

WATER QUALITY ASSESMENT IN MENTHA BELT AREA OF BARABANKI DISTRICT USING GEOSPATIAL TECHNIQUE

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ABSTRACT

Ground water plays a huge role in human existence and it is used for the purposes such as agriculture and drinking. In India, by far most of the populace is dependent on ground water. Thus, it is essential to screen the nature of water with the help of physio-chemical parameters. This examination assesses the physio-chemical properties of ground water, for example, Electrical Conductivity (EC), pH, Total Hardness (TH), Calcium(Ca), Chloride (Cl-), Magnesium(Mg), Bicarbonet (HCO_3) by gathering 23 water sample from different location of hand pumps (India Mark II) which is appropriated inside Barabanki District. Global Positioning System is used for plotting the water test areas and planning of water quality is done by use of Inverse Distance Weighted (IDW) method of Interpolation in ArcGIS 10.8.1. This examination assesses water quality of Barabanki District (2022).



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singhpratibha418@gmail.com**Received:** March 6, 2022**Revised:** March 22, 2022**Published:** April 30, 2022**Keywords-**Physio-chemical, Inverse Distance Weighted (IDW), Spatial Distribution Maps

INTRODUCTION

In the present situation, in a huge segment of the metropolitan territories in India, the step by step water demand is met by groundwater use, as the surface water is either missing or sullied. Groundwater is the essential source that is normally used for drinking and water framework purposes in provincial, metropolitan and semi metropolitan regions. All things considered, the examinations of physiochemical and organic boundaries lead to study the idea of groundwater. Hydro chemical characteristic of groundwater can in like manner be inspected for the groundwater assessment. Geographic Information System (GIS) arranging technique is the best agent contraption in the assessment of quality of groundwater and its utilization for water system, drinking and constructional needs. ArcGIS Software can accomplish better



comprehension of groundwater quality by speaking to the information. There is an opportunity of changes in groundwater quality due to hydrology and geologic conditions over some vague time span. Moreover, foolish evacuation of waste or refuse are one among the fundamental components for groundwater pollution. The current examination is completed in the Barabanki District situated in Uttar Pradesh. Notwithstanding, the significant wellspring of drinking water for region is groundwater which is now debased because of modern foundations.

Objectives of present study

The objective of current examination are given underneath-

- To plot the GPS points of water sample locations.
- To survey the water quality parameters
- To make spatial distribution map of various water quality parameters.

Study Area

Barabanki is a city and the administrative headquarters of Barabanki District in the state of Uttar Pradesh in India. The city is about 30 km east of Lucknow the state capital. The city is center of Sufi saint Warish Ali Shah at Deva Sharif.

Barabanki lies in the state of Uttar Pradesh is one of the most developing district, It is located in the center part of the state with area of about 3891.5 Sq.Kms. and is sub-divided into six tehsils named: Nawabganj, Fatehpur, Ramsanehi Ghat, Haidergarh, Ramnagar and Sirauli. District is bounded Faizabad in east Fatehpur from west Lucknow is in the south of District and in the North by Raybareli. Geographical extent of the district lies between 26°30' and 27°19' **North** Latitudes and 80° 58' and 81°55' **East** Longitudes. River Ghaghra is the main river flowing through the district and is the main source of water supply throughout the district. Study area map is

