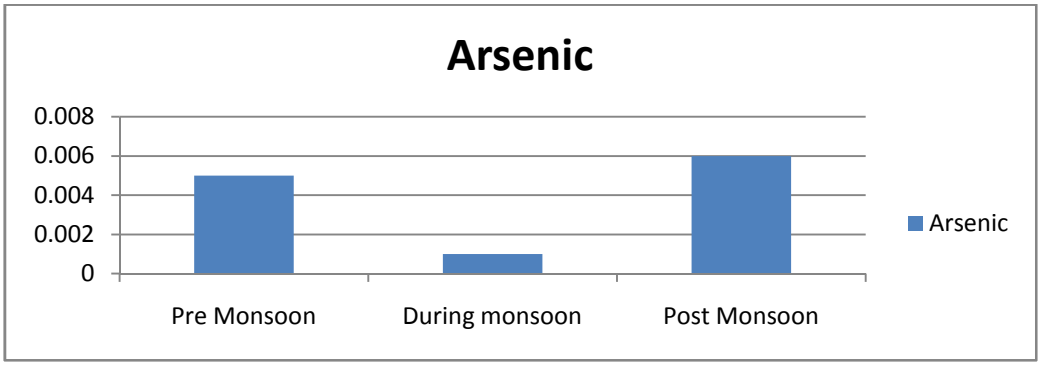

Condutivity
0.7
0.65
0.6
0.55
0.5
0.45
Pre Monsoon
During Monsoon
Post Monsoon
Condutivity

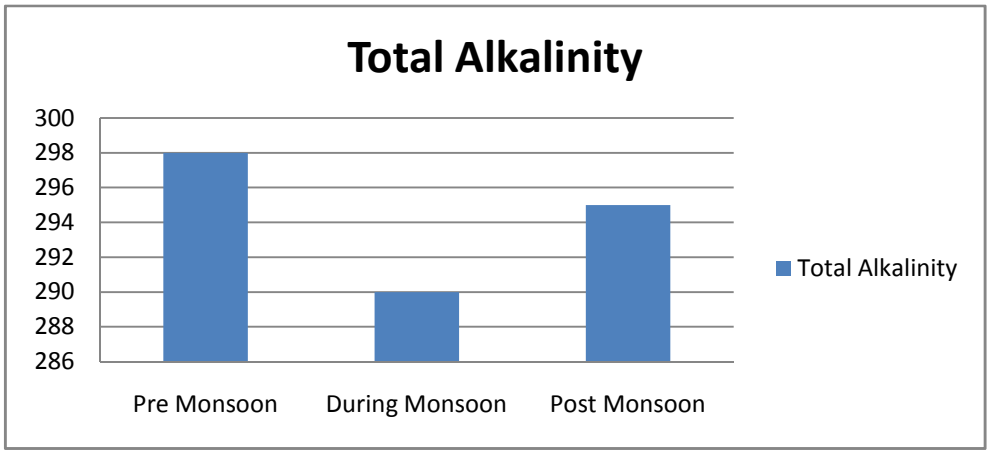

Calcium
108
106
104
102
100
98
96
Pre Monsoon
During Monsoon
Post Monsoon
Calcium

