A PROJECT REPORT

ON

A Geospatial Analysis of Ground Water Quality Mapping using GIS

in

Nalgonda District

Telangana - A casestudy

DEPARTMENT OF GEOLOGY

UNIVERSITY COLLEGE OF SCIENCE SAIFABAD

The project work carried out with collaboration of

TELANGANA REMOTE SENSING APPLICATION CENTRE (TRAC)

AS A PARTIAL FULFILLMENT OF M.Sc GEOLOGY(CBCS)
COURSE OF THE OSMANIA UNIVERSITY,HYDERABAD-04

PROJECT WORK / DISSERTATION

SUBMITTED TO

DEPARTMENT OF GEOLOGY

UNDER ESTEEMED GUIDANCE

DR.CH.VENKATESHWARLU SIR

BY

E. MANITEJA

H.NO- 1011-20-522-019

M.Sc GEOLOGY (IV SEMESTER) 2020-2022

DEPARTMENT OF GEOLOGY

UNIVERISTY COLLEGE OF SCIENCE, SAIFABAD

OSMANIA UNIVERSITY

HYDERABAD-04 , 2022.

UNIVERSITY COLLEGE OF SCIENCE SAIFABAD

OSMANIA UNIVERSITY

DEPARTMENT OF GEOLOGY

CERTIFICATE

This is to certify that the project entitled '' **A Geospatial analysis for ground water quality mapping using GIS – A case study'' (UNIVERSITY COLLEGE OF** Partial fulfillment of the requirement for award of **MASTER OF SCIENCE (M.Sc)** to **SCIENCE SAIFABAD O.U**) is being submitted by **EDEM MANITEJA** (1011-20-522-019) **UNIVERSITY COLLEGE OF SCIENCE SAIFABAD, OU** is record of the bonafide work carried out all under the guidance of **Dr.CH VENKATESHWARLU** during academic year: 2020-2022.

INTERNAL EXAMINER EXTERNAL EXAMINER

HEAD OF THE DEPARTMENT PRINCIPAL

D E C L A R A T I O N

I here by declare that the work presented here, is entirely an outcome of my own effort. I submit this to the Osmania University , in partial fulfillment of the curriculum prescribed for the award of Degree of " MASTER OF SCIENCE " in Geology.

Department of Geology

Osmania University Hyderabad

EDEM MANITEJA

1011-20-522-019

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The present study has been undertaken in the partial fulfillment of the curriculum prescribed for the award of the M.sc. in Geology the study of "**ASSESSMENT OF A GEOSPATIAL ANALYSIS OF GROUND WATER QUALITY MAPPING USING GIS IN NALGONDA DISTRICT OF YEARS 2018-19-20" TELANGANA – A CASE STUDY is assigned to me for project work by Dr. Ch. Venkateshwarlu, Head of the Department Geology Department.The field work carried out after IV semester exams.**

I wish to take this opportunity, to express my sincere gratitude to **Dr. Ch. Venkateshwarlu, Assistant Professor in Geology, Osmania University,** for carrying me this problem for dissertation constant and valuable guidance and encouragement, in carrying out this work.

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ABSTRACT

Now-a-days ground water has become as essential resource due to an increase of its need for domestic, agricultural and industrial uses etc., consequently ground water quality is very important as its quantity.GIS helps in better understanding of spatial patterns and relations.

The present study represent the spatial variability of ground water quality mapping for Nalgonda district, Telangana. The thematic map of groundwater quality parameters, such as pH, TDS, Electrical Conductvity(EC), Chloride (Cl), Sulphates (SO4), Nitrate (NO3), Fluoride (F), Sodium(Na) has been tested for all the water samples in order to understand the hydro geochemistry of the groundwater.

The results obtained for water quality parameter were compared with standard parameter values suggested by the Bureau of Indian Standards (IS 10500:2012) for drinking water suitability.

The spatial contour map of these groundwater quality parameters was derived in Arc Map10.4 software using an Inverse Distance Weighted (IDW) spatial interpolation technique. The study facilitates to understand the existing groundwater quality conditions and to develop appropriate management practices to protect the groundwater sources.

INTRODUCTION

Groundwater is almost globally important for human being consumption as well as for the support of habitat and for maintaining the quality of base flow to rivers. Ground water resources are of high dependence due to its uses for all purposes starting from domestic, agricultural, industrial and commercial. The high dependence resulted in increasing pressure on available ground water resources in terms of quantity and quality.

The high with drawal for industrial and agricultural activities that related to the increase in population and low recharge reduced the amount of available groundwater which contributes significantly to the deterioration in groundwater quality. Therefore groundwater quality monitoring has become very essential.

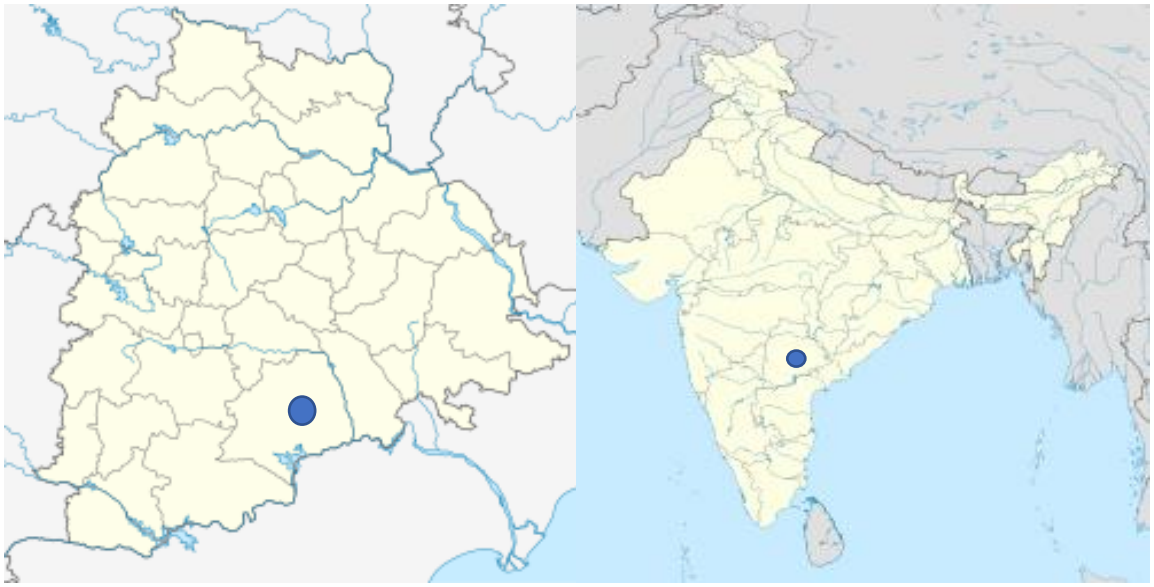
Geospatial technology is the latest one available to various thematic data can store, analyze and manipulate for the natural resources management. The existing groundwater quality condition monitoring and management of polluted areas are identified using GIS software.

The GIS-based groundwater quality mapping and its suitability evaluation for irrigation and domestic purpose.The study area having the issues of environmental pollution due to the dying factories, untreated sewage water released into the river system. The present study has made to prepare the various thematic maps of groundwater quality parameters spatial variation for Nalgonda district using Geospatial Technology.

STUDY AREA

Nalgonda (formerly known as Nilagiri) is a town and the district headquarters of Indian state of Telangana. During the medieval Bahamani kingdom, it was renamed Nalgunda. The name was changed to "Nalgonda" for official uses during the rule of the later Nizam kings. Nalgonda District is located in the Southern region of the Indian state of Telangana.

It lies between 17.050°N to 79.2667°E and its area is 14,240 sq km with 59 Mandals 17 towns and 1,135 villages with the population of 3,777,725 and Density with 230/km^2. The approximate temperature varies from 26^{o}C to 52^{o}C . Nagarjuna sagar dam is also located in this district. It is irrigation ,hydroelectric projects and dinking water projects also available in this district.



● - It indicates Nalgonda district in State wise and Country wise

METHODOLOGY

The methodology involves collections of water samples. The water quality database is analyzed and then used as attribute database for the preparation of thematic maps showing distribution of various water quality parameters. The thematic map of groundwater quality parameters, such as pH, TDS, EC, Carboante(CO3), Sodium(Na), Chloride(Cl) Sulphates(SO4), Nitrate(NO3), Fluoride(F), were used for overlay integration analysis to prepare the groundwater quality map of Nalgonda district using Inverse Distance Weighted(IDW) spatial interpolation technique. Finally the various water quality spatial contour maps were used in GIS for integration analysis to prepare the water quality map.

