International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 07 | July 2021 www.irjet.net p-ISSN: 2395-0072

ANALYSIS AND SPATIAL DISTRIBUTION OF DIFFERENT WATER QUALITY PARAMETER IN THE BUFFER ZONE OF KALI RIVER USING FIELD METHODOLOGY AND GIS

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Abstract - *The rivers and the water bodies should be the existence line for any civilization. This study evaluates the chemical properties of Kali River water such as pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Hardness (TH), Calcium (Ca), Magnesium (Mg) by collecting 14 water samples from river channel which is well distributed within 2 km buffer zone of Kali River in 2020. Global Positioning System (GPS) was used to identify and plot the locations of water sampling and spatial distribution of water quality parameter was done with the help of Inverse Distance Weighted (IDW) that is Interpolation tool in ARCGIS 10.4. This study is done to identify the pattern of change in different water quality parameter.*

Key Words: Spatial Distribution, Inverse Distance Weighted (IDW), Buffer

1.INTRODUCTION

Kali River water is an essential factor for the advancement of the study area. The study emphasis on the variation of different parameters and how is it changing as Kali River meets the River Ganga. The total length of river in the study area is about 168.2 km and the total area of buffer zone along Kali River is 278.58 square km. Kali River East origins from the Anthawada town which is situated in the north direction of Daurala square of Jansath tehsil of Muzaffarnagar area. This river travels a distance of around 498 km from its origin point and travels through various districts of Uttar Pradesh before to converging into stream Ganga close to Kannuaj. This river never streams straight and streams in a crisscross way or in zig-zag manner, likewise called Nagin and nearby close to Kannauj, it is called Kalindi.

1.1 Objectives

The principal objectives of this study are

- Assessment of different water quality parameter
- Spatial Distribution of these parameter in buffer zone of Kali River

2. STUDY AREA

The area under study is a part of the Kali River stretch between border of village Bhanau and Kannauj of Indo-Gangetic Plains, which lies between the latitude 27°00'45"N to 27°22'40"N and the longitude 79°59'06"E to 79°08'53"E in 4 districts of Uttar Pradesh which are Etah, Mainpuri, Farrukhabad and Kannauj

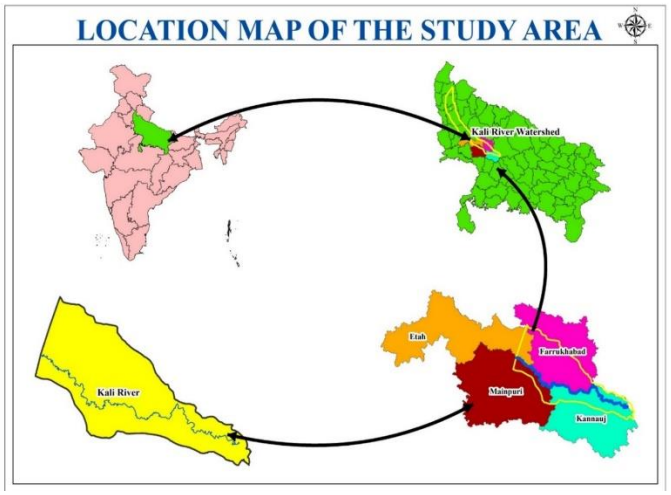

Fig -1: Location Map

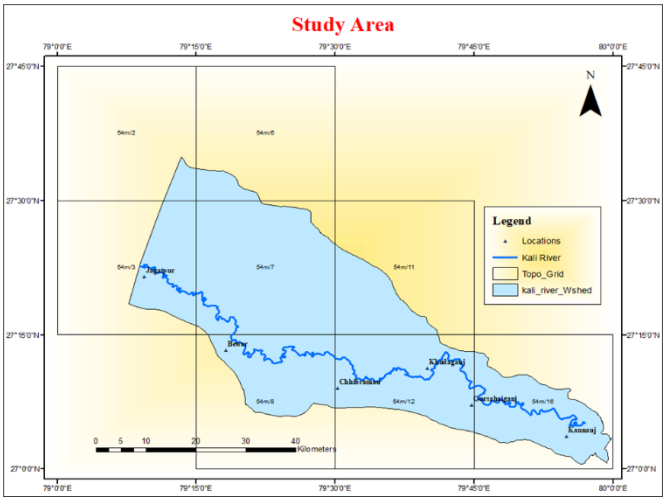

Fig -2: Map of Study Area

3. MATERIAL AND DATA USED

3.1 Data Used

- Survey of India Topographical Sheets: 54M/2, 54M/3, 54M/6, 54M/7, 54M/8, 54M/11, 54M/12)