represented in Fig.1 below-

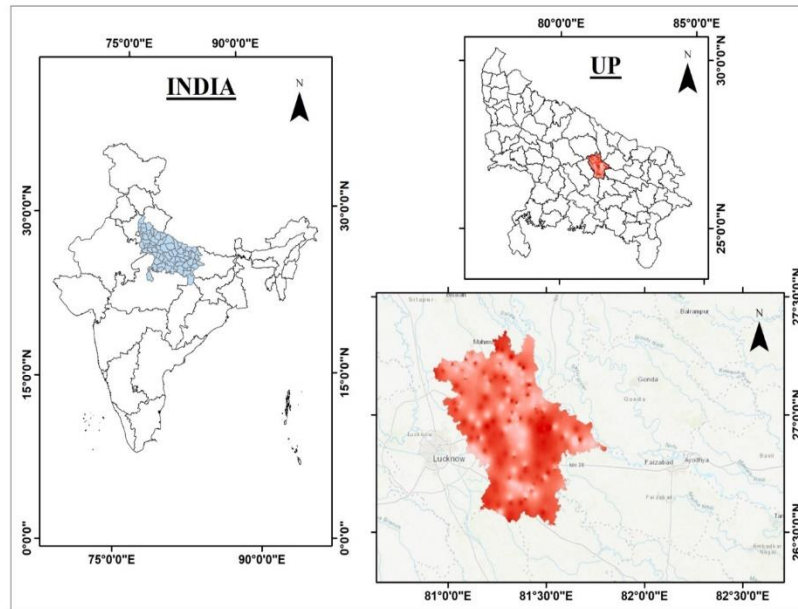


Fig.:-1 Location of Study Area

Material and Data Used

Data Used

♣ Survey of India Topographical Sheets: 63F/2 , 63F/9, 63F/5, 63F/6, 63E/8, 63E/12, 63E/16, 63A/16, 63E/7, 63E/3, 63F/13, 63F/1, 63E/4

Instruments used for water quality assessment

- ♣ Global Positioning System
- ♣ Water quality field kit
- ♣ Digital pH-meter
- ♣ Digital conductivity meter

Methodology

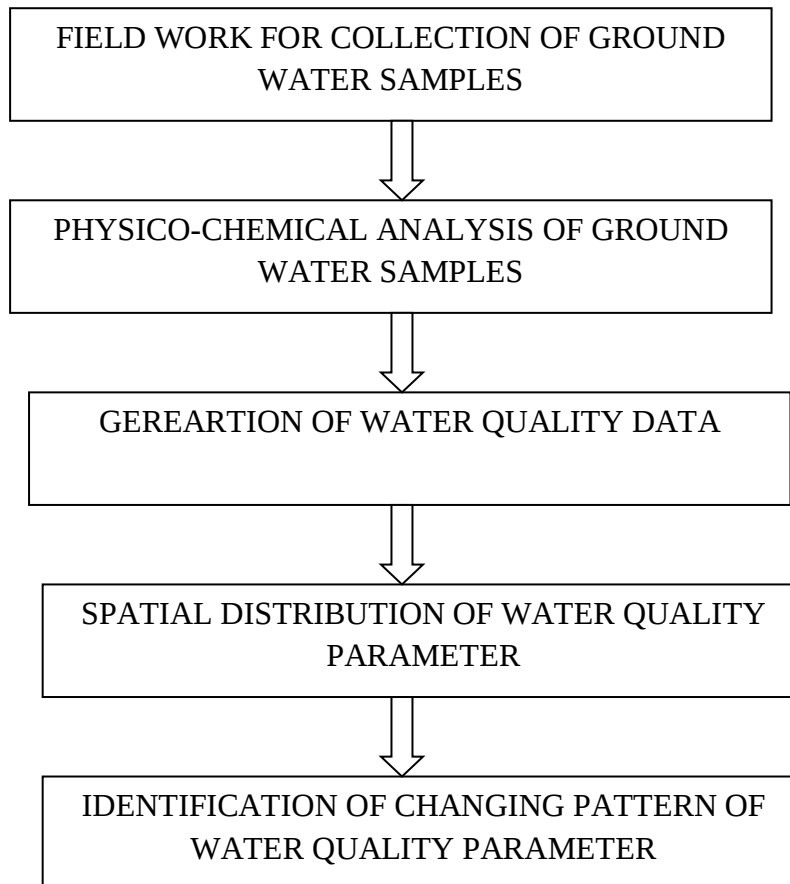


Fig -2: Flow chart of methodology

For the analysis of water quality parameters total 80 samples were collected in the buffer zone of Ghaghara River. All these samples were analysed in the water testing laboratory. GPS (Global Positioning System) used for the identification of the coordinate of the locations at which water sample has been collected. ArcGIS 10.8.1 is used for the spatial distribution of various parameters of water quality with the help of IDW (Inverse Distance Weighted) tool. Drainage map is generated with the help of Survey of India topographical sheets. Which helps in identifying the cause of change in distribution of various parameters.