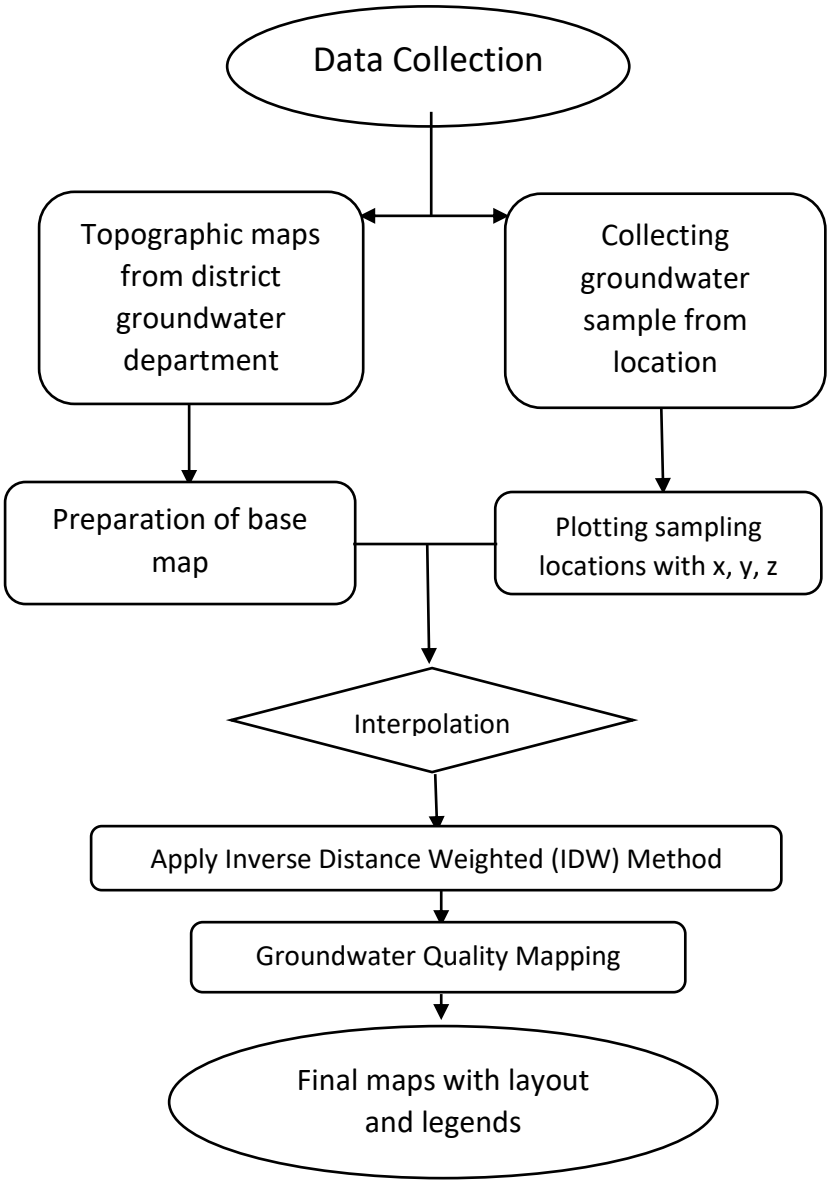


Fig.Methodolgy

GROUND WATER ANALYSIS

s.no	district	mandal	village	Lat gis	long gis	gwl	season	pH	TDS	EC	CO3	SO4	NO3	Cl	F	Na
186	NALGOND	Advidevul	Ulsaipaler	16.70682	79.4997	0.57	postmonsoon 2018	8	1012	648	0	13	2	130	2	78
187	NALGOND	Anumula	Anumula	16.79879	79.28955	16.41	postmonsoon 2018	9	1705	1091	60	143	5	20	5	376
188	NALGOND	Anumula	Chintagud	16.83309	79.29209	3.47	postmonsoon 2018	8	430	275	0	1	0	40	0	34
189	NALGOND	Anumula	Rajavaram	16.68016	79.40751	7.84	postmonsoon 2018	8	1764	1129	0	35	1	310	1	115
190	NALGOND	Anumula	Sreeramp	16.72911	79.30464	5.35	postmonsoon 2018	8	1409	902	0	39	1	200	1	115
191	NALGOND	Chandamp	Chandamp	16.57848	78.88836	12.09	postmonsoon 2018	7	1830	1171	0	49	1	320	1	176
192	NALGOND	Chandur	Angadipet	16.98408	79.01842	13.84	postmonsoon 2018	9	2530	1619	60	284	3	310	3	484
193	NALGOND	Chandur	Bangariga	16.98467	79.01136	14.245	postmonsoon 2018	8	1450	928	20	30	3	80	3	290
194	NALGOND	Chandur	Chandur	16.9681	79.0601	10.64	postmonsoon 2018	9	1163	744	40	95	2	60	2	103
195	NALGOND	Chandur	Sirdepally	17.01489	79.06308	13.61	postmonsoon 2018	9	1161	743	40	59	2	130	2	112
196	NALGOND	Chityala	Velimined	17.22892	79.02017	28.96	postmonsoon 2018	8	1480	947	0	198	1	180	1	94
197	NALGOND	Devarakor	Padamtipa	16.67664	78.79738	17.29	postmonsoon 2018	8	823	527	0	134	1	60	1	23
198	NALGOND	Devarakor	Tatikole	16.62524	78.85665	24.34	postmonsoon 2018	9	745	477	40	14	3	20	3	152
199	NALGOND	Gundlapal	Vavikole	16.67579	78.76505	7.17	postmonsoon 2018	9	3450	2208	60	135	4	370	4	697
200	NALGOND	Gurrampo	Gurrampo	16.85171	79.09138	2.14	postmonsoon 2018	7	1241	794	0	8	0	150	0	58
201	NALGOND	Gurrampo	Koppole	16.91462	79.14688	1.3	postmonsoon 2018	8	406	260	0	2	0	60	0	38
202	NALGOND	K.Mallepa	K.Mallepa	16.72939	78.98103	20.36	postmonsoon 2018	7	2740	1754	0	558	1	440	1	220
203	NALGOND	kanagala	kanagala	16.93734	79.19843	7.54	postmonsoon 2018	8	1292	827	0	25	1	210	1	96
204	NALGOND	Kattangur	Cheruvu A	17.19865	79.35425	39.75	postmonsoon 2018	7	2810	1798	0	20	0	770	0	99
205	NALGOND	Kattangur	Kattangur	17.16189	79.3203	9.85	postmonsoon 2018	7	2670	1709	0	38	2	520	2	333
206	NALGOND	Marriguda	Marriguda	16.93992	78.86381	12.98	postmonsoon 2018	8	1320	845	0	77	3	200	3	94
207	NALGOND	Munugod	Kistapur	17.15625	79.01703	13.46	postmonsoon 2018	8	1497	958	0	3	2	170	2	217
208	NALGOND	Munugod	Kompalli	17.09931	78.99372	9.43	postmonsoon 2018	7	1926	1233	0	106	1	320	1	176
209	NALGOND	Nakrekal	Arlagadda	17.13911	79.40064	14.58	postmonsoon 2018	8	1411	903	0	25	1	210	1	151
210	NALGOND	Nakrekal	Nakrekal	17.15934	79.42098	10.65	postmonsoon 2018	8	1620	1037	0	46	1	320	1	98
211	NALGOND	Nakrekal	Vallabhap	17.23895	79.4799	2.08	postmonsoon 2018	8	1767	1131	20	10	1	350	1	247
212	NALGOND	Nalgonda	Mushamp	16.97492	79.32478	16.87	postmonsoon 2018	8	1352	865	20	59	1	200	1	144
213	NALGOND	Nalgonda	S L B C G V	17.06018	79.30091	5.7	postmonsoon 2018	8	487	312	0	3	0	80	0	37
214	NALGOND	Nalgonda	Seetaram	17.11031	79.21675	11.11	postmonsoon 2018	9	781	500	40	61	1	90	1	78
215	NALGOND	Narketpal	Akkenepa	17.29008	79.23565	1.9	postmonsoon 2018	8	2270	1453	0	12	1	510	1	240
216	NALGOND	Narketpal	Narketpal	17.20025	79.19131	19.47	postmonsoon 2018	8	809	518	0	47	4	20	4	37
217	NALGOND	Nidamanu	Nidamanu	16.84	79.28528	4.67	postmonsoon 2018	8	2020	1293	0	118	2	330	2	374
218	NALGOND	P.A Pally	Angadipet	16.71656	79.08447	9.02	postmonsoon 2018	7	1715	1098	0	218	1	260	1	110
219	NALGOND	Peddavoo	Velmagud	16.77852	79.18302	13.93	postmonsoon 2018	8	691	442	40	4	3	40	3	105
220	NALGOND	Shaligowr	P.Kondara	17.24944	79.42306	11.69	postmonsoon 2018	8	2380	1523	0	97	2	430	2	284
221	NALGOND	Thiparthy	Thipparth	17.01375	79.41831	8.055	postmonsoon 2018	8	1310	838	0	9	1	220	1	87
222	NALGOND	Thiparthy	Mamidala	17.06521	79.465	12.84	postmonsoon 2018	7	4850	3104	0	421	1	950	1	367

NALGONDA_2018

sno	district	mandal	village	lat_gis	long_gis	gwl	season	pH	TDS	EC	CO3	SO4	NO3	CL	F	Na
186	NALGONDA	Advidevul	Ulsaipaler	16.70682	79.4997	0.35	post monsoon 2019	8	1330	851		40	24	200	1	111
187	NALGONDA	Anumula	Anumula	16.79879	79.28955	7.75	post monsoon 2019	9	2340	1498	90	41.25	314	190	3	440
188	NALGONDA	Anumula	Chintagud	16.83309	79.29209	2.43	post monsoon 2019	8	1257	804	20	26.25	144	160	1	156
189	NALGONDA	Anumula	Rajavaram	16.68016	79.40751	5.86	post monsoon 2019	8	2200	1408		52.5	12	400	1	180
190	NALGONDA	Anumula	Sreeramp	16.72911	79.30464	4.23	post monsoon 2019	9	639	409	20	16.5	5	60	1	72
191	NALGONDA	Chandamp	Chandamp	16.57848	78.88836	9.86	post monsoon 2019	8	1594	1020		38.75	86	330	2	176
192	NALGONDA	Chandur	Angadipet	16.98408	79.01842		post monsoon 2019	8	1750	1120	70	14.5	70	170	4	309
193	NALGONDA	Chandur	Bangariga	16.98467	79.01136	11.1	post monsoon 2019	9	1249	799	80	21.25	33	80	3	252
194	NALGONDA	Chandur	Chandur	16.9681	79.0601	16.32	post monsoon 2019	8	1981	1268		35	238	260	2	110
195	NALGONDA	Chandur	Sirdepally	17.01489	79.06308	10.13	post monsoon 2019	9	1055	675	60	14.25	19	110	1	119
197	NALGONDA	Devarakon	Padamtipa	16.67664	78.79738	13.88	post monsoon 2019	7	1001	641		10.25	163	60	1	25
200	NALGONDA	Gurrampo	Gurrampo	16.85171	79.09138	1.09	post monsoon 2019	7	1686	1079		52.5	7	340	0	81
202	NALGONDA	K.Mallepa	K.Mallepa	16.72939	78.98103		post monsoon 2019	8	314	201		10.5	2	40	1	25
203	NALGONDA	kanagala	kanagala	16.93734	79.19843	4.15	post monsoon 2019	8	569	364		8.25	11	60	0	17
205	NALGONDA	Kattangur	Kattangur	17.16189	79.3203	3.08	post monsoon 2019	7	2900	1856		40	24	570	2	323
208	NALGONDA	Munugod	Kompalli	17.09931	78.99372	5.63	post monsoon 2019	8	1438	920		26.25	38	230	0	105
209	NALGONDA	Nakrekal	Arlagadda	17.13911	79.40064	6.71	post monsoon 2019	7	2390	1530		6.5	37	570	0	139
210	NALGONDA	Nakrekal	Nakrekal	17.15934	79.42098	5.53	post monsoon 2019	8	1545	989		33.75	33	290	1	109
211	NALGONDA	Nakrekal	Vallabhap	17.23895	79.4799	1.05	post monsoon 2019	8	1365	874		14.5	197	140	1	53
212	NALGONDA	Nalgonda	Mushamp	16.97492	79.32478	3.32	post monsoon 2019	8	2049	1311	30	32.5	11	540	1	266
213	NALGONDA	Nalgonda	S L B C G V	17.06018	79.30091	2.58	post monsoon 2019	7	365	234		7.75	2	30	0	24
214	NALGONDA	Nalgonda	Seetaram	17.11031	79.21675	10.38	post monsoon 2019	8	1165	746		30	140	130	1	110
215	NALGONDA	Narketpal	Akkenepa	17.29008	79.23565		post monsoon 2019	7	2470	1581		42.5	39	570	1	281
216	NALGONDA	Narketpal	Narketpal	17.20025	79.19131	16.1	post monsoon 2019	8	826	529	10	7	43	100	3	36
217	NALGONDA	Nidamanu	Nidamanu	16.84	79.28528	3.85	post monsoon 2019	8	2270	1453		52.5	156	260	2	346
218	NALGONDA	P.A Pally	Angadipet	16.71656	79.08447	4.6	post monsoon 2019	7	1483	949		32.5	146	190	1	101
219	NALGONDA	Peddavoo	Velmagud	16.77852	79.18302	5.52	post monsoon 2019	8	1839	1177		40	20	280	2	249
220	NALGONDA	Shaligowr	P.Kondara	17.24944	79.42306	7.78	post monsoon 2019	8	1503	962		36.25	80	280	1	132
221	NALGONDA	Thiparthy	Thipparth	17.01375	79.41831	1.07	post monsoon 2019	8	683	437		6	2	40	2	70
222	NALGONDA	Thiparthy	Mamidala	17.06521	79.465	8.25	post monsoon 2019	8	3180	2035		46.25	369	570	1	257

NALGONDA_2019

s.no	District	Mandal	village	gwl	lat gis	long gis	season	pH	TDS	EC	CO3	SO4	NO3	CL	F	NA
186	NALGOND	Advidevul	Ulsaipaler	16.70682	79.4997	0.32	Post-monsoon 2020	8	1079	691	0	22	14	110	2	101
187	NALGOND	Anumula	Anumula	16.79879	79.28955	2.4	Post-monsoon 2020	9	1925	1232	30	23	188	90	4	378
188	NALGOND	Anumula	Chintaguc	16.83309	79.29209	0.92	Post-monsoon 2020	8	1630	1043	10	23	199	240	1	152
189	NALGOND	Anumula	Rajavaram	16.68016	79.40751	6.03	Post-monsoon 2020	8	1443	924	0	32	18	230	1	105
190	NALGOND	Anumula	Sreeramp	16.72911	79.30464	0.26	Post-monsoon 2020	8	839	537	0	20	29	50	1	70
191	NALGOND	Chandamp	Chandamp	16.57848	78.88836	4.51	Post-monsoon 2020	8	1506	964	0	21	219	170	2	111
192	NALGOND	Chandur	Angadipet	16.98408	79.01842	6.14	Post-monsoon 2020	8	543	348	20	16	3	80	0	52
193	NALGOND	Chandur	Bangariga	16.98467	79.01136	4.46	Post-monsoon 2020	8	835	534	0	10	16	90	1	35
196	NALGOND	Chityala	Velimineo	17.22892	79.02017	9.94	Post-monsoon 2020	8	1406	900	0	21	151	230	1	75
197	NALGOND	Devarakor	Padamtipa	16.67664	78.79738	8.38	Post-monsoon 2020	8	805	515	0	10	135	50	1	23
198	NALGOND	Devarakor	Tatikole	16.62524	78.85665	13.44	Post-monsoon 2020	9	995	637	40	19	18	50	2	214
199	NALGOND	Gundlapal	Vavikole	16.67579	78.76505	5.2	Post-monsoon 2020	8	2967	1899	0	21	13	240	3	599
200	NALGOND	Gurrampo	Gurrampo	16.85171	79.09138	1.67	Post-monsoon 2020	7	1397	894	0	33	2	150	0	59
201	NALGOND	Gurrampo	Koppole	16.91462	79.14688	0.94	Post-monsoon 2020	8	508	325	0	16	23	100	0	44
202	NALGOND	K.Mallepa	K.Mallepa	16.72939	78.98103	2.3	Post-monsoon 2020	8	1180	755	0	41	38	150	1	91
203	NALGOND	kanagala	kanagala	16.93734	79.19843	1.58	Post-monsoon 2020	8	1381	884	0	17	220	170	1	78
204	NALGOND	Kattangur	Cheruvu A	17.19865	79.35425	11.07	Post-monsoon 2020	7	2718	1740	0	30	17	670	0	125
205	NALGOND	Kattangur	Kattangur	17.16189	79.3203	3.18	Post-monsoon 2020	7	2819	1804	0	30	28	540	1	408
206	NALGOND	Marriguda	Marriguda	16.93992	78.86381		Post-monsoon 2020	8	519	332	0	15	2	80	0	48
207	NALGOND	Munugod	Kistapur	17.15625	79.01703	3.13	Post-monsoon 2020	9	1320	845	30	15	15	50	3	282
208	NALGOND	Munugod	Kompalli	17.09931	78.99372	3.14	Post-monsoon 2020	8	1504	963	0	27	36	220	1	114
209	NALGOND	Nakrekal	Arlagadda	17.13911	79.40064	2.96	Post-monsoon 2020	7	2144	1372	0	31	38	400	1	214
210	NALGOND	Nakrekal	Nakrekal	17.15934	79.42098	1.58	Post-monsoon 2020	8	942	603	0	9	34	40	3	46
211	NALGOND	Nakrekal	Vallabhap	17.23895	79.4799	1.19	Post-monsoon 2020	8	910	582	0	11	38	50	3	40
212	NALGOND	Nalgonda	Mushamp	16.97492	79.32478	1.3	Post-monsoon 2020	8	1014	649	10	21	20	160	1	95
213	NALGOND	Nalgonda	S L B C G V	17.06018	79.30091	1.08	Post-monsoon 2020	7	1320	845	0	19	37	240	1	56
214	NALGOND	Nalgonda	Seetaram	17.11031	79.21675	8.05	Post-monsoon 2020	8	2080	1331	0	20	59	110	6	380
215	NALGOND	Narketpal	Akkenepa	17.29008	79.23565	2.26	Post-monsoon 2020	7	5988	3832	0	157	5	1630	2	731
216	NALGOND	Narketpal	Narketpal	17.20025	79.19131	7.6	Post-monsoon 2020	8	942	603	0	9	34	40	3	46
217	NALGOND	Nidamanu	Nidamanu	16.84	79.28528	3.64	Post-monsoon 2020	8	2162	1384	20	36	173	200	2	428
218	NALGOND	P.A Pally	Angadipet	16.71656	79.08447	1.86	Post-monsoon 2020	8	543	348	20	16	3	80	0	52
219	NALGOND	Peddavoo	Velmaguc	16.77852	79.18302	3.06	Post-monsoon 2020	8	505	323	0	16	5	70	0	50
220	NALGOND	Shaligowr	P.Kondara	17.24944	79.42306	3.6	Post-monsoon 2020	8	2244	1436	0	26	109	390	1	284
221	NALGOND	Thiparthy	Thipparth	17.01375	79.41831	0.17	Post-monsoon 2020	8	1510	966	0	10	8	130	1	149
222	NALGOND	Thiparthy	Mamidala	17.06521	79.465	4.97	Post-monsoon 2020	8	2592	1659	0	37	271	470	1	208
223	NALGOND	Vemulapa	Bommaka	17.02653	79.51808	3.08	Post-monsoon 2020	8	1608	1029	0	18	3	340	1	189