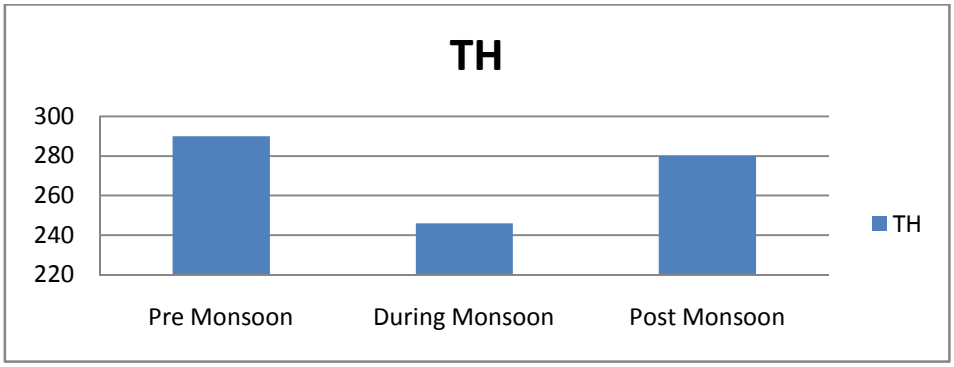

Nitrate
4
3
2
1
0
Pre Monsoon
During Monsoon
Post Monsoon
Nitrate

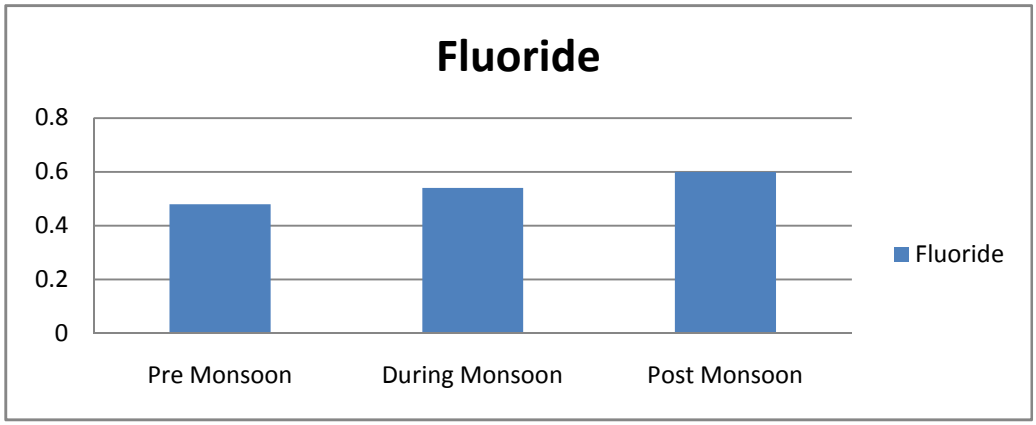

Sulphate
95
90
85
80
75
Pre Monsoon
During Monsoon
Post Monsoon
Sulphate

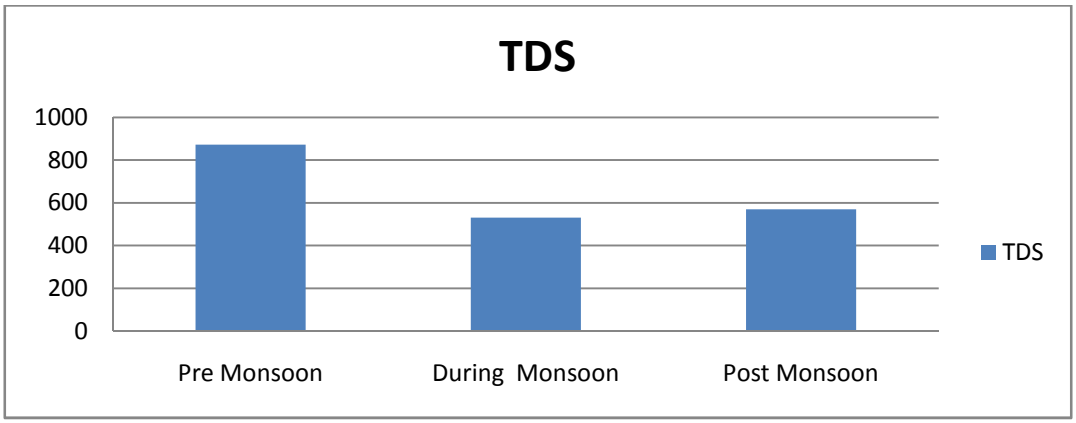

Iron
0.6
0.4
0.2
0
Pre Monsoon
During Monsoon
Post Monsoon
Iron

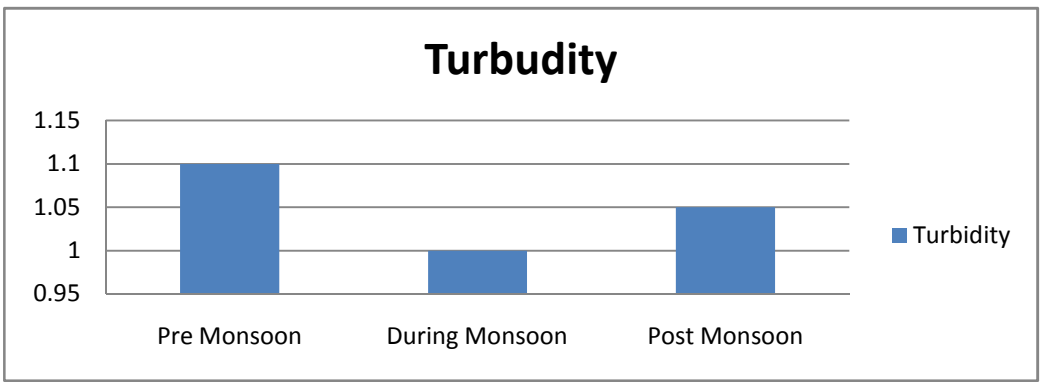

Arsenic
0.008
0.006
0.004
0.002
0
Pre Monsoon
During monsoon
Post Monsoon
Arsenic

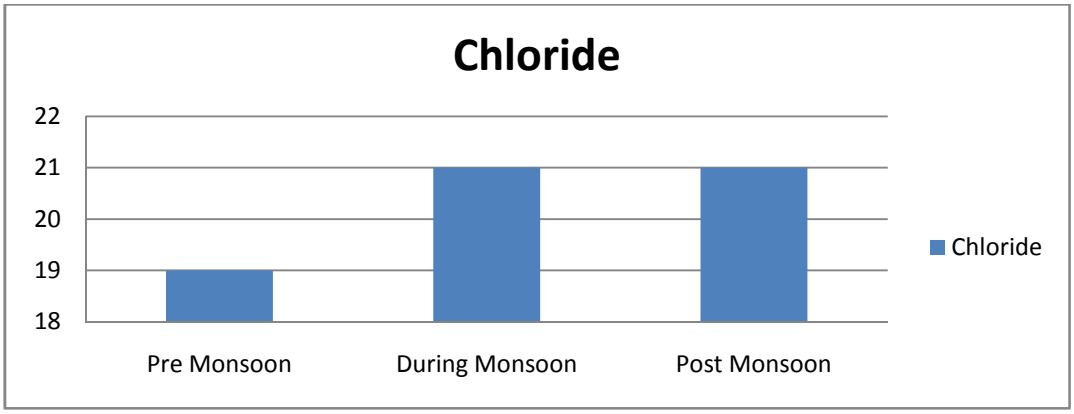

Total Alkalinity
300
298
296
294
292
290
288
286
Pre Monsoon
During Monsoon
Post Monsoon
Total Alkalinity


TH
300
280
260
240
220
Pre Monsoon
During Monsoon
Post Monsoon
TH


Fluoride
0.8
0.6
0.4
0.2
0
Pre Monsoon
During Monsoon
Post Monsoon
Fluoride


TDS
1000
800
600
400
200
0
Pre Monsoon
During Monsoon
Post Monsoon
TDS


Turbudity
1.15
1.1
1.05
1
0.95
Pre Monsoon
During Monsoon
Post Monsoon
Turbidity



CONCLUSION

This study shows that physico-chemical changes do not change water quality in Ara block and the result of the chemical analyses of ground water indicates no considerable variation. Most parameter complies with USPH, ICMR and EUROPEAN standards. In maximum locations it is not contaminated. It must be noted that a water quality of Ara block of Bhojpur District in good in all manner and it do not effected by seasonal variation.

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