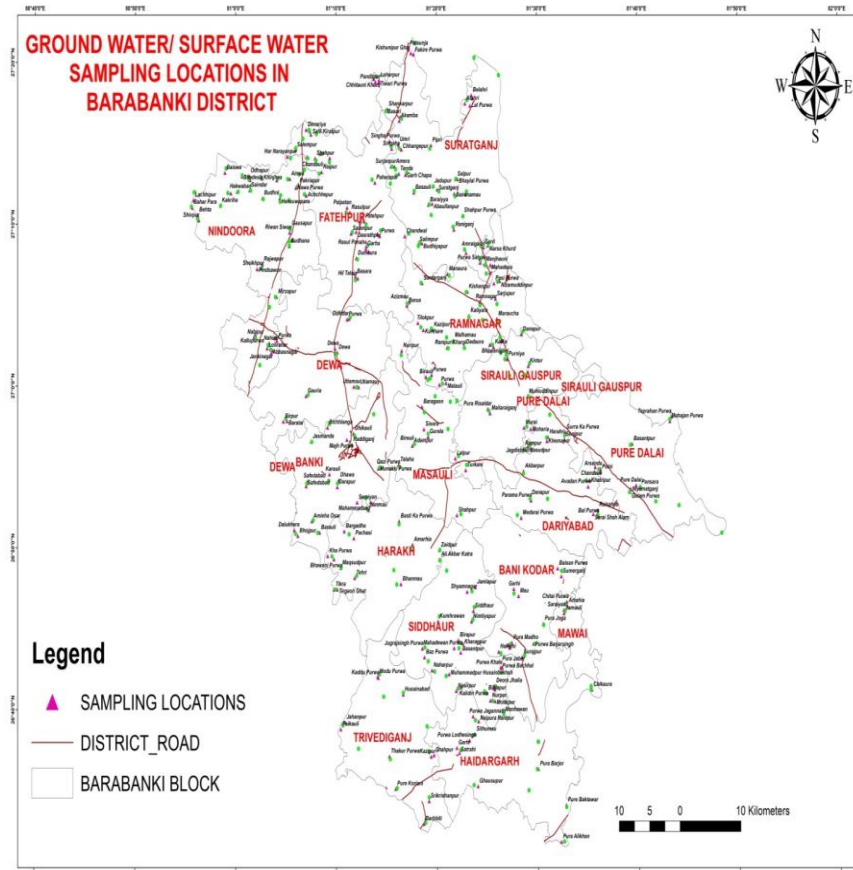


Fig.-2Field Sampling Map

Result and Discussion

Table. 1. Result of Different Location of Barabanki District

S.N.	Sampling Station	Latt.	Long.	pH	EC	TH	Ca ⁺⁺	HCO ₃	Cl ⁻	Mg ⁺⁺
1	Banki	26.63623	81.32354	8.2	511	74.88	26.85	228.83	10.64	48.03
2	Baba kiKuti	26.64002	81.31083	7.7	513	97.26	40.28	213.57	36.16	56.98
3	Barabanki(New)	26.71111	81.25333	8.2	662	48.02	16.85	198.32	157.40	21.17
4	Chaubisi	26.84294	81.09847	7.67	337	43.71	24.17	167.81	17.02	19.54
5	Daryabad	26.90285	81.12338	7.48	503	66.04	41.62	218.83	46.79	24.42
6	Datauli Chanda	26.91161	81.15186	7.12	628	93.84	56.39	350.87	63.81	37.45
7	Dewa	26.94865	81.15572	7.75	416	50.18	28.20	137.30	42.54	21.98
8	Fatehpur(new)	26.98571	81.12722	7.94	350	44.76	25.85	134.30	17.02	17.91
9	Gutauna	27.02525	81.17035	7.69	465	38.58	21.48	152.55	12.76	17.10
10	Kaisarganj	27.06883	81.17373	7.9	658	48.22	23.57	335.61	14.89	14.65
11	Kalkeshwar temp	27.11326	81.19919	7.8	343	21.57	13.43	157.81	76.57	8.14
12	Kitlupur	27.16955	81.20387	7.2	812	95.75	55.05	305.10	142.51	40.70
13	Kotwa Sarai	27.17622	81.14097	8.1	767	28.08	13.43	427.14	75.57	14.65
14	MasauliChaurah	27.17671	81.09990	8.0	464	16.97	12.08	381.38	78.70	4.88
15	Purwaamarsingh	26.58650	81.40013	7.4	638	19.94	13.43	305.10	70.19	6.51
16	Ramnagar	26.97099	81.38196	8.2	649	85.33	65.79	208.83	42.54	19.54
17	Rani Katra	26.97100	81.37552	7.5	477	64.99	38.94	258.83	38.29	26.05
18	Rasauli	26.94655	81.24867	7.35	620	44.68	34.91	152.55	14.89	9.77
19	Sarai Barai	26.58651	81.40013	7.36	451	35.04	22.83	167.81	70.19	12.21
20	Sidhaur	26.83557	81.55667	7.5	524	71.21	40.28	381.38	27.65	30.93
21	Sundhiamau	26.84583	81.54361	8.0	602	70.40	41.28	161.81	91.46	30.12
22	Tikaitnagar	26.89944	81.57722	7.6	769	56.56	39.28	244.08	93.59	16.28
23	Trivediganj	26.96889	81.16389	7.8	573	56.97	26.85	198.32	59.56	30.12