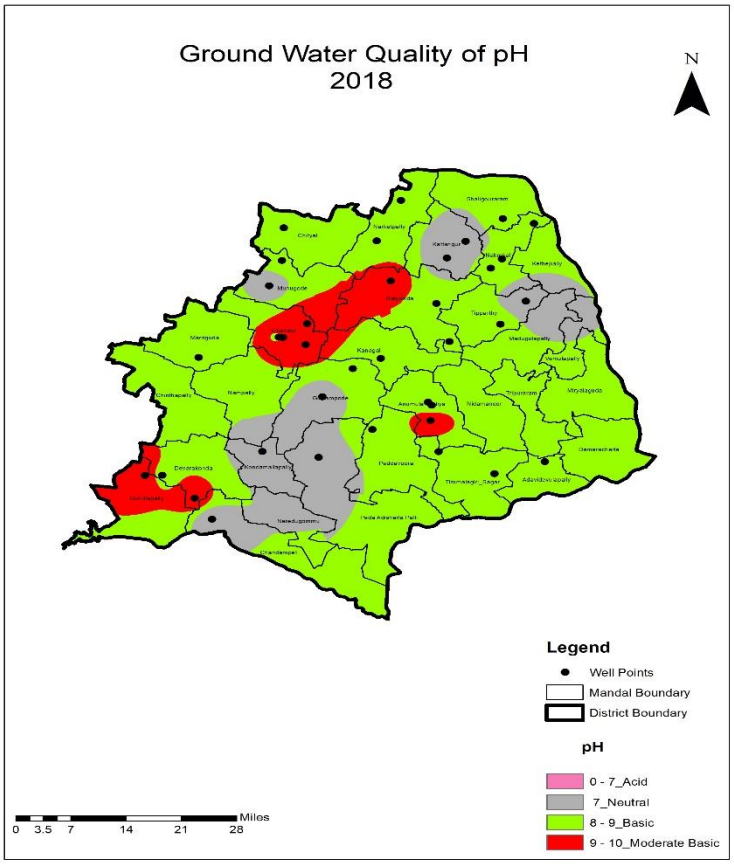
NALGONDA_2020

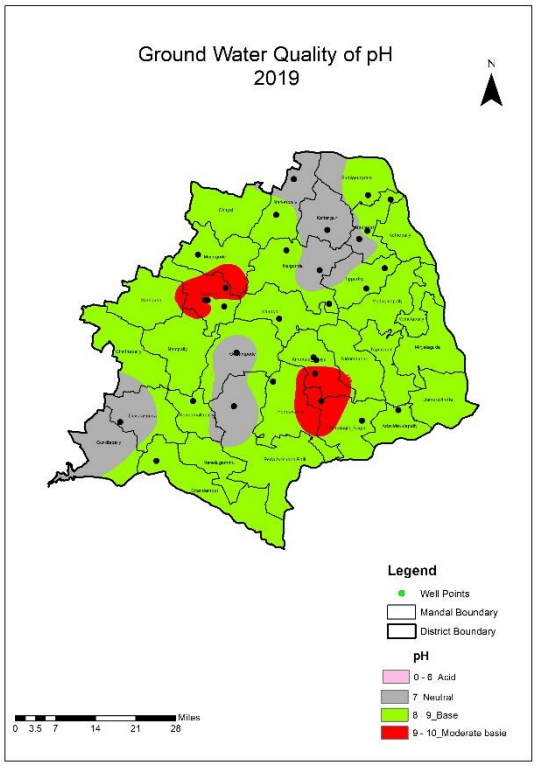
RESULTS AND DISCUSSIONS

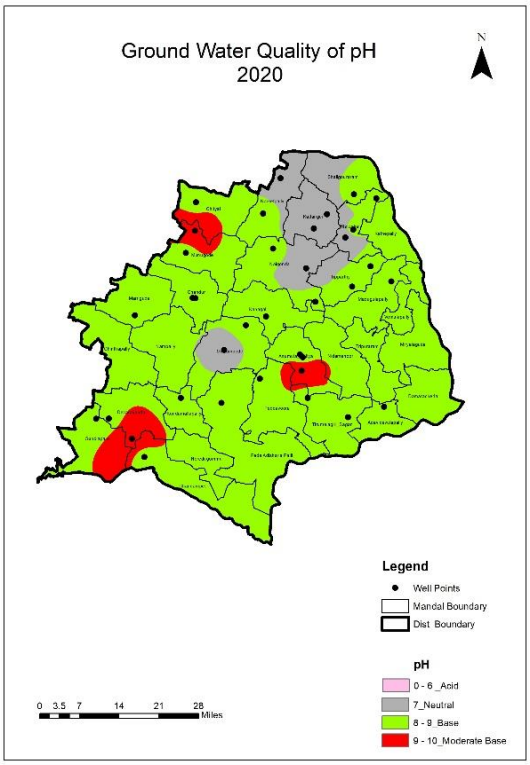
The spatial and the attribute database generated are integrated for the generation of spatial variation maps of major water quality parameters pH, TDS, Ca,Cl,SO4,NO3,F. Groundwater quality maps has been showed below for each parameter. In this study groundwater quality data were prepared using Arc Map 10.4 software. This integration of the groundwater quality maps helps us to know the existing groundwater condition in the are

pH :

pH is a significant parameter in evaluating acidity or alkalinity of water. The computation of pH is to determine the intensity or alkalinity and measures the concentration of hydrogen ions.We have taken that previous years of 2018-19-20 data of ground water quality analysis for comparative studies.







The study area of pH area is ranges from 7-10 as per Indian Standards ,we concluded that the points and we have plotted in that areas with some indicative points.

As we know the pH value generally classified into three as that only we kept in the map they are Acidic(0-6),Neutral(7) ,Base(8-9),Moderate base(9-10) like this we plotted and given colour indications to the map that which we have seleced the area of Nalgonda District.

As the pH in 2018 studies,we observe that the base is more and moderate base is also more compare to acidic, it is completely absent in that area and in some areas the neutral also present.

As the pH in 2019 studies, we observe that the same as base is more here also,in some areas moderate base, same as moderate base we find neutral also,but the change in neutral and moderate base is slight difference as compare to the 2018, but the thing is that moderate

base and neutral also is slight deplicting in some areas which we have compare to the previous year data.

As the pH in 2020 studies, we clearly notice that the base is more and the moderate base is slight increament and neutral is slight decreament in previous year of 2019 data and also compare to the 2018 data the decreament in moderate base and neutral is there.

CONSEQUENCES OF pH :

As we know that the pH is a significant parameter in evaluating acidity or alkalinity of water.

As the pH of the above maps , that the base is more it means if that will mix up with the drinking water , that water if the humans will drink means a lot of pain,irritation and many abnormal activities as takes place.

And where as the plants minimum growth to require is that the pH is 5-5.7,if it is more means they will not grow and die , make for sure that another is acid rain that its have pH value is <5.6 ,so it is neutralisied by pulverised limestone, it is acidic so it affects the river water,rain and aquatic animals also.

And also the pH that it changes the cause of tooth decay,due to dirt present in the mouth that which we not doing brushing twice a day and if we drink low pH of water we lose our teeth also due to tooth enamel was damaged by low pH substances(acidic) that which we are taking.

And that we noticed that above figures that the base is more , so it might be high content of fluorine also mix with water and leads to fluorosis disease it defines about the improper development of bones ,one type of disability it may causes.

ELECTRIC CONDUCTIVITY :

EC is the significant parameter in evaluating the electric current is present in water that we get from wells of Nalgonda district. Salts or other chemicals that dissolve in water can break down into positively and negatively charged ions. These free ions in the water conduct electricity, so the water electrical conductivity depends on the concentration of ions.

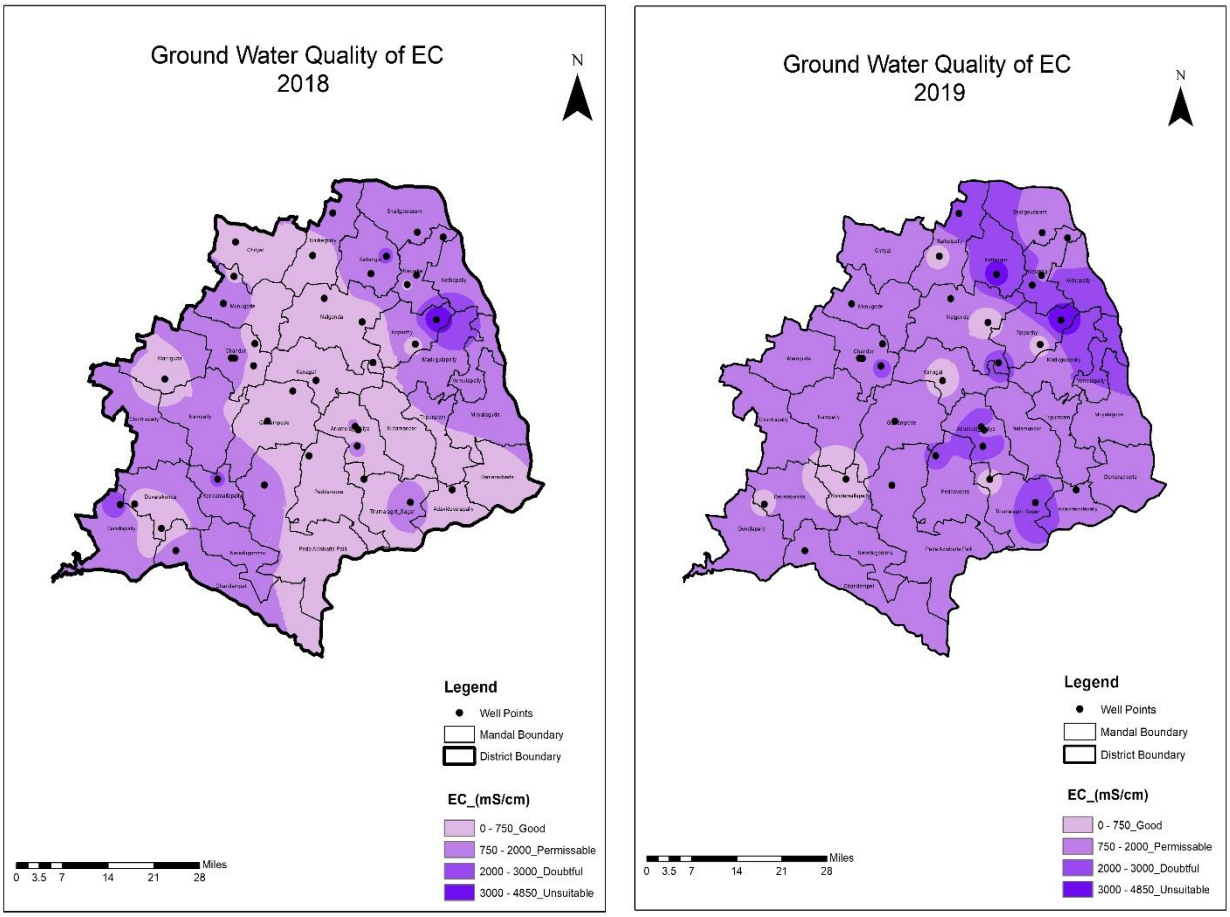
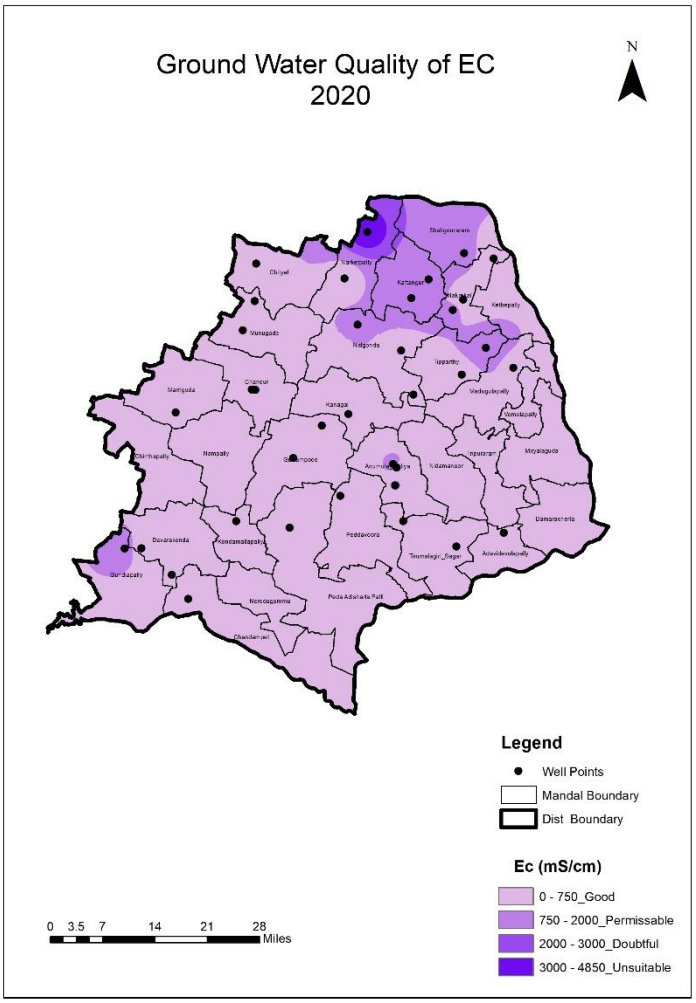


