

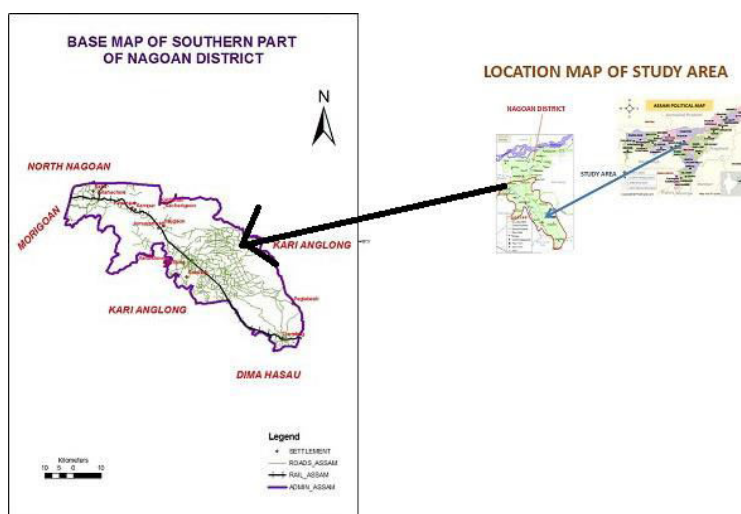
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION IN SOUTHERN PART OF NAGAON DIST. COVERING DOBOKA, NILBAGAN ETC. AREAS WITH SPECIAL EMPHASIS ON GROUND WATER QUALITY (2014-15)

1. INTRODUCTION:

The Directorate of Geology and Mining taken up a programme on " Preliminary Hydrogeological investigation in Southern part of Nagaon Dist. Covering Doboka, Nilbagan etc. areas with special emphasis on ground water quality" in the year 2014-15.

The study area is located in southern part of Nagaon district bordering Karbi along district in the east , Dima hasao in south and south west and Morigaon in the west. Cartographically the area confined between Latitude $26^{\circ}12''$ to $27^{\circ}25''$ N & Longitude $92^{\circ}00''$ to $92^{\circ}85''$ E .

About 650 sq.km. area was covered by hydrogeological investigation. 56 numbers of wells were surveyed out of which 15 numbers are dug well, 34 numbers hand tube well and 7 were deep tube well . 101 numbers of water samples both acidic and non acidic were collected during the field investigation. As some of villages of southern Nagaon district is highly affected by fluoride so special emphasis was given to those and nearby areas and collected samples accordingly.



2. MATERIAL AND METHODS:

In an around Neelbagan, Doboka and Hojai area, water samples were collected during pre monsoon period in the month of March 2015 from 56 random locations. The sampling points were confined to bore wells of PHE supply, dug wells and shallow tube wells which are used for drinking purposes.

Pre-cleaned good quality one litre polythene bottles were used for groundwater sample collection. Samples were collected after flushing out the tube wells to fresh ground water . Preservatives (1:1 HNO₃ Solution) were added to each water samples at the time of sampling and the container were sealed, Collected samples were protected from direct sunlight during transportation to the laboratory. Each of the groundwater samples were analyzed to study the major ions present.

3. GEOLOGY AND DRAINAGE:

The geologic formation of Nagaon district belongs to Archaean, Pre-Cambrian, Tertiary and Quaternary periods. The Archaean rocks comprise the metamorphic rock types of gneisses and schists which are introduced by younger acidic and basic intrusive. Rest part of the study area is made up partly of early Tertiary sedimentary deposits and Quaternary alluvial deposits. The sediments are mostly shale, sandstone, limestone and conglomerate. (Taher ,2005.)

Two main rivers of the study area are Kopili and Jamuna. After entering Assam the Kopili separates the Karbi Anglong district from the Dima Hasao North Cachar Hills district and flows into the Nagaon district in a north-westerly direction. While Jamuna River with a catchment of 3960 km² flows to the Kopili at Jamunamukh. The Kopili River finally flows to Kalang, a spill channel of Brahmaputra, near Hatimukh after traversing a distance of 290 km². The total catchment of Kopili River is about 16,421km².