3.2 Instruments used for water quality assessment

- Global Positioning System
- Water quality field kit
- Digital pH-meter
- Digital conductivity meter
- Titrimetric method (with EDTA)

4. METHODOLOGY

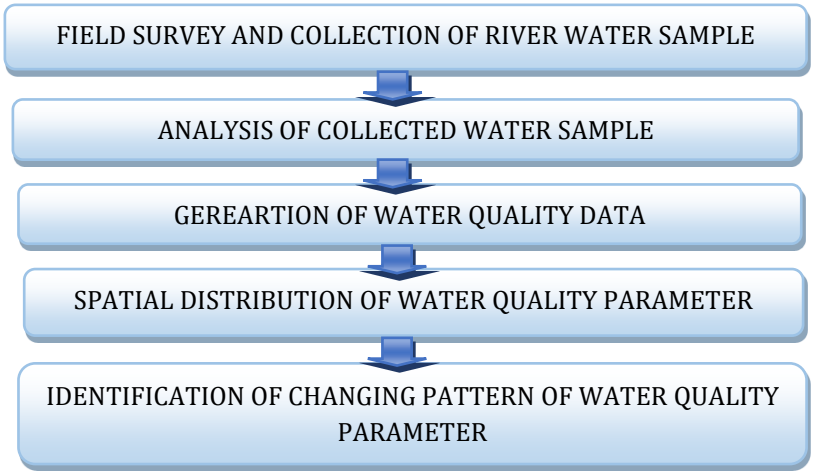

Fig -3: Flow chart of methodology

For the analysis of water quality parameters total 14 sample were collected in the buffer zone of Kali 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 10.4 is used for the spatial

distribution of various parameter 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.