Figure.EC



The study area shows the electric conductivity ranges between 0 to 4850(mS/cm) as per Indian Standards,as that we conclude that among values that we have plotted the points in maps of three years with some indications.

As according to the Indian Standards that the EC is classified into three formats,they are Good (0-750),Permissbale (750-2000), Doubtful (2000-3000), Unsuitable (3000-4850) like we show colour indications to the map whether which colour shows what it might be with some hints of that area of Nalgonda district.

As we observe the 2018 studies of EC that we understand about the good in that some areas it shows good and in some permissable but mostly it is good it means it have good salts for production for EC and in some areas it shows the permissable is less compare to the Good

and the very less areas as we observe the doubtful and Unsuitable ranges.

As we watch the 2019 studies,we will define that the EC is majorly of Doubtful and Permissable ,and less amount of Good and Unsuitable as we compare to the previous of 2018 it make a complete change over where the good is sudden decreament and also same situation ofr Unsuitable also.

As we noticed that the 2020 studies,we understand about the EC in some areas it shows mostly of Good, Permissable and Unsuitable but less amount of the Doubtful areas,as we compare to previous year 2019 study cases the major increament in Good and sudden fall down in the permissable and complete fall down in Doubtful.

CONSEQUENCES OF EC :

EC is measurement of water's ability to conduct the electricity,total concentration,mobility,valence and relative concentration of ions.

If Ec is less in water it might be the low production of crops that which we are eating know,reason behind that is it does not receive the proper nutrients to the crop that's why the low production, symptoms that crop shows are : Discolour In leaves, Holes in leaves.

If Ec is too high means it leads to the physiological drought which restricts root water uptake by the plant, even when the substrate is moist.

If the EC is more, then we can reduce by the hydroponics ,you can simply add more water to your reservoir,then this will make effectively dilute the concentration of salts ,which will lower your EC

EC of an aqueous solution increases with temperature signficantly about 2^{o} celsius.

TOTAL DISSOLVED SOLIDS (TDS) :

TDS is significant parameter that which shows about the salts are present in the water either it is goor or bad. It comprise inorganic salts, principally – Ca, Mg, K, Na, Hco3, Chlorides and So4 and small amounts of organic matter that are dissolved in water.TDS concentrations are often reported in parts per million (ppm).

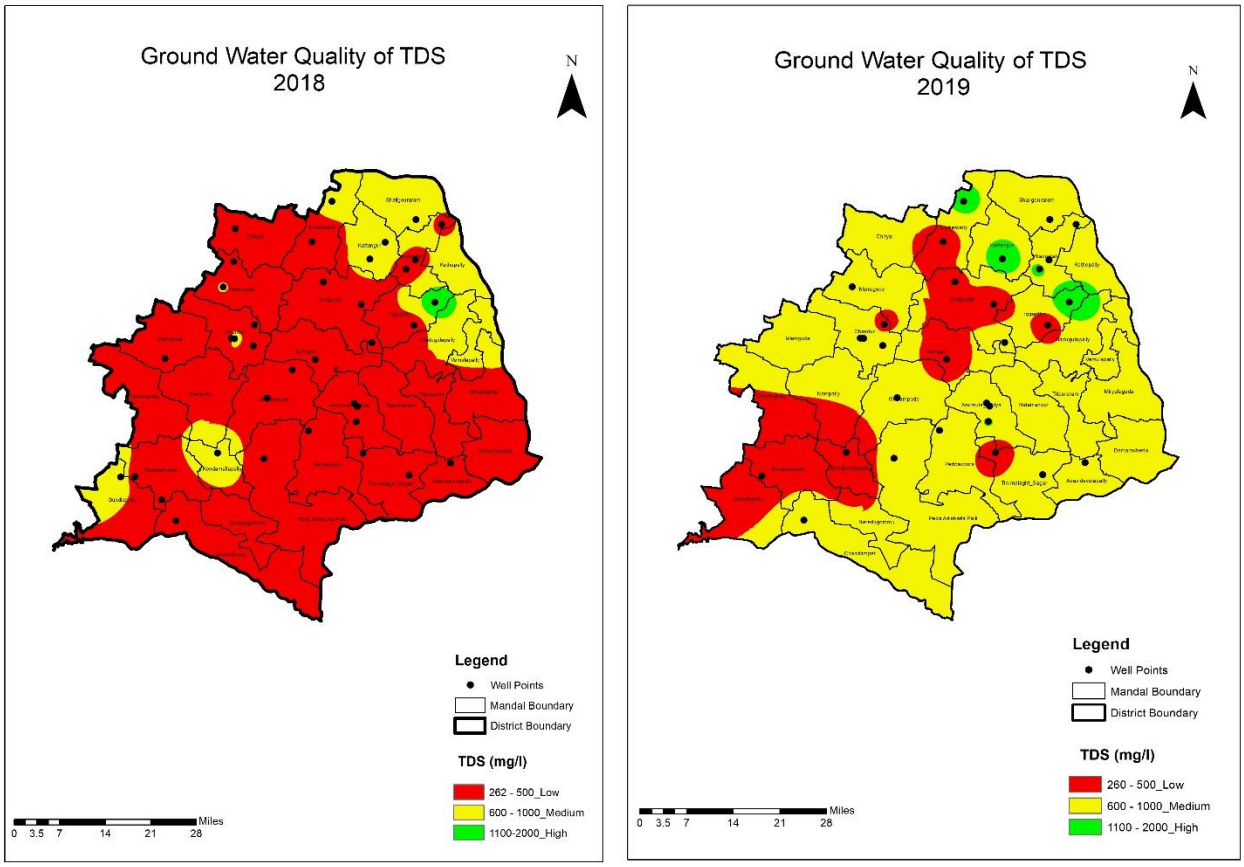
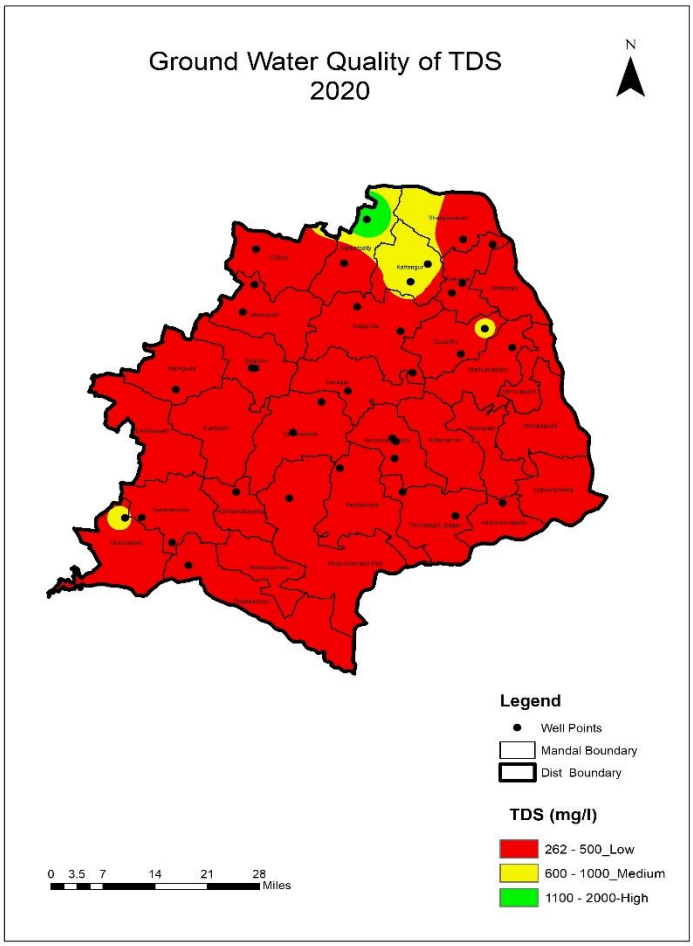


Figure.TDS



The study area shows about the TDS of ranges varies from 262 to 2000 as per Indian standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the TDS is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(262-500), Medium(600-1000), High(1100-2000) like this we plotted points and divided the values, gave some colour indications also for hint to identitfy them easily by looking at the map it seems.

As above the TDS image of 2018 studies, we observed that the TDS value is majorly low,it seems to be ok, and other point of colour indication is yellow so it is also present in some areas(some what

danger) and finally the green colour(harmful) is slight less areas covered compare to the before colour areas.

As the TDS of 2019 studies, we noticed that the there is change in compare to the previous year is that the yellow colour indication gradually increases it is medium of TDS and the slightly decreases in red colour(Low) compare to 2018 studies and there is not that much of change in green colour (High).

As the TDS of 2020 studies, we concludes that the TDS of the previous years of 2018-19 are that there is a change in red that it is gradually increasing, the yellow decreament is happen compare to previous years and the green colour also shows decreament in the above map. It means the upliftment of this map is red (Low).

CONSEQUENCES OF TDS :

The presence of potassium, sodium and chloride increases the TDS level in the water. However, the presence of toxic ions such as lead, nitrate, cadmium, and arsenic present in water can lead to a number of serious health problems.

High levels of TDS means it is unfit for consumption and several diseases like nausea, lung irritation, rashes, vomiting, dizziness etc., Drinking water with elevated amount of TDS for longer periods will expose body to various chemicals, toxins and may cause chronic health conditions like cancer, liver, kidney.

The consumption of low TDS water, naturally occurring or received from a treatment process, does not results in the harmful effects to the human body.

Any measurement of the TDS is higher than 1000 ppm means, it is unsafe for all the living beings on earth.

CHLORINE :

Chlorine is a significant parameter that which shows about the how much it is present in the water near the well points. Chlorine is effective and continues to keep the water safe as it travels from the treatment plant to the consumer's tap.This parameter shows the concentration levels in the form of Milligram per litre. Liquid chlorine and bleach (sodium hypochlorite) have a pH of 11.0 to nearly 13.0 so it is logical to think that they will raise the pH of the pool water.