*** All values in mg/l except pH**

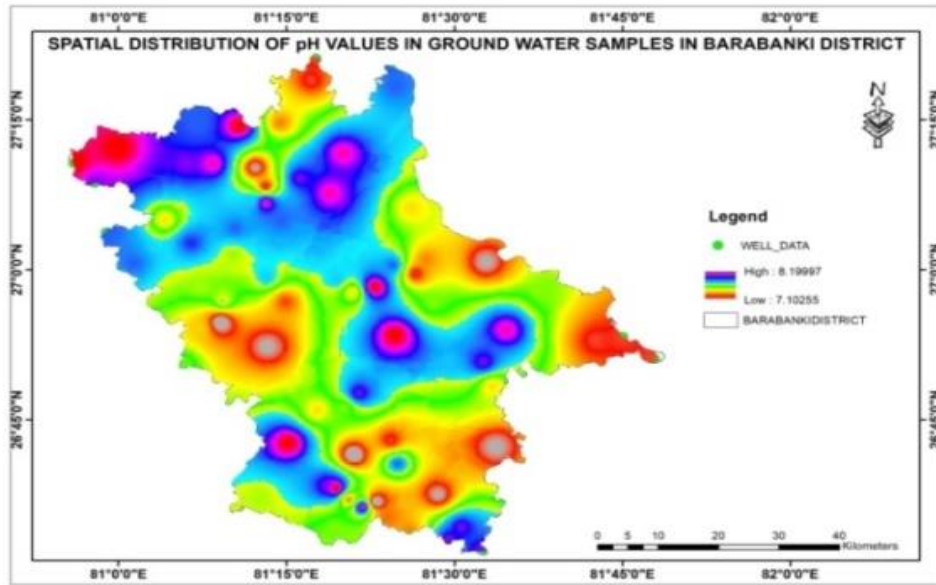


Fig. 3:- Spatial Distribution of pH value of Ground Water

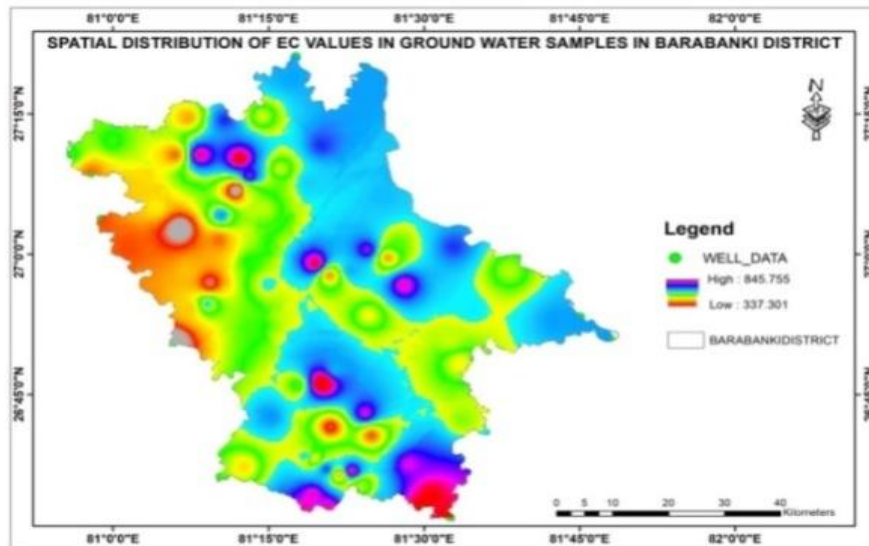


Fig. 4:- Spatial Distribution of EC value of Ground Water

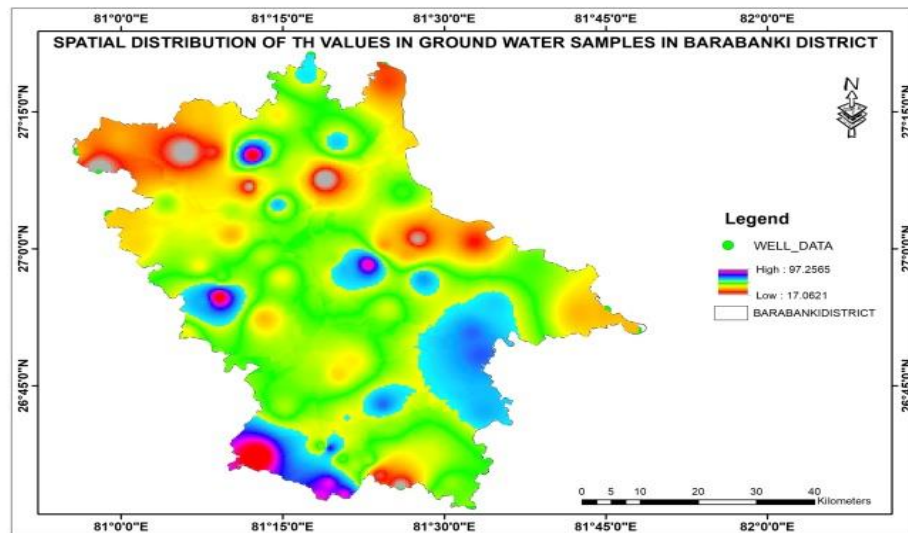


Fig. 5:- Spatial Distribution of T.H. value of Ground Water

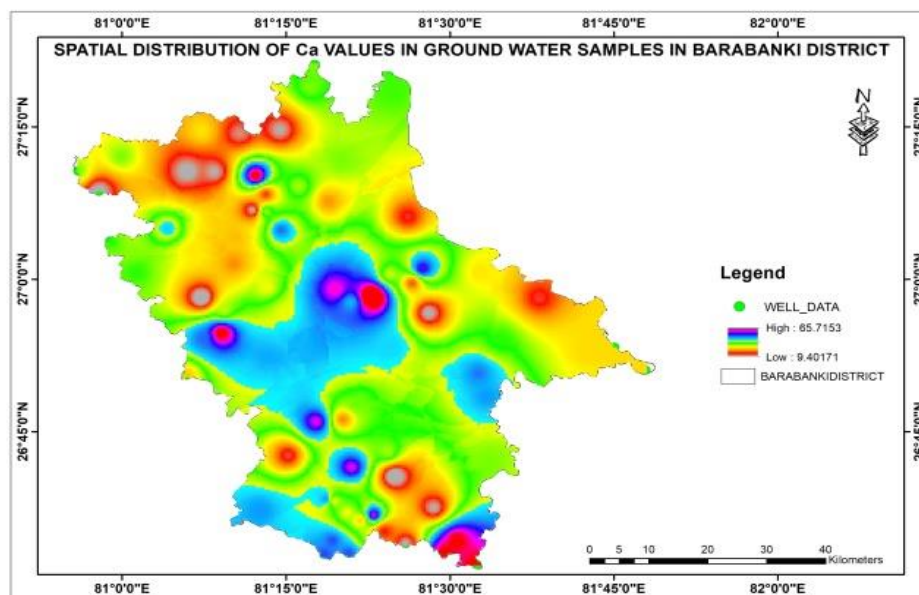


Fig. 6:- Spatial Distribution of Ca value of Ground Water

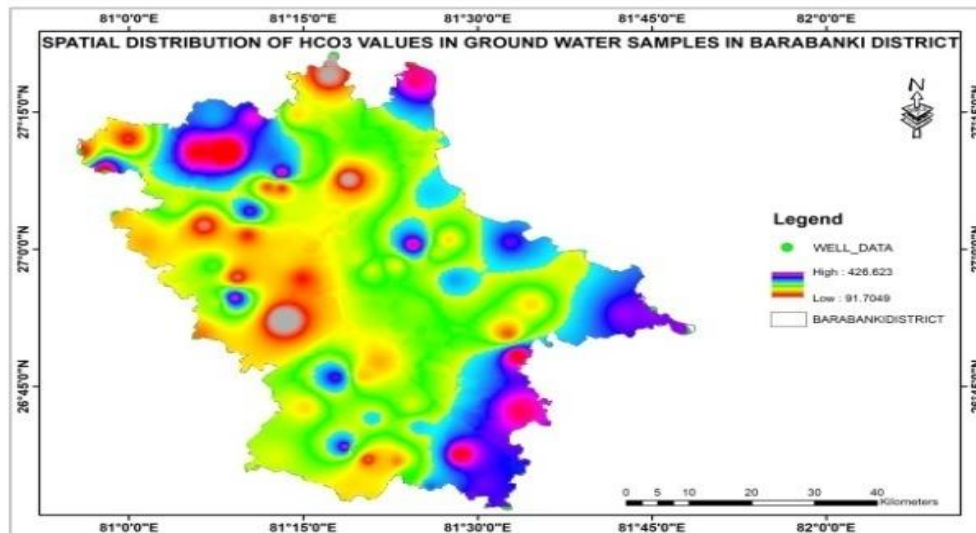


Fig. 7:- Spatial Distribution of HCO_3 value of Ground Water

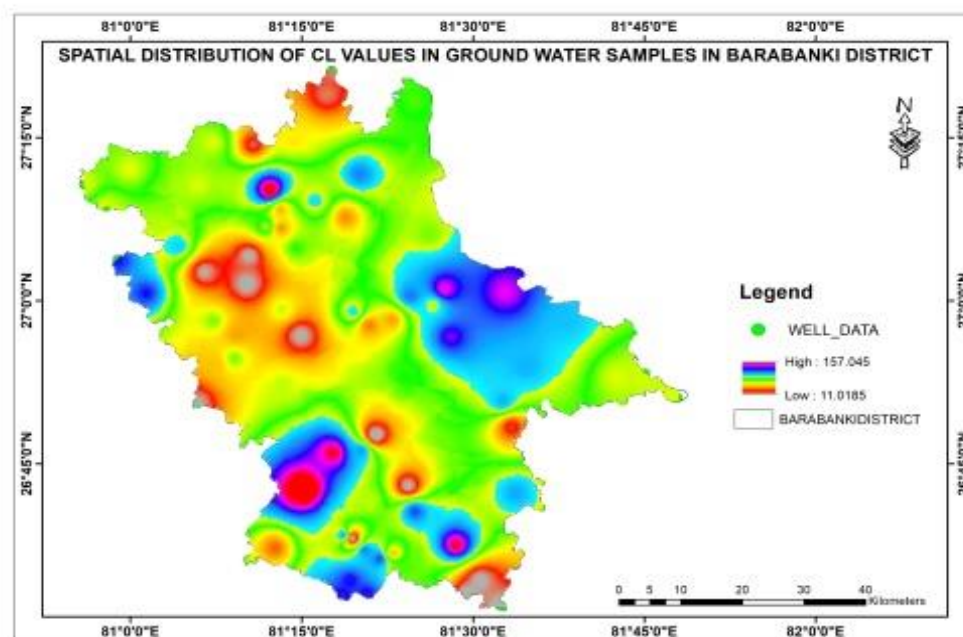


Fig. 8:- Spatial Distribution of Cl^- value of Ground Water

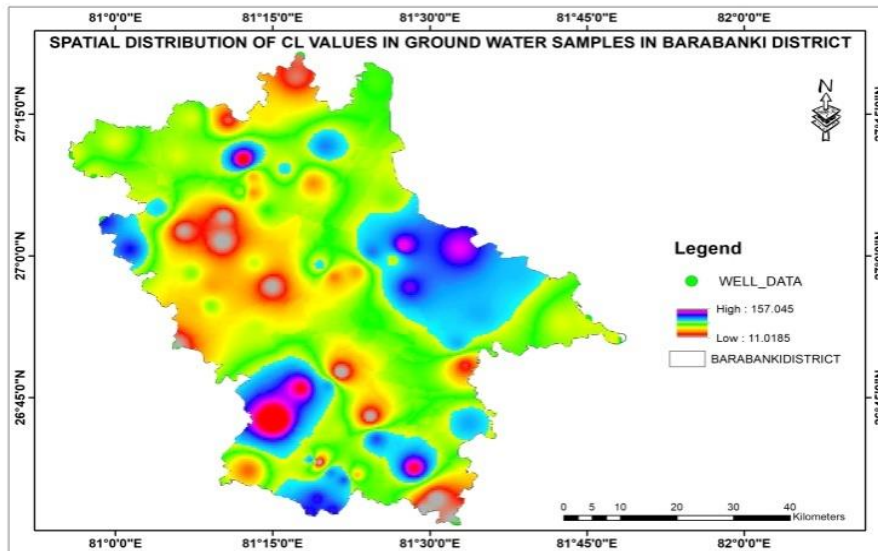


Fig. 9:- Spatial Distribution of HCO_3 value of Ground Water

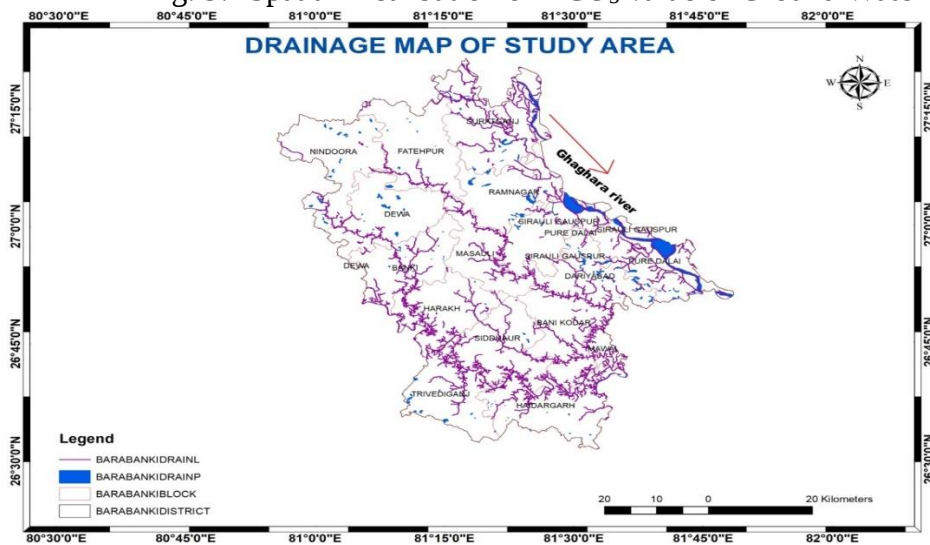


Fig -10: Drainage map of study area