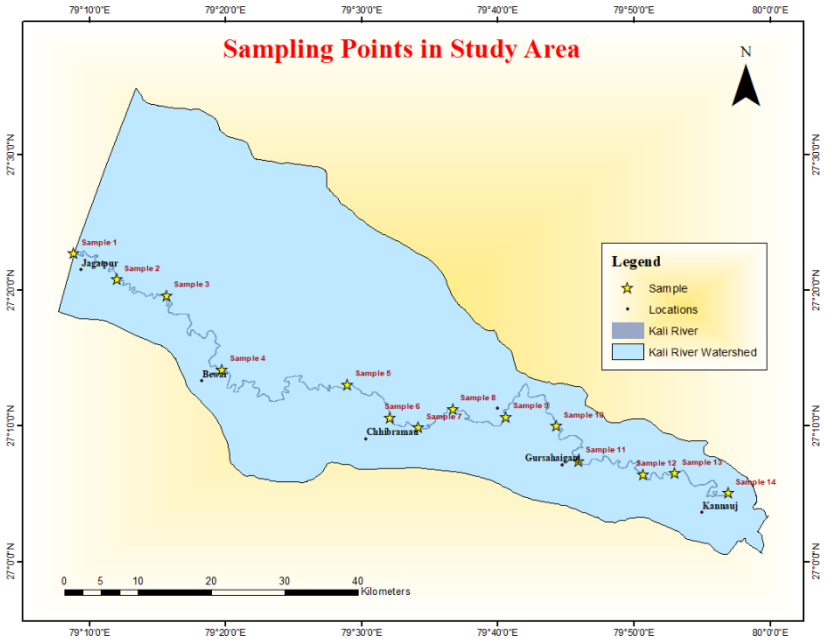

Fig -4: Sampling location map

5. RESULT AND DISSCUSSION

Table -1: Values of Various water quality parameter

Sample No.	Ph	EC (uS/cm)	HCO3 (mg/l)	CI (mg/l)	Ca (mg/l)	T.H. (mg/l)	Mg (mg/l)	TDS (mg/l)
1	8.00	671	350.82	104.22	89.51	409.42	45.25	402.6
2	7.71	687	259.30	104.22	82.05	409.42	49.77	412.2
3	7.75	680	274.56	97.84	89.51	362.90	33.94	408
4	7.82	885	396.58	127.61	89.51	437.34	52.03	531
5	7.87	828	396.58	114.85	93.24	446.64	52.03	496.8
6	7.90	822	320.32	157.39	93.24	428.03	47.51	493.2
7	7.97	820	350.82	136.12	89.51	428.03	49.77	492
8	7.92	818	305.06	144.63	89.51	465.25	58.82	490.8
9	7.93	793	335.57	116.98	85.78	325.68	27.15	475.8
10	8.26	287	167.79	42.54	48.48	167.49	11.31	172.2
11	7.99	292	167.79	14.89	52.21	223.32	22.62	175.2
12	8.11	293	152.53	25.52	48.48	223.32	24.89	175.8

13	7.84	302	183.04	23.40	44.75	195.41	20.36	181.2
14	8.12	332	167.79	31.90	52.21	204.71	18.10	199.2