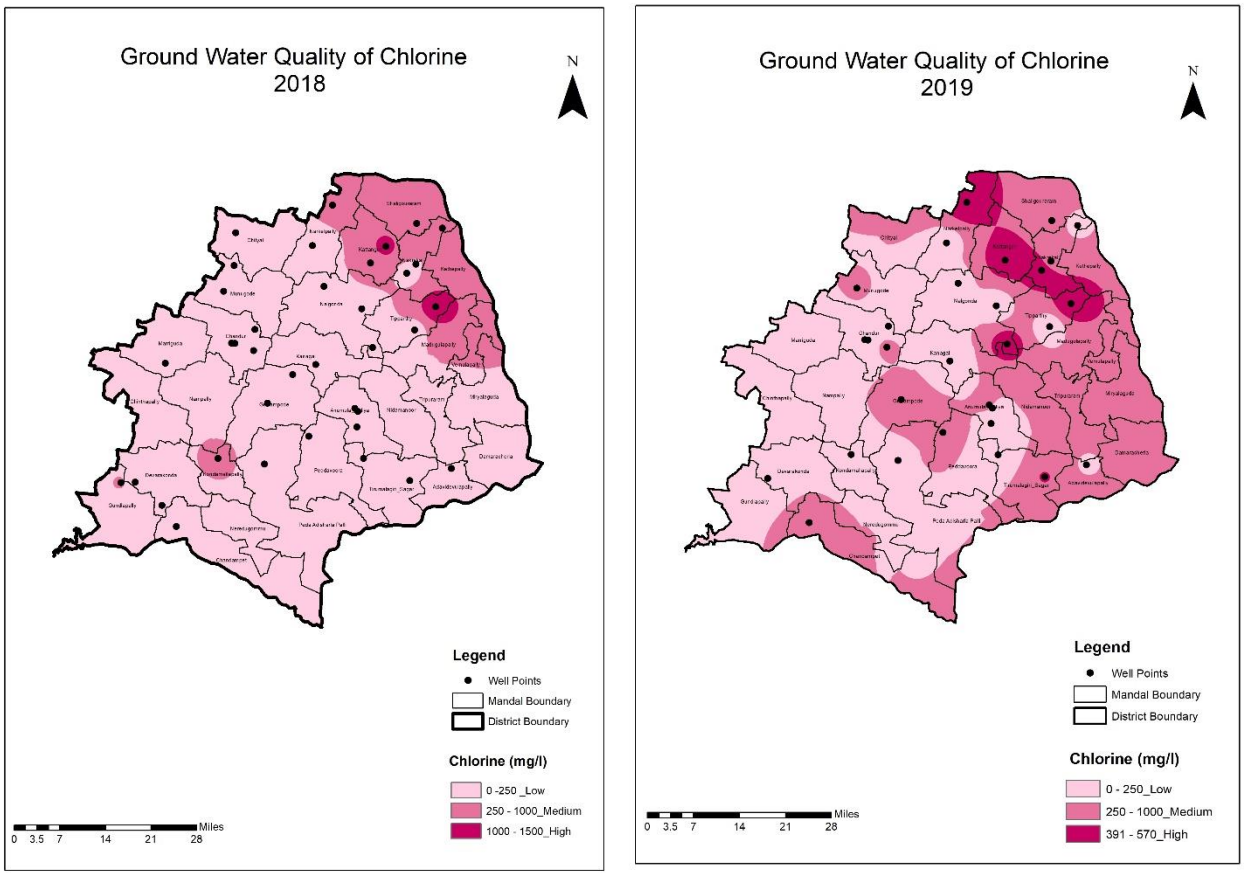
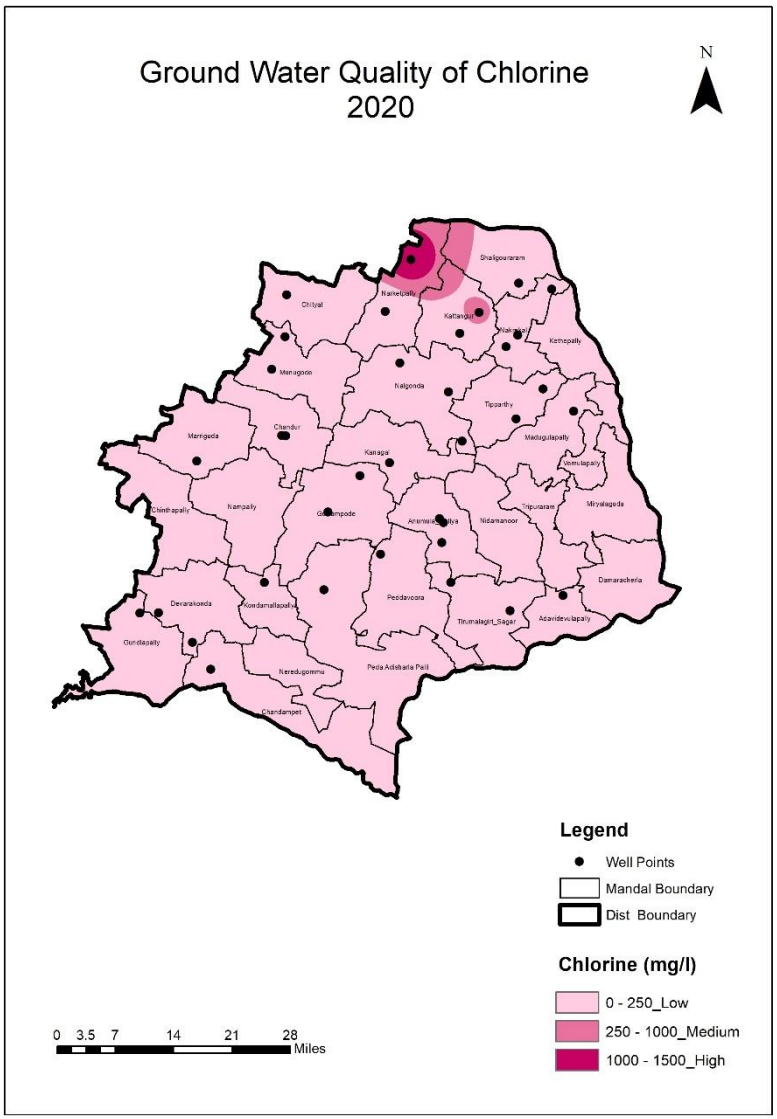


Figure.Chlorine



The study area says about the chlorine of ranges from 250 to 1500 as per Indian Standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the Chlorine is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(0-250), Medium(250-1000), High(1000-1500) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As above the Chlorine image of 2018 studies, we observed that the Chlorine, maximum area is covered with low percent of (0-250).and coming to the next point moderately it is covered by medium of pink (250-1000) and final point is the very less area it is covered of dark pink(1000-1500).

As the Chlorine of 2019 studies, , we noticed that the there is change in compare to the previous year is that the low covered areas are decreased compare to previous years and coming to the medium covered areas it increases it occupancy and the last one high, it is also same situation like medium.

As the Chlorine of 2020 studies, we concludes that the TDS of the previous years of 2018-19 are that there is such a dramatic change in medium and high areas,totally deplicted areas and the low areas majorly increament in their areas.

CONSEQUNCES OF CHLORINE :

Excess chlorine can alter the pH level of the water in the pool, making it more acidic. The acid levels can cause any of the following symptoms: Irritant dermatitis which is a red skin rash characterized by raised itchy red bumps. Eye irritation and over-dilated blood vessels in the eyes

Algae growth is another issue that can arise when your pool's chlorine level has been too low for too long. Black algae and mustard algae are the worse kinds, because they're hard to remove once they're made their presence known. Cloudy water can also become an issue when your pool's chlorine level is too low.

When chlorine enters the body as a result of breathing, swallowing, or skin contact, it reacts with water to produce acids. The acids are corrosive and damage cells in the body on contact.

FLUORINE :

Fluorine is a significant parameter that which shows about the occurrence of fluoride in groundwater is due to weathering and leaching of fluoride-bearing minerals from rocks and sediments.The parameter used for this concentration levels in th form of the Milligram per litre. Fluoride ions exist predominantly as hydrofluoric acid in acidic environments with a pH below 5.2.

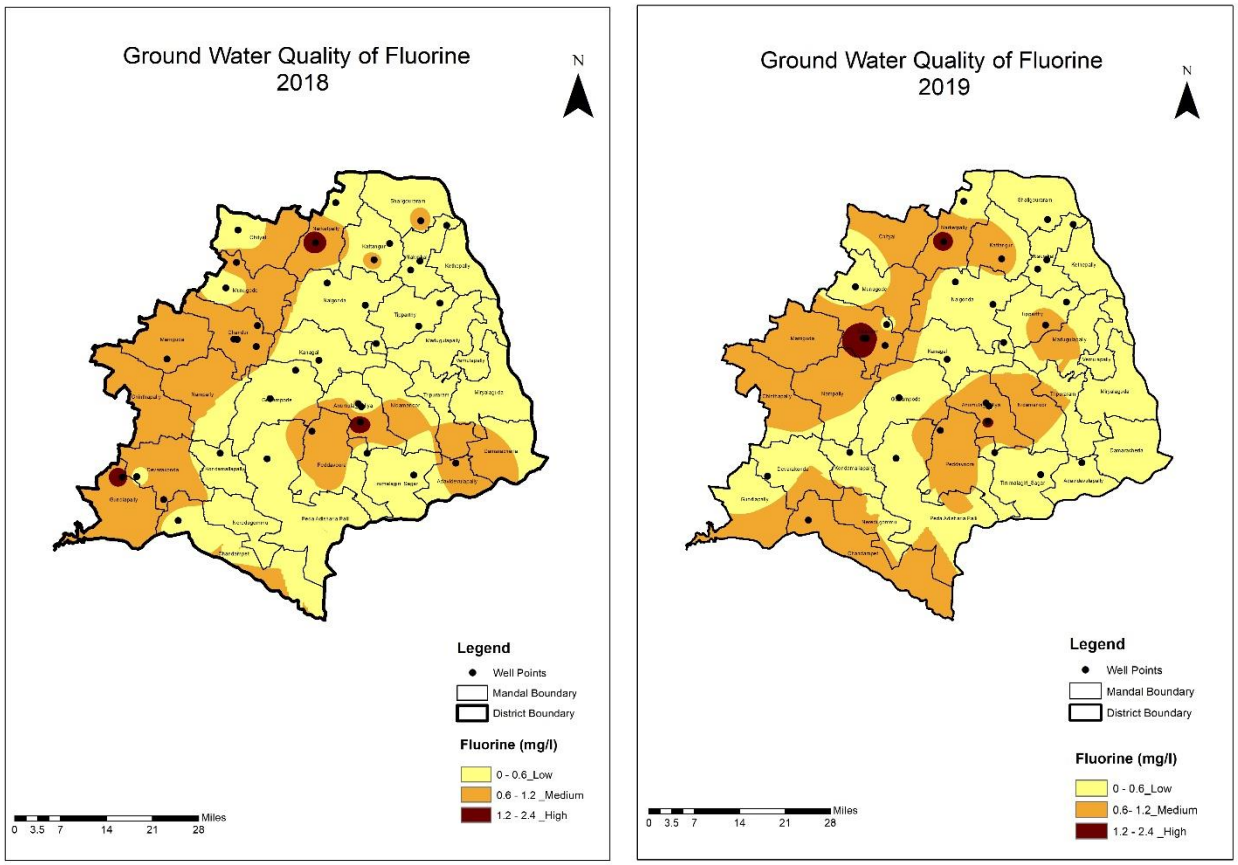
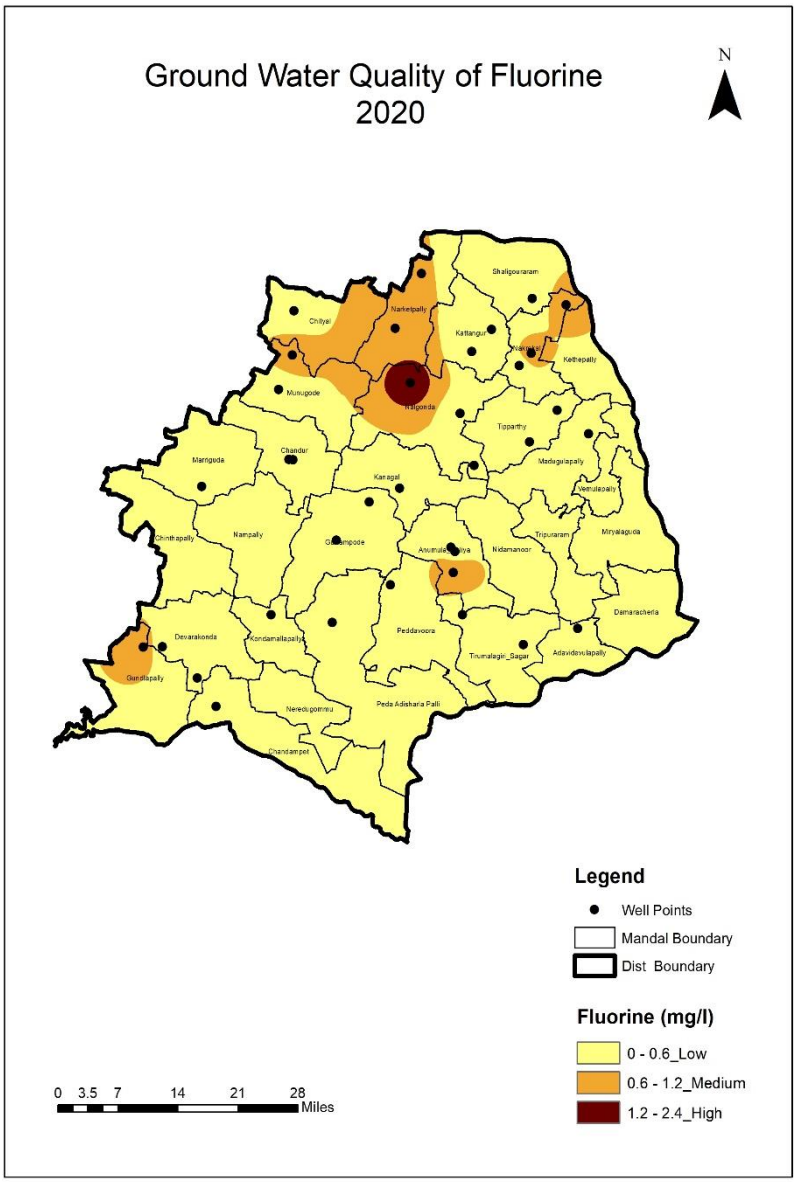


Figure: Fluorine



The study area says about the Fluorine of ranges of from 0 to 2.4 as per Indian standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As As according to the Indian Standards, the Fluorine is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(0-0.6), Medium(0.6-1.2), High(1.2-2.4) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As above the Fluorine image of 2018 studies,we observed that the fluorine , maximum area covered by low percent (0-0.6), next covering factor is the medium is of percent (0.6-1.2) and the last one which have less covered area is high is of (1.2-2.4).