4. WELL DETAILS:

56 nos of wells were surveyed out of which 15 nos are dug well, 34 nos hand tube well and 7 were deep tube well. The depth to water level of dug wells varies from 1.00 m bgl to 8.43 m bgl. The depth to water level of dug wells varies from 1.00 m bgl to 8.43 m bgl. 101 nos of water sample both acidic and non acidic were collected during the field investigation. Gps was used to determine the latitude and longitude of the wells along with its altitude. The other hydrogeological data such as total depth of the well, temperature and Ph of water samples were also collected. (Fig2 & Table1)

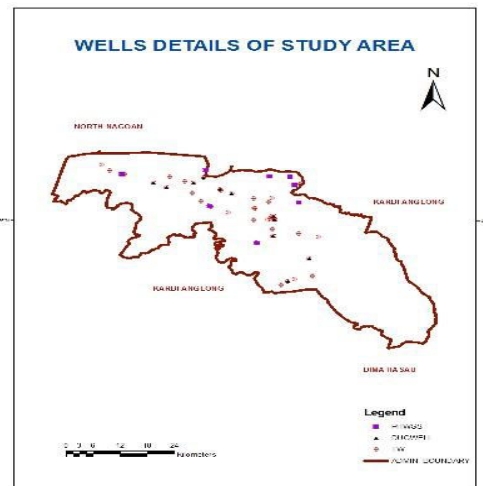


Fig 2: Well Details of Study area

5. RESULT AND DISCUSSION:

5a. Ground water Quality:

From the number of ground water studies in Nagaon district it is found some of the places of the study area are well known for high concentration for fluoride and population suffering from dental or skeletal fluorosis. Therefore special importance is given to those areas to determine its present status and collected samples accordingly. The analytical results of 56 ground water samples of the study area are present in Table 2. The quality of ground water in the district is suitable for both the drinking and irrigation purposes except the high concentration of fluoride (F) in certain areas. Almost all the constituents are within the permissible limits of drinking water standards, except Iron (Fe), which exceeds the permissible limit at a few places. Areas like Akashiganga Haldiati Tapatjuri, Neelbagan and Doboka the contaminated wells are sealed as such all the samples except one well (5.4 mg/lit) in Haldiati area, show fluoride below permissible limit. (Table1)

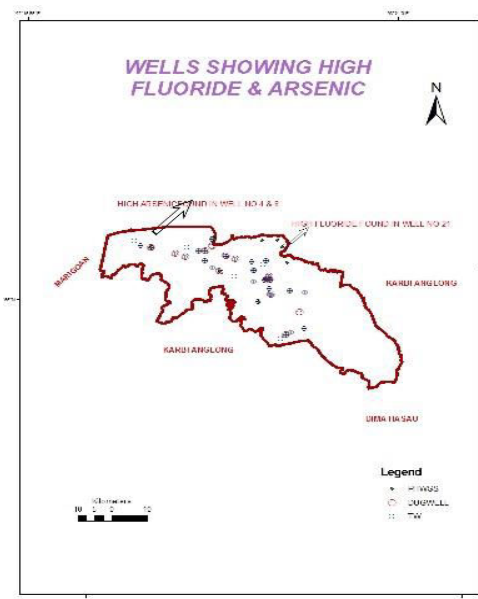


Fig 3: Wells showing high Fluoride and Arsenic

Fluoride was detected in ground water in some of wells in southern part of Nagaon district back in 1999. Although most of the wells affected by fluoride is sealed by PHE, but the effect of dental fluorosis still can be seen in school going children.

Villagers are quite aware of fluoride contamination and according to them they use supply water from spring through a filter plant in Akashiganga "Dhikharumukh water supply scheme". But considering the dental fluorosis affected children, there is still scope for further work in that area.

Some of the salient features of study area:

- Arsenic is found in two hand tube wells of the study area, which is 0.02mg/L.
- Both the wells are on the bank of Kopili river
- Except one well in Haldiati area all the samples show fluoride below permissible limit ie 1.5 ppm .
- As Haldiati area is highly affected by fluoride most of the wells which are affected by fluoride contamination are sealed by PHE.
- During the survey villagers with dental and skeletal fluorosis were noticed in Haldiati and Tapatjuri area

5b. Awareness:

Though the people of the area are aware about fluoride contamination and its health impacts, still there are some gaps in knowledge regarding the disease and mitigation measures available to prevent the contamination. PHE sealed the contaminated tube wells by red marking but it was not found about people initiative using simple domestic fluoride removal water treatment method (like Nalgonda method). Fluorosis victims generally suffer from social inferiority. When the disease cripples the principal income earner of the household, the entire family descends deeper into poverty. People believes the myth that by boiling water, fluoride level can be reduced, so tried to break this myth by discussing with affected people at the time of survey . The high value location of fluoride in ground water requires proper treatment for water being used as drinking purposes and alternate sources like pond, river and rain water should be made available to the people living in the area.



Fig4: Photographs showing People affected by dental and skeletal fluorosis in the area

Table 1.WELL DETAILS ALONG WITH FLUORIDE CONCENTRATION(March 2015)

SL NO	WELL TYPE	LOCATION	LAT	LONG	ALTITUDE in m(GPS)	TOPO SHEET	TOTAL DEPTH in m (bgl)	DTW in m (BGL)	FLUORIDE in ppm
1	DW	Nij Narikalbari	26°10'18.3"	92°37'42.4"	69	83 B/12	6.5	5.00	0.08
2	DW	Kampur	26°09'35.5"	92°39'21.2"	72	83 B/12	9.00	2.61	0
3	DW	Jyoti Nagar	26°10'18.8"	92°42'54.8"	57	83 B/12	3.84	3.06	0.05
4	DW	Kathiatoli	26°11'6.8"	92°44'13.5"	60	83 B/12	7.25	4.04	0.19
5	DW	Sarupathar	26°09'8.6"	92°46'25.2"	59	83 B/16	4.88	2.22	0.06
6	DW	Bheleuguri	26°08'23.9"	92°47'56.4"	68	83 B/16	3.35	2.45	0.07
7	Dw	Nilbagan	26°04' 08"	92°54' 31.6"	60	83 B/16	10.4	6.4	0.36
8	DW	Nandalalpur1	26°01' 25.6"	92°53' 20.3"	70	83 B/16	4.2	1	BDL
9	DW	Jurapukhri	25°50' 24.5"	92°56' 26"	77	83 C/13	9.2	8.43	0.28
10	DW	Ramnagar	25°57' 41.2"	92°58' 02.3"	80	83 C/13	6.3	4.01	0.24
11	DW	Uttar Bordolong	25°53' 53.2"	92°55' 16.5"	80	83 C/13	9.5	7.36	0.09
12	DW	UttarAsli Nagar	26°04' 39.8"	92°53' 26.1"	60	83 B/16	10.97	7.36	0.54
13	DW	Niz doboka1	26°05' 58"	92°51' 03"	63	83 B/16	8.6	6.6	0.63
14	DW	Jamunamukh	26°06' 20.2"	92°44' 59.9"	62	83 C/12	9.2	4.9	0.71
15	DW	Borkola	26°40' 18.3"	92°38' 53.7"	58	83 C/12	5.8	2.07	BDL
16	Falls water	Akashiganga	26°10' 36.4"	92°56' 32.2"	82	83 B/16	9.5	NA	0.1
17	PHE	Rangalu Sutar Gaon	26°12'21.5"	92°44'40"	59	83 B/12	30.48	NA	0..16
18	PHE	Sutar gaon	26°12'21.5"	92°44'40"		83 B/12	100	NA	0.1
19	PHE	Hojai Town WSS	26°0' 15.5"	92°51' 18.4"		84 B/16	9.2	NA	0.23
20	PHE	Rahdhola	26°06' 24.8"	92°45' 7.2"	64	83 C/12	NA	NA	1.2
21	Stream water	Dhikharumukh WSS	26°10' 36.4"	92°56' 32.2"		84 B/16	NA	NA	0.07
22	TW	Garmari	26°13'20.5"	92°30'52.2"	52	83 B/12	NA	NA	BDL
23	TW	Chaparmukhgaon Panchayat	26°12'07.2"	92°31'13"	61	83 B/12	36.58	NA	BDL
24	TW	Guimari	26°11'43.5"	92°34'39.1"	61	83 B/12	30.48	NA	BDL
26	TW	Patia pam	26°08'32.7"	92°42'44.8"	76	83 B/12	60.96	NA	0.26
27	TW	Mahaniati	26°10'29"	92°41'47.1"	67	83 B/12	38.1	NA	0.22
28	TW	Sarupathar1	26°09'8.6"	92°46'25.2"	68	84 B/16	42.67	NA	0.1
29	TW	Sardar gaon	26°07' 40.7"	92°50' 48.8"	60	83 B/16	15.15	NA	0.28
30	TW	Doboka Sutar Gaon,	26°06' 57.3"	92°52' 46.6"	57	83 B/16	48.77	NA	0.2
31	TW	Haldiati	26°09' 59.9"	92°56' 56.3"	79	83 B/16	24.38	NA	5.4
32	TW	Burigaon	26°07' 39.3"	92°53' 22.7"	69	83 B/16	65.53	NA	0.28

SL NO	WELL TYPE	LOCATION	LAT	LONG	ALTITUDE in m(GPS)	TOPO SHEET	TOTAL DEPTH in m (bgl)	DTW in m (BGL)	FLUORIDE in ppm
33	TW	Nilbagan	26°04' 08"	92°54' 31.6"	60	83 B/16	9.14	NA	0.3
34	TW	Joynagar	26°04' 8.5"	92°54' 32"	60	83 B/16	NA	NA	0.54
35	TW	Murajhar	26°04' 3.1"	92°50' 49"	70	83 B/16	45.72	NA	0.58
36	TW	Islam Nagar	26°02' 31"	92°53' 16.5"	76	83 B/16	67.05	NA	0.35
37	TW	Hojai1	26°0' 15.5"	92°51' 18.4"	75	83 B/16	12.19	NA	0.06
38	TW	Nandalalpur	26°01' 25.6"	92°53' 33.4