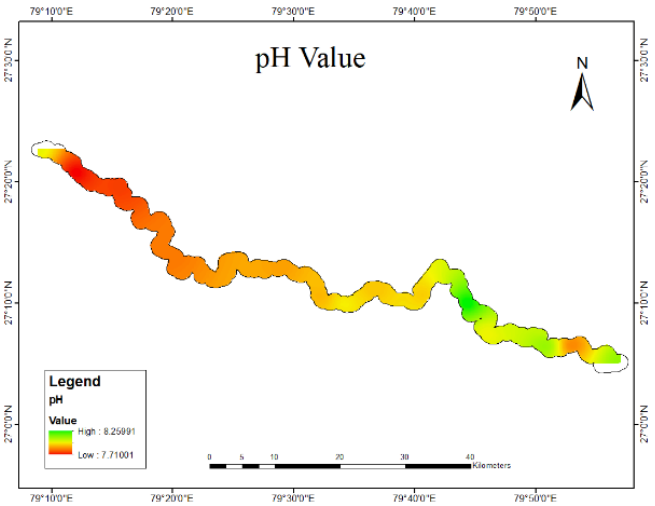

Fig -5: Spatial Distribution of pH

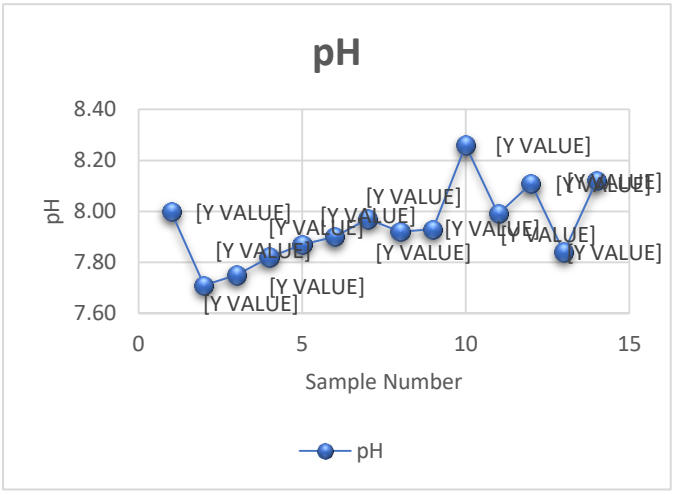

Chart -1: Variation in pH

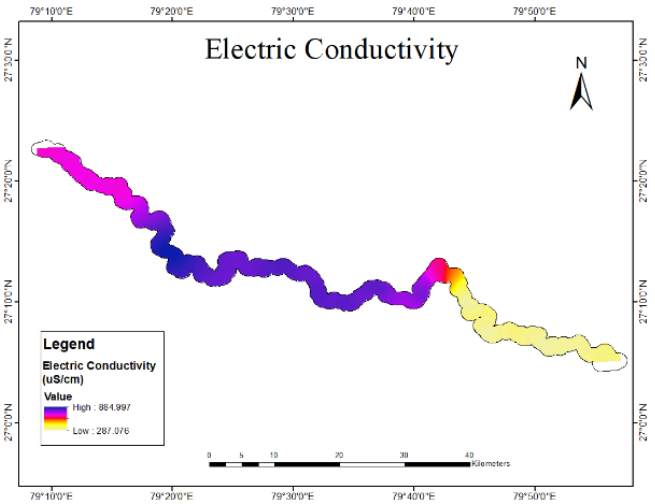

Fig -6: Spatial Distribution of EC

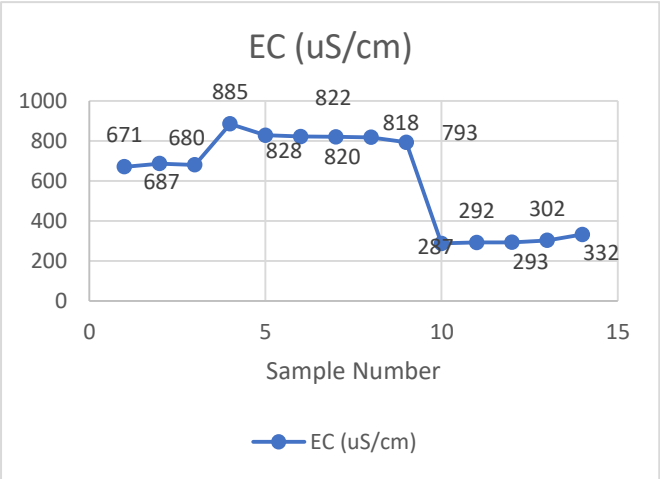

Chart -2: Variation in EC

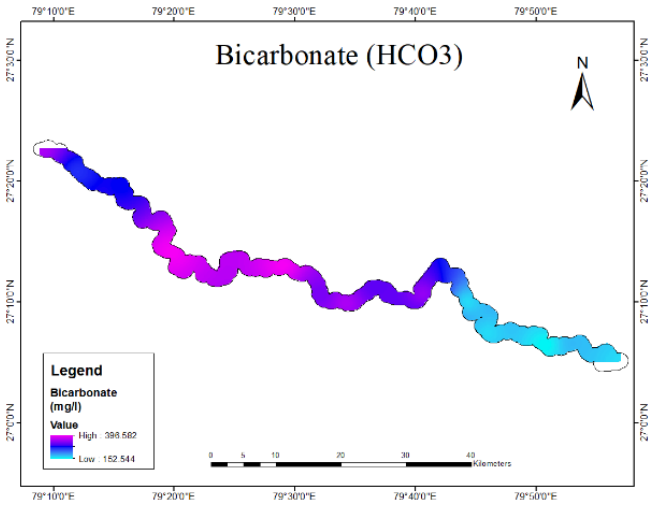

Fig -7: Spatial Distribution of Bicarbonate

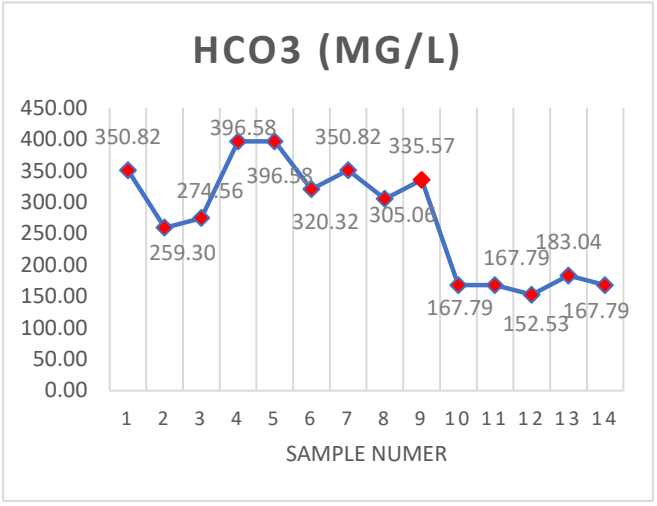

Chart -3: Variation in Bicarbonate

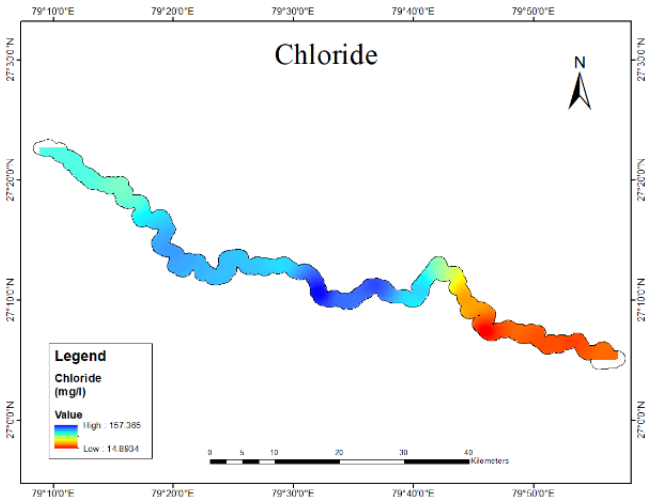

Fig -8: Spatial Distribution of Chloride

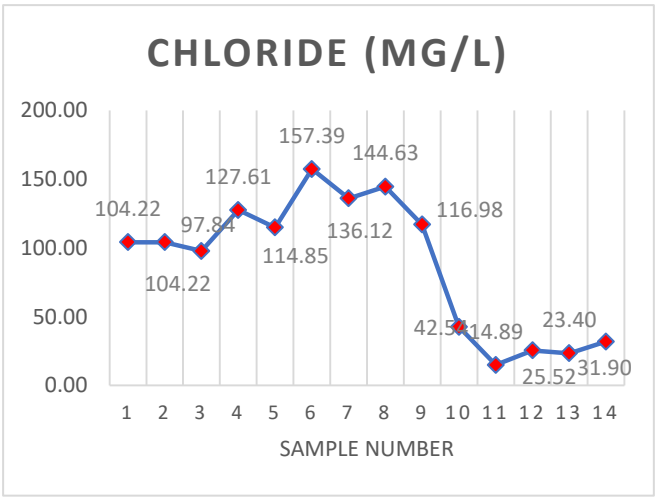