As the Fluorine of 2019 studies, we clearly noticed that the low indicating light yellow has somewhat decreament and the medium is increament and the high also compare to the previous year, it is also increased lightly.

As the Fluorine of 2020 studies, we observed that there is huge change compare to the previous years, the change again the low(Light yellow) has increased and the medium(Yellow)and high(Brown) has decreased compare to last year with the areas of well points also.

CONSEQUENCES OF FLUORINE :

Too much fluoride can cause dental fluorosis—a discoloration of teeth, usually with opaque white marks, lines, or mottled enamel and poor mineralization.

In some cases, excess fluoride can damage the parathyroid gland. This can result in hyperparathyroidism, which involves uncontrolled secretion of parathyroid hormone. This can result in a depletion of calcium in bone structures and higher-than-normal concentrations of calcium in the blood. Lower calcium concentrations in bones make them more susceptible to fractures.

Fluorosis is a crippling disease resulted from deposition of fluorides in the hard and soft tissues of body.

Exposure to high concentrations of fluorine can cause death due to lung damage.

CARBONATE :

Carbonate is significant parameter that which show about the carbonate that hardness is a measure of carbonates and bicarbonates dissolved in water. It refers to the 'buffering' ability of the water, which is how the water maintains a stable environment for aquatic life. To determine carbonate hardness you need to measure total alkalinity. The pH of a solution of carbonate is approximately 12.3.

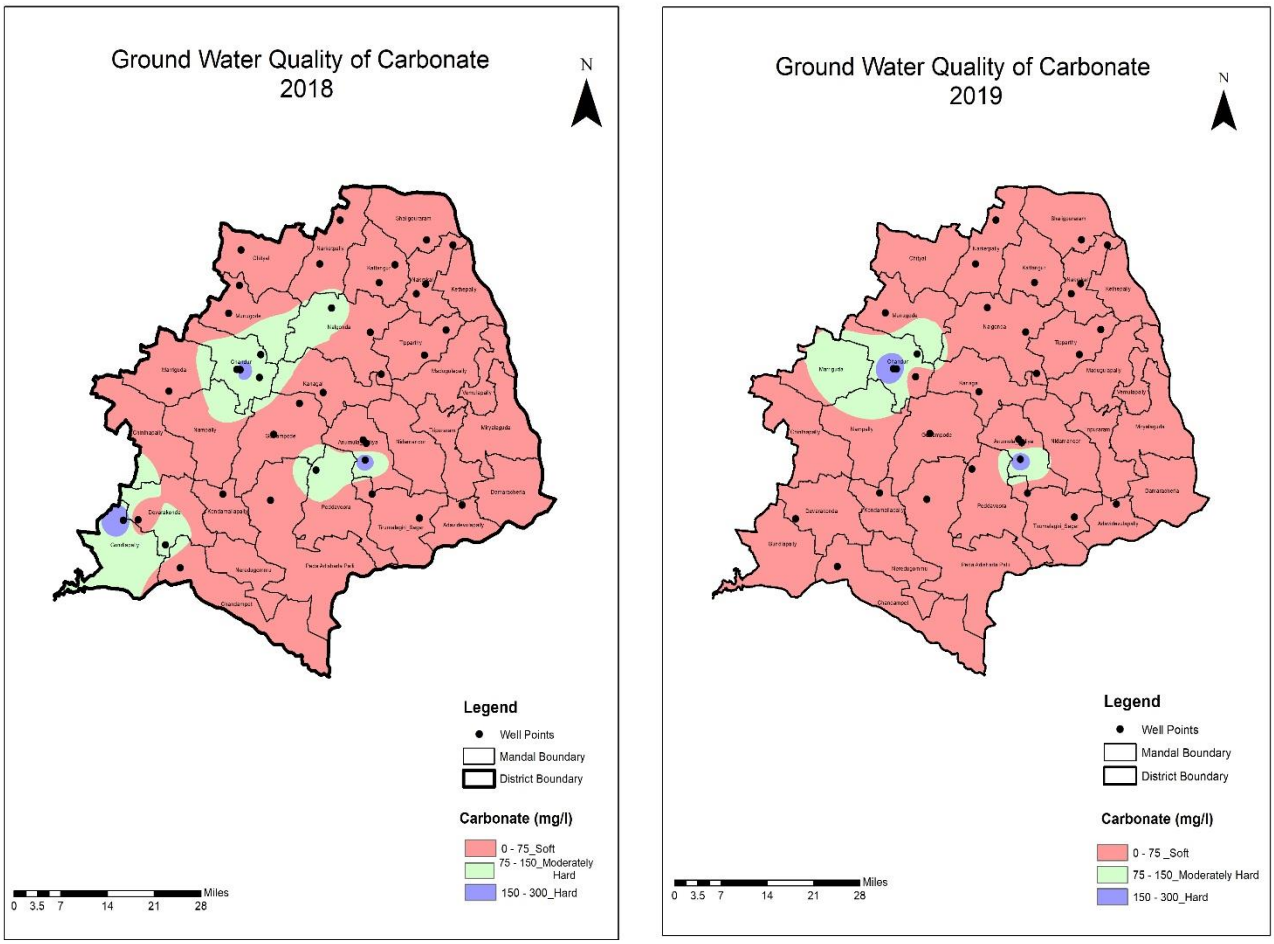
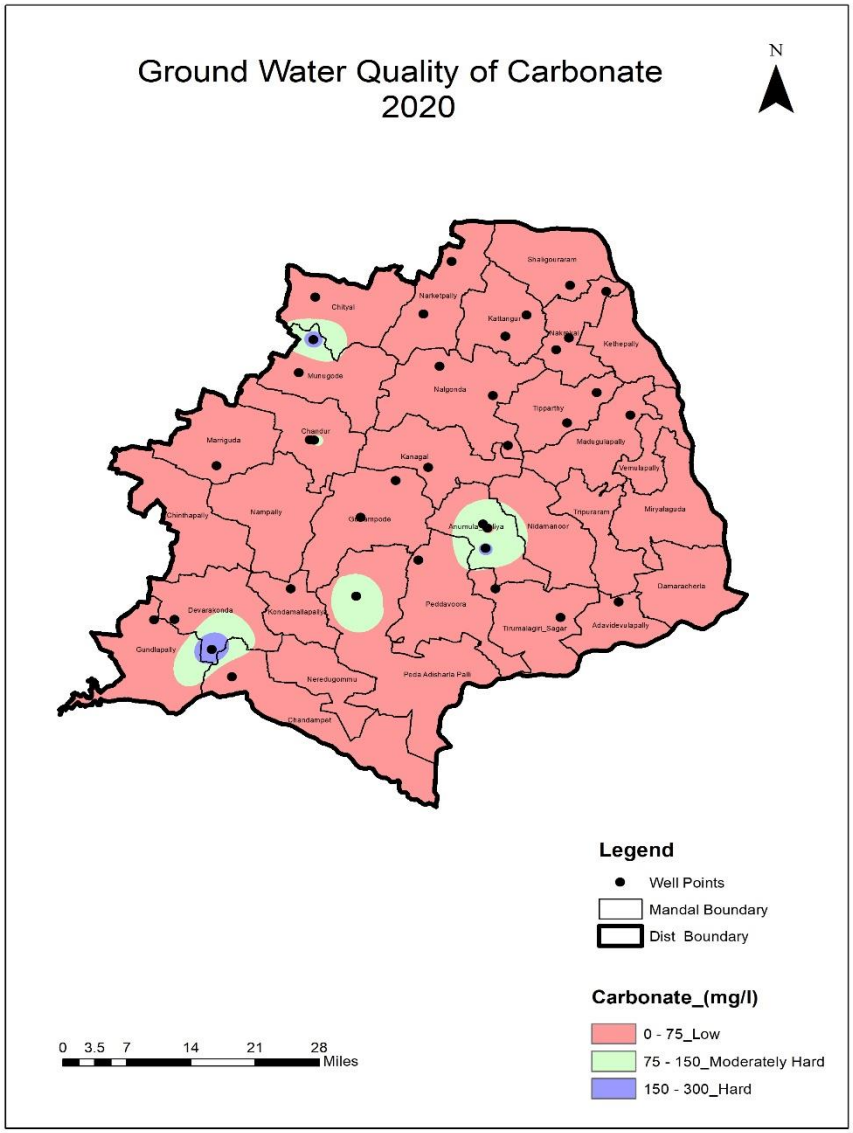


Figure: Carbonate



The study area says about the Carbonate of ranges from 0 to 300 as per Indian Standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the Carbonate is catergorized into three major that which I have divided according to which I got values from water analysis data they are Soft(0-75), Moderate Hard(75-150), Hard(150-300) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As above the Carbonate image of 2018 studies,we observed that the fluorine , maximum area covered by Soft percent (0-75), next covering factor is the Moderate hard is percent (75-150) and the last one which have less covered area is hard is of (150-300).

As the Carbonate of 2019 studies, we generally identified that the major part is of Soft only and the further like moderate hard and hard parts are decreased in this year and that areas also.

As the Carbonate of 2020 studies, we noticed that the as usual part of the soft is remain same and the compare to the previous year of Moderate hard, this is increased some how ann the Hard part is deplicted it seems.

CONSEQUENCES OF CARBONATE :

A water body with a high level of alkalinity (which is different than an alkaline water body) has higher levels of calcium carbonate, $CaCO3$, which can decrease the water's acidity.

Carbonated water has benefits for digestion. It may improve swallowing, increase feelings of fullness, and reduce constipation.

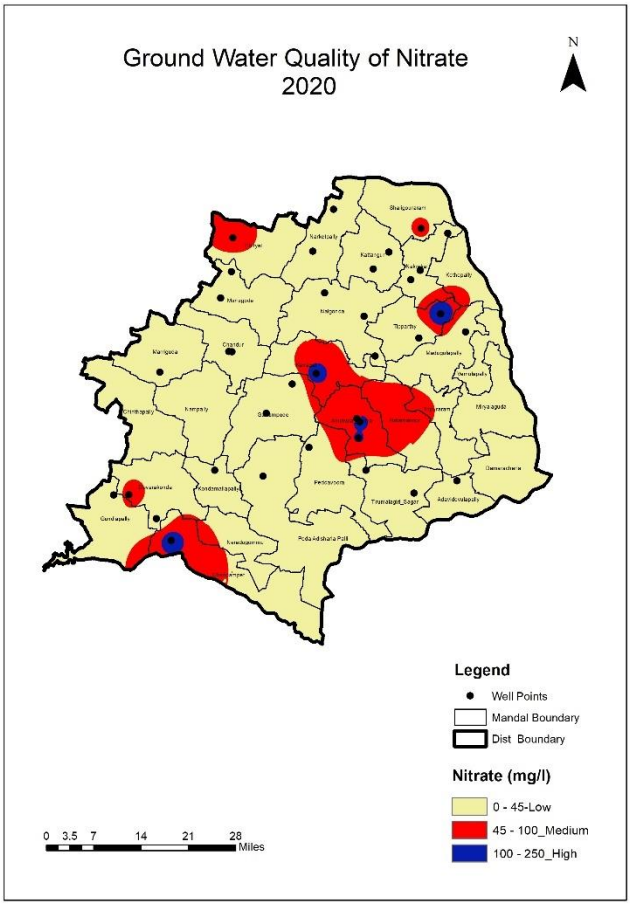
Carbonate hardness provides a buffering capacity to the pH of the water. A correct KH value provides a stabilising effect to the pH.

The harder the water, the lower the toxicity of other metals to aquatic life. In hard water some of the metal ions form insoluble precipitates and drop out of solution and are not available to be taken in by the organism. Large amounts of hardness are undesirable mostly for economic or aesthetic reasons.

When hard water is heated solid deposits of calcium carbonate can form. This scale can reduce the life of equipment, raise the costs of heating the water, lower the efficiency of electric water heaters, and clog pipes.

NITRATE :

Nitrate is a significant parameter that which shows about the Nitrate that (NO3) and nitrite (NO2) are forms of nitrogen in the environment, both natural and human-made. Large amounts of nitrate in drinking water can be harmful to a person's health because nitrate can change into nitrite in the human body. Optimum values of pH and nitrate concentration for denitrification are given. Generally, the optimum pH was 7.0-7.5.