CONCLUSION

The present study investigates water quality parameters i. e pH, Electrical conductivity, Total hardness, Ca^{++} , Mg^{++} , HCO_3 , Cl of Barabanki district, U.P to check the suitability for purpose of drinking. The parameters such as pH, Electrical conductivity, Total hardness, Mg , Ca , Cl , HCO_3 are within permissible limits as per BIS (IS 10500: 2012) Standards for drinking water. However, in some part of Barabanki district the level of permissible limit for drinking purpose. Hence, the water is not suitable for drinking directly, as it may result in bad health of the people living there. However, with some suitable treatments, it can be used for drinking purpose.

REFERENCES

- [1] American Public Health Association “Standard methods for the examination of water and wastewater. American Public Health Association, American Water Works Association, and Water Pollution Control Federation”, 19th edition, Washington, D.C, 1995.
- [2] BIS. Standards for water for drinking and other purposes, Bureau of Indian standards publication. New Delhi, 2012.
- [3] Barik, R.N. and Patel, R.K., 2004. Seasonal Variation of Water Quality of Atharabanki River near Paradip. Indian J. of Envi. Prot., 24(3): 161 - 166.
- [4] Magesh, N. S., & Chandrasekar, N. (14 december 2011). Evaluation of spatial variations in groundwater quality by WQI and GIS technique: a case study of Virudunagar District, Tamil Nadu, India. Arabian journal of Geosciences 6, 1883–1898(2013).
- [5] Manivanan, R. (2006). Recycling of Industrial Effluents. Pune: New India Publishing Agency.
- [6] Pandey, S. K., & Tiwari, S. (2009). Physico-chemical analysis of ground water of selected area of Ghazipur city-A case study. Nature and Science, 2009;7(1), ISSN 1545-0740.