Chart -4: Variation in Chloride

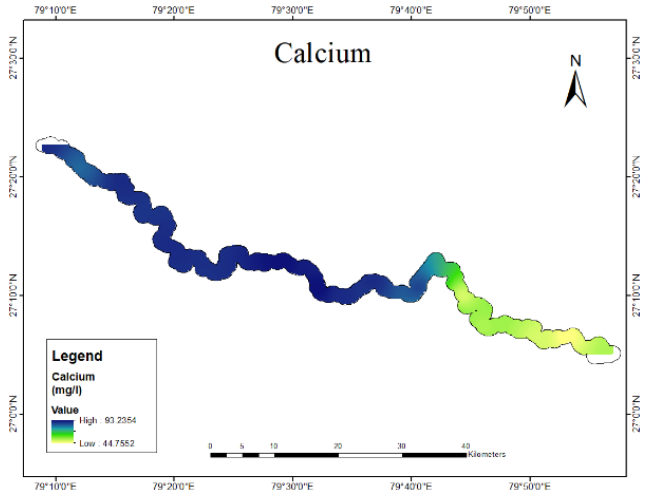

Fig -9: Spatial Distribution of Calcium

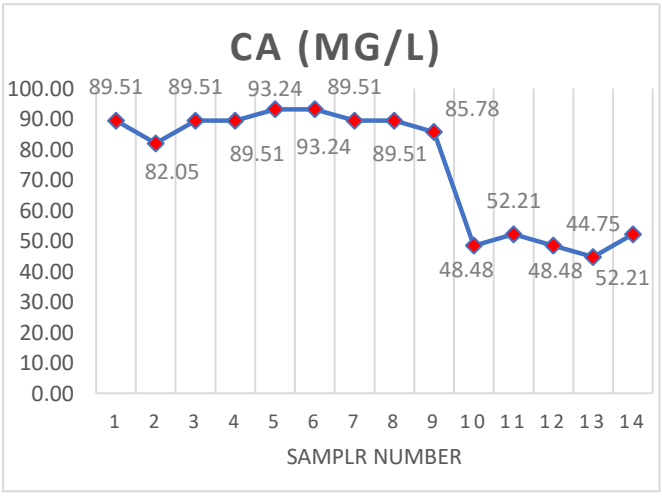

Chart -5: Variation in Calcium

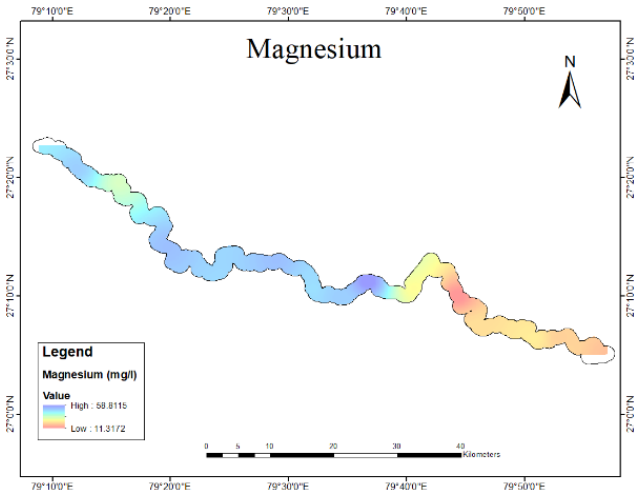

Fig -10: Spatial Distribution of Magnesium

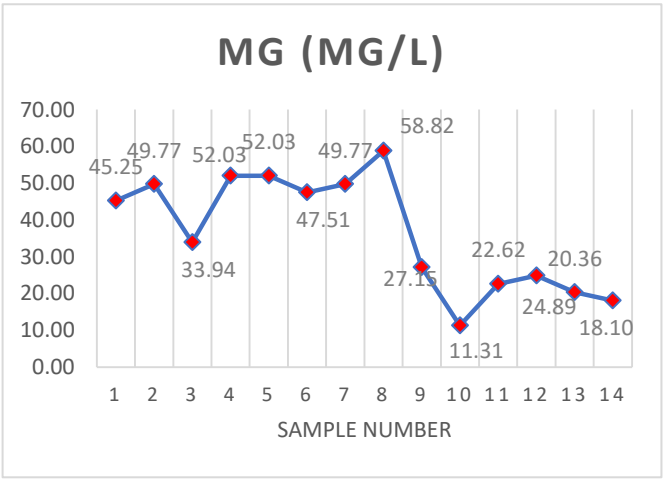

Chart -6: Variation in Magnesium

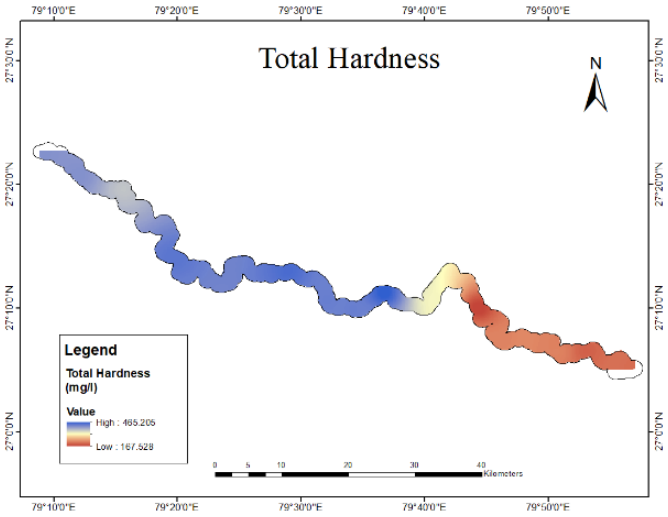

Fig -11: Spatial Distribution of Total Hardness

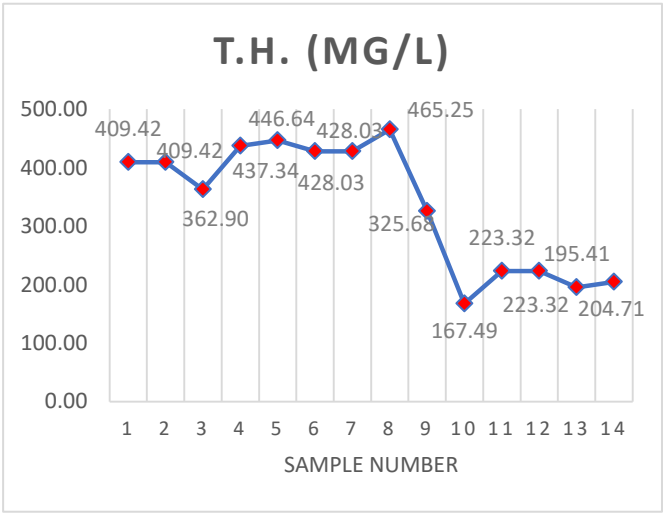

Chart -7: Variation in Total Hardness

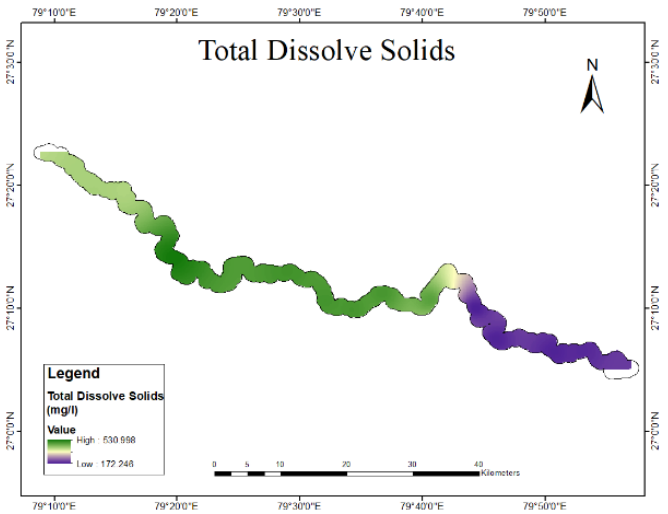

Fig -12: Spatial Distribution of TDS