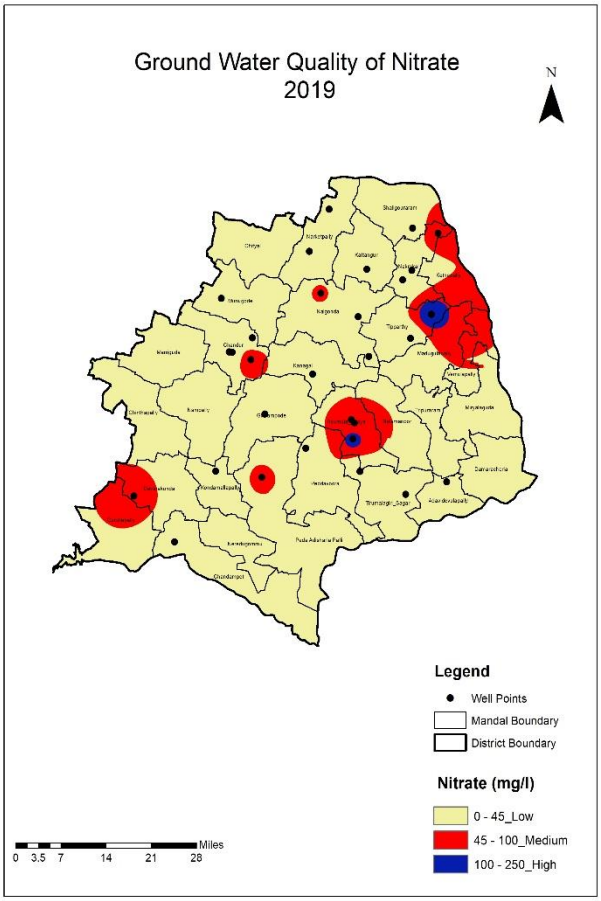
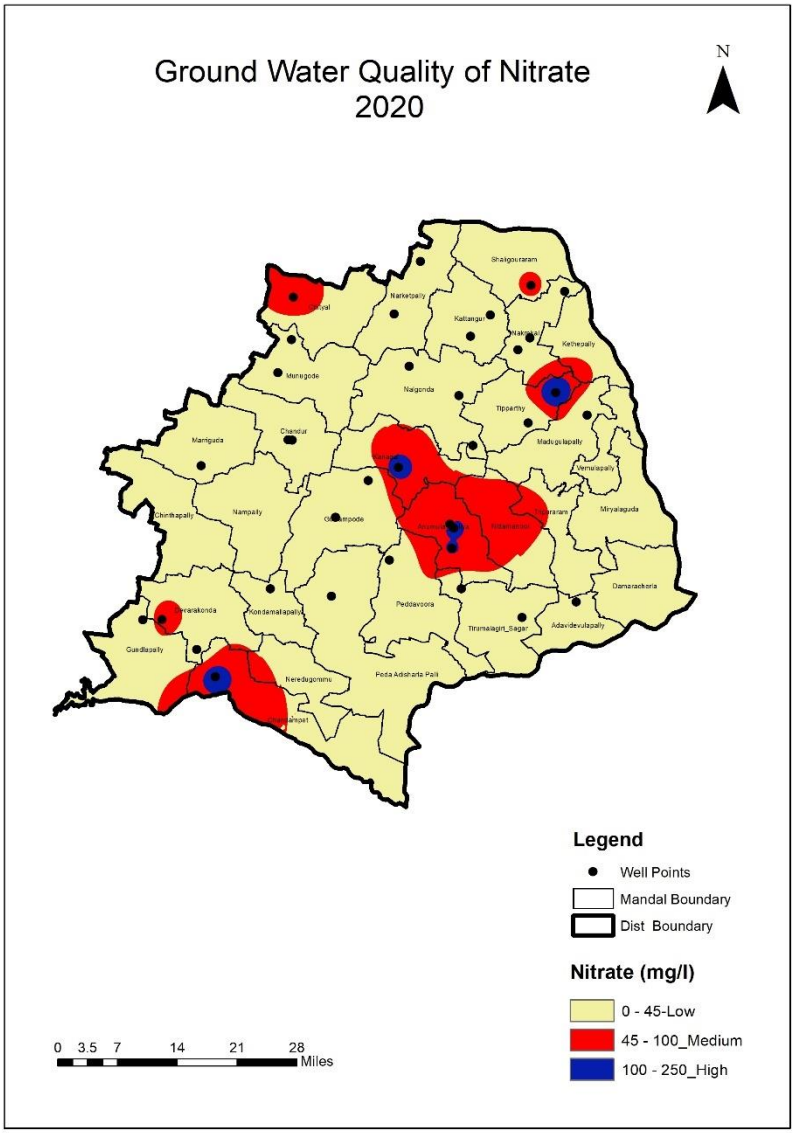


Figure:Nitrate



The study area says about the Nitrate of ranges from 0 to 250 as per Indian Standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the Nitrate is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(0-45), Medium (45-100), High(100-250) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As the Nitrate of 2018 studies, we observed that the Nitrate is mostly covered with the occupancy of Low with (0-45) and coming to the next point the medium is occupying the less amount of (45-100) and the another one is High is very less of (100-250).

As the Nitrate of 2019 studies, we noticed that the Nitrate is Low is some how slight decreament due to the medium and high are very increasing slowly occupying the low areas, but the thing is that low remains same as usual.

As the Nitrate of 2020 studies, know we can clearly noticed that the slowly low the Low covered areas are decreased and the medium and high areas increasing, but the major occupancy by low only now also.

CONSEQUENCES OF NITRATE :

High levels of nitrate in drinking water may increase the risk of colon cancer. Nitrate may enhance the cancer potential of other compounds or may turn into cancer-causing chemicals like the body.

High levels of nitrate in water can be a result of runoff or leakage from fertilized soil, wastewater, landfills, animal feedlots, septic systems, or urban drainage. It can be difficult to pinpoint where the nitrate in drinking water comes from because there are many possibilities.

Nitrate reactions [NO3-] in fresh water can cause oxygen depletion. Thus, aquatic organisms depending on the supply of oxygen in the stream will die.

High levels can turn skin to a bluish or gray color and cause more serious health effects like weakness, excess heart rate, fatigue, and dizziness.

SULPHATE :

Sulphate is a specific indication parameter that which shows about the Sulphate as a simple and precise turbidimetric method of determining sulfate(S) in water samples is described. It is widely distributed in nature and may be present in natural water in concentrations ranging from a few to several thousand milligrams/litre. pH value of sulfate-rich wastewater largely derived from acidic wastewater is usually around 3–4.

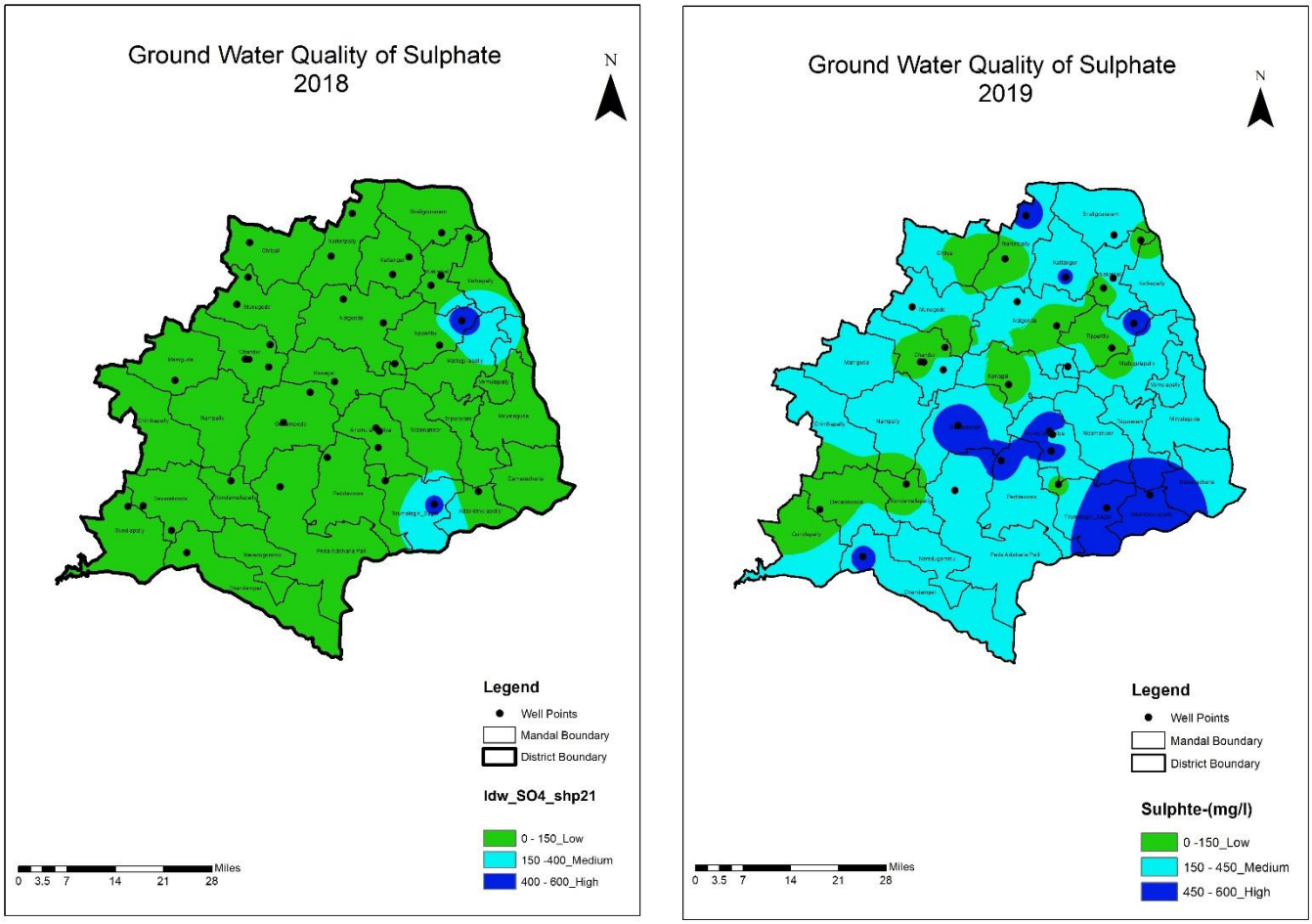
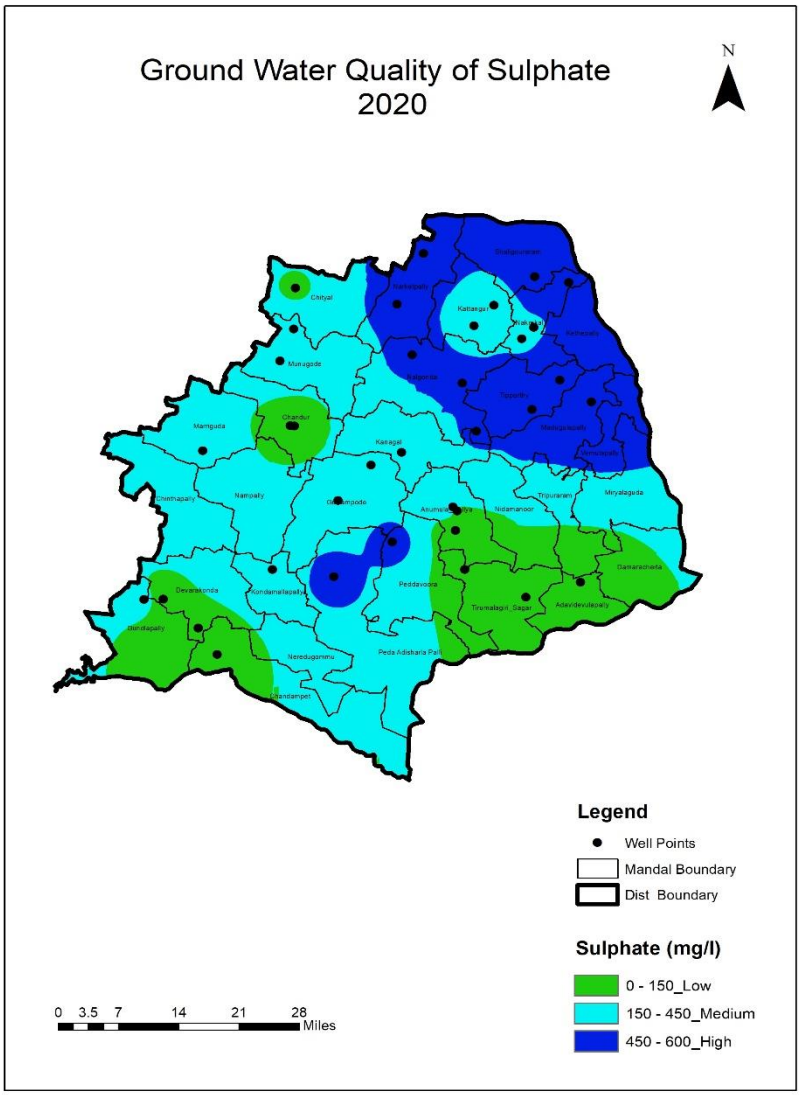


Figure: Sulpahte



The study area says about the Sulphate of ranges from 0 to 600 as per Indian Standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the Suplahte is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(0-150), Medium (150-400), High(400-600) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As the Sulphate of 2018 studies, we observed that the sulphate is majorly covered with the Low concentration areas of (0-150) and the less occupancy of the Medium and High concentration areas of the values are (150-400) and (400-600).

As the Sulphate of 2019 studies, we noticed that the sulphate, that there is a dramatic change in Low has decreased and the oocupied more areas is Medium and next to that is High area is more.

As the Sulphate of 2020 studies, we keenly observed that the sulphate of Low concetration is increased as compare to last year and the slight decreament in Medium and the rapid increament in the High area zone and compare to the previous years there is a fluctuation in Low, Medium and High concentration zones.

CONSEQUENCES OF SULPHATE:

If we drink wate containing high amount of sulphate, they have health effects similar to those, these include reduced lung function, aggravated asthmatic symptoms, and increased risk of emergency department visits, hospitalizations, and death in people who have chronic heart or lung diseases.

Sulfur not only stinks and makes your water taste bad, it can also stain your sinks, toilets, and clothing and even damage plumbing. The bacteria that create the sulfur smell produce a slime that can potentially corrode your plumbing pipes.

The most common form of sulfur in well-oxygenated waters is sulfate. When sulfate is less than 0.5 mg/L, algal growth will not occur.

In addition, sulfates contribute to acidification of surface water and soil, and contribute to acid rain and fog that damage ecosystems, forests and plants. Because sulfates are light colored, they reflect energy from sunlight back into space. This means that sulfates have a cooling influence on climate change.

SODIUM :

Sodium is a significant indication parameter, that which shows about the Sodium,it is a highly soluble chemical element with the symbol “Na.” Sodium is often naturally found in groundwater. The most common sources of elevated sodium levels in groundwater are: •Erosion of salt deposits and sodium bearing rock minerals. The sample pH range is from 4 - 14, and it must be adjusted to > pH 9 with the Sodium ISA (ionic strength adjuster).

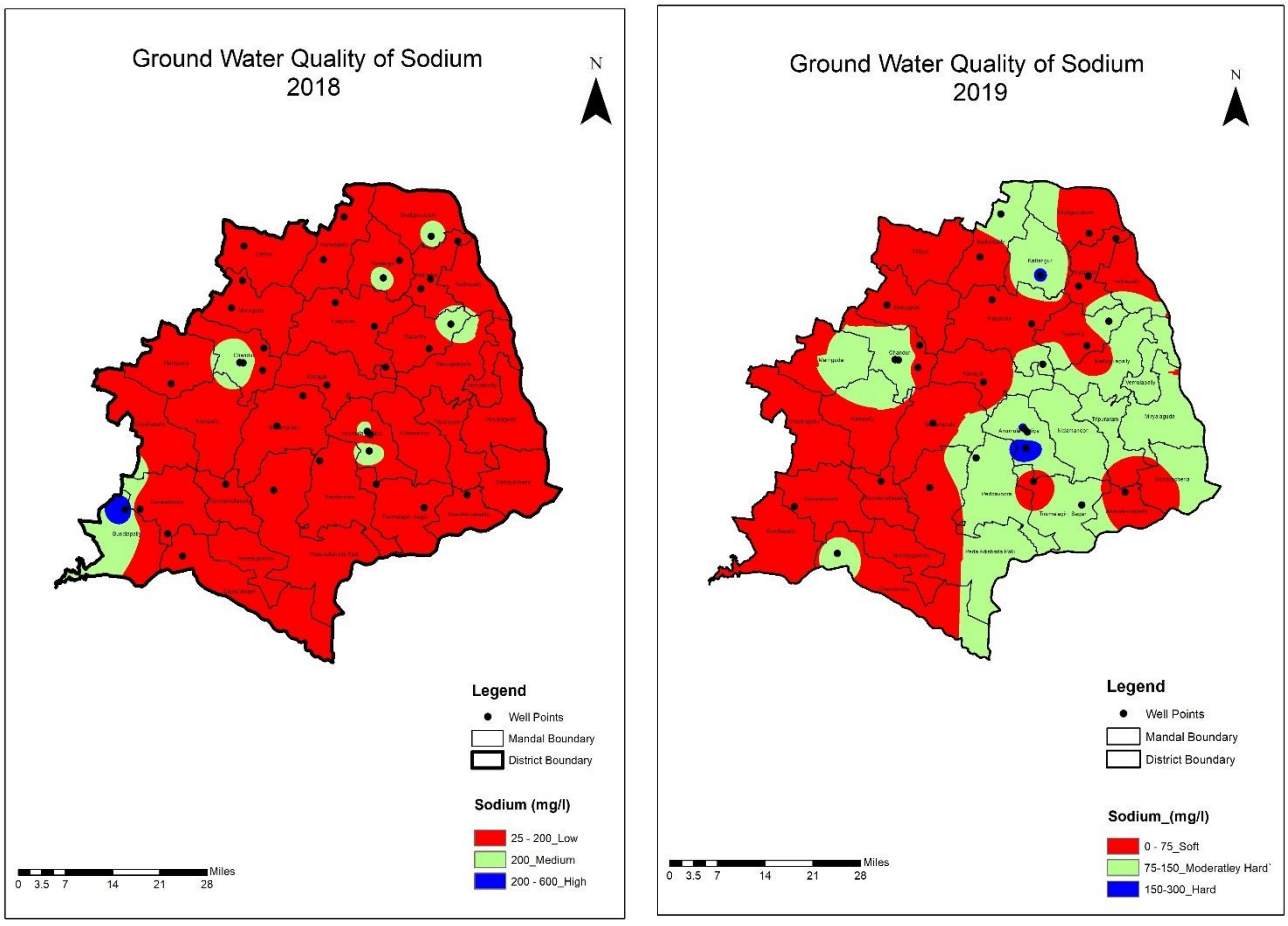
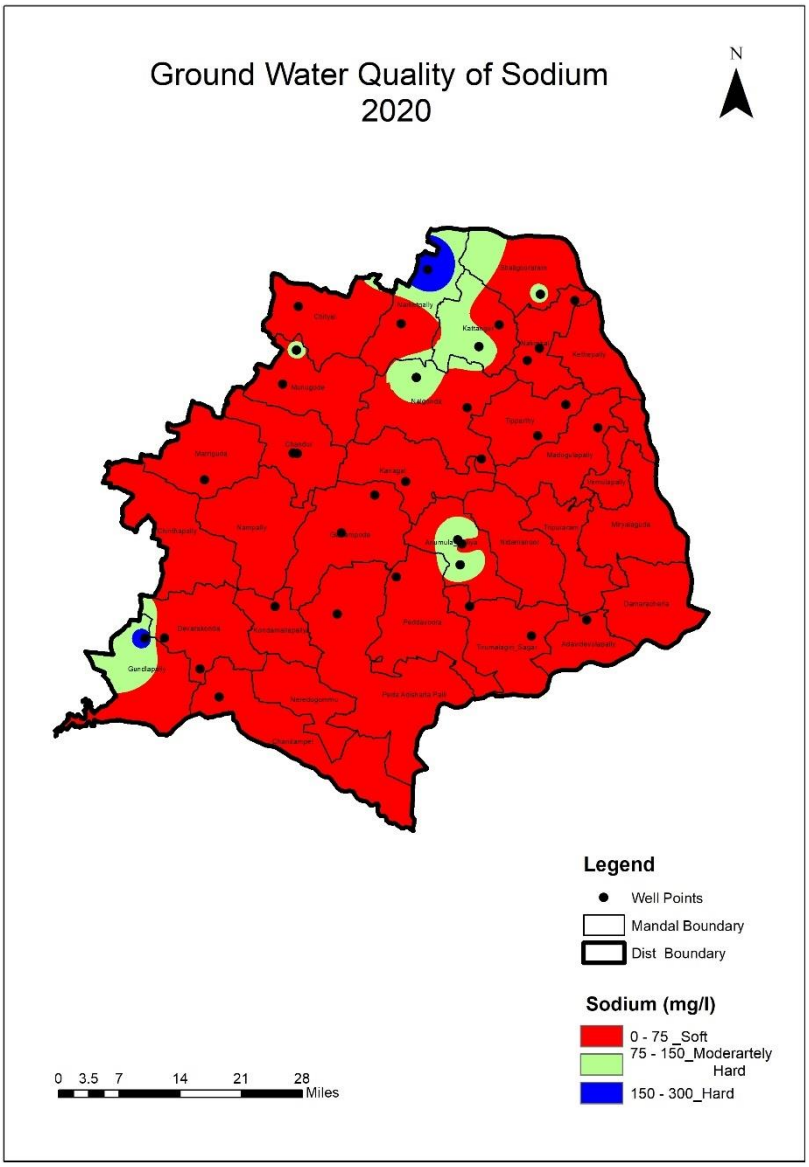


Figure: Sodium



The study area says about the Sodium of ranges from 25 to 600 as per Indian Standards, we conlcude that we have plotted with points in map of three years with water analysis data and we gave some indications to that points in the map.

As according to the Indian Standards, the Sodium is catergorized into three major that which I have divided according to which I got values from water analysis data they are Low(25-200), Medium (200), High(200-600) like this we plotted points and divided the values, gave some colour indications also for hint to identify them easily by looking at the map it seems.

As the Sodium of 2018 studies, we observed that the sodium, high amount of Low concentration areas are appeared with (25-200) and the next one is that Medium has occupied with less area and the High is too small area of occupancy.

As the Sodium of 2019 studies,we noticed that the sodium, the percentage of Low ahs decreased some how and the Medium occupancy is more compare to previous year and the High remain same as previous year.

As the Sodium of 2020 studies, we clearly noticed that the sodium agina the Low has increased its occupancy compare to previous year and the Medium has decreasedin its areas also and the little amount increament takes place in High concentration area.

CONSEQUENCES OF SODIUM:

Sodium (salt) will give drinking water a salty taste at a concentration,people who suffer from high blood pressure, cardiovascular disease, heart disease, kidney problems or are required to be on a low sodium diet should be aware of the sodium (salt) level in their drinking water.

If sodium gets high in water,we cause disease of Hypernatremia typically causes thirst. The most serious symptoms of hypernatremia result from brain dysfunction. Severe hypernatremia can lead to confusion, muscle twitching, seizures, coma, and death.

Because of the low sodium, the amount of water in your body rises and causes your cells to swell. This can lead to many problems. Some are mild, but others can be serious and even life-threatening.

For most people sodium in a water supply well does not present a substantial or unique health risk because the level obtained from water is much less than from the diet.

CONCLUSION

The spatial representation of groundwater quality analysis indicates that the study area needs a few measures of treatment before utilization of groundwater. The study facilitates to understand the existing groundwater quality conditions and to develop appropriate management practices to protect the groundwater sources.

From the analysis of ground water map during year of 2018 we have observed the pH of ground water in Gundlapally and Chandur is Moderate Basic and Basic in Marriguda and Chityal, and it changes from basic to neutral in Kondamallepally, Nerudugommu.

During the year of 2019 we have observed the change in pH in different areas such as chintapally, nampally is basic and Chandoor, Peddavoora is Moderate Basic and in area such as Devarakonda, Katttangur it is basic.

Druing the year of 2020 the change in pH in different areas such as Kangal, tripuraram is basic, where as in areas such as Gurrampode, Shaligouraram it is observed the pH of water is Moderate basic in Munnugoda and Chityal areas. From these ground water analysis of various years we have observed that the pH of ground water changes in various years depending upon Pollution, water content and Environment.

In Nalgonda area we have observed very high amount of Fluorine and small amounts of Carbonates, Sulphates and Nitrates.

We can reduce various parameters by using process such as Water treatment and Reducing various chemicals from the Industries and also by disposal of waste. Avoiding superfacial erosion by planting trees in bare lands.

REFERENCES

[1] Piscopo.G. Groundwater Vulnerability map, explanatory notes, Castlereagh catchment, NSW Department of land & water conservation. (2001)

[2] Sanjay Kumar Goyal, B.S.Choudhary ,GIS based spatial distribution mapping & suitability evaluation of Groundwater Quality for domestic & agricultural purpose in kaithal district: Environmental earth Sciences; Springer February (2010)

[3] BIS, Specifications for drinking water, New Delhi: IS: 10500.(2012).

[4] APHA Standard methods for the examination of water and waste water (19th edn).Washington :American Public Health Association.(1995)

[5] Balakrishnan, P., Abdhul Saleem., and Mallikarjun, N.D., Groundwater quality mapping using geographic information system (GIS): A case study of Gulburga city, Karnataka, India, African Journal of Environmental Science and Technology, vol 5, No.12,pp.1069-1084.(2011)

[6] Nagarajan, R., Rajmohan, N., Mahendran, U., and Senthamilkumar,S, Evaluation of groundwater quality and its suitability for drinking and agricultural use in Thanjavur city, Tamil Nadu, India, Environmental Monitoring Assessment, DOI 10.1007/s10661-009-1279-9.(2009)

[7] Lo CP, Yeung AKW Concepts and techniques of geographic information systems New Delhi: Prentice-Hall of India Pvt. Ltd, p.492. (2003).

[8] Jeong, C.H... Effect of land use and urbanization on hydrochemistry and contamination of groundwater from Taejon area, Korea. Journal of Hydrology, 253, 194–210. (2001)