- [7] Porchelvi, R. S., & Selvavathi, P. (2017). Analysis of Ground Water Quality by Fuzzy Comprehensive Evaluation in Cauvery Delta Region, Tamil Nadu, India. American Journal of Mathematical Analysis, Vol. 5 No. 1, 1-6.
- [8] Prasanth, SV Sarath, et al. "Evaluation of groundwater quality and its suitability for drinking and agricultural use in the coastal stretch of Alappuzha District, Kerala, India." Applied Water Science 2.3 (2012): 165-175.
- [9] Ramakrishnaiah, C. R., Sadashivaiah, C., & Ranganna, G. (2009). Assessment of Water Quality Index for the Groundwater in Tumkur Taluk, Karnataka State, India. E- Journal of Chemistry, 6(2), 523-530.



- [10] Ranjan, R. K., Ramanathan, A., Parthasarathy, P., & Kumar, A. (01 June 2012). Hydrochemical characteristics of groundwater in the plains of Phalgu River in Gaya, Bihar, India. *Arabian Journal of Geosciences* volume 6, pages 3257–3267 (2013).
- [11] Ravikumar, P., & Somashekar, R. K. (27 November 2011). A geochemical assessment of coastal groundwater quality in the Varahi river basin, Udupi District, Karnataka State, India. *Arabian Journal of Geosciences* volume 6, 1855–1870 (2013).
- [12] Singh, P., & Shukla, D. K. (2010). Ground Water Quality mapping in Gorakhpur District. 11th ESRI India User Conference. ESRI India.
- [13] Srikanthan, L., Jayaseelan, J., Narendran, D., Manikandan, I., & Sing, S. H. ((2013)). Determination of ground water quality using water quality index in part of Chennai city, Tamilnadu. *Indian Journal of Science*, 3(8), 81-84.
- [14] WHO. Guidelines for Drinking Water Equality, World Health Organization, Geneva 1984; 2:49.