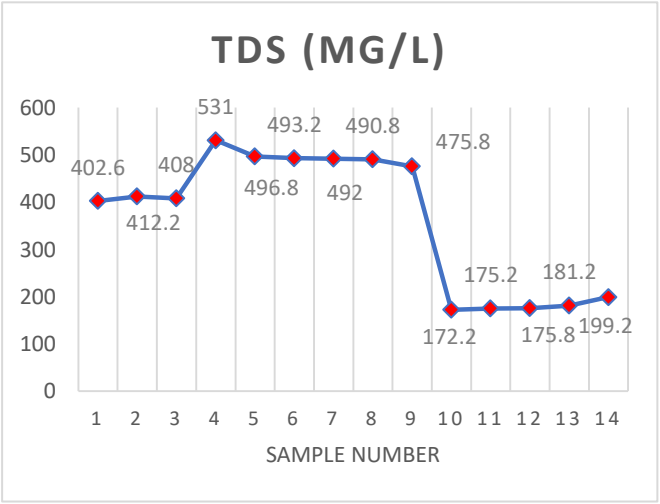

Chart -8: Variation in TDS

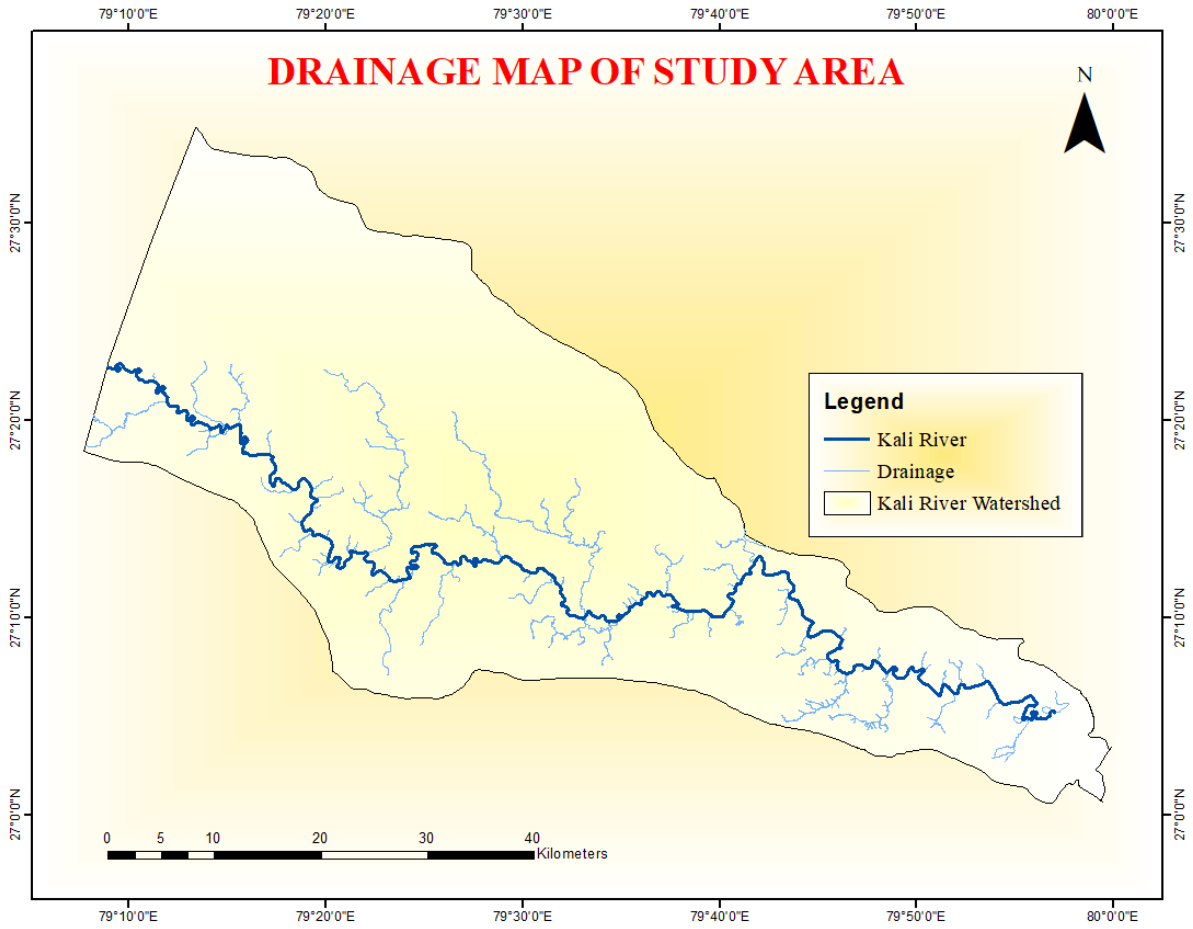

Fig -13: Drainage map of study area

6. CONCLUSION

As indicated by BIS (Bureau of Indian Standard) pH of surface water body ought to be least 6.5 and maximum 8.5 which are under the admissible limit that is 6.5-8.5. At first electric conductivity at Border of village Ramnagar and Bhanau is 671 uS/cm, most elevated is 885 uS/cm at Village Gazianpur and finally EC of the river water is 332 uS/cm at the endpoint. In the river at first, the value of bicarbonate was 350 mg/l at the boundary of Ramnagar and Bhanau village, most extreme is 396.5 mg/l and before merging is 167.7 mg/l. In the beginning calcium hardness is 89.05 mg/l, most elevated at village Abhaypur is 93.24 mg/l and finally, at merging point is 52.21 mg/l. Chloride concentration in the river water is 104.22 mg/l, most elevated is close to town Harballabh which is 157.39 mg/l and prior to depleting into Ganga River chloride concentration is 31.90 mg/l. Magnesium concentration is 45.25 mg/l at the beginning stage, most elevated is found close to village Darora which is 58.82 mg/l and before intersection point magnesium concentration is 18.10 mg/l. At first Total hardness is 409.42 mg/l, most extreme is at close to town Darora which is 465.25 mg/l and finally at the confluence point, total hardness is 204.71 mg/l. The most elevated value of TDS is seen close to town Gazianpur which is 531 mg/l and finally, at merging point, the value of TDS is 199 mg/l. By overlying the drainage map, it can be concluded that different streams which are merging with Kali River are responsible for variation in different parameter in the study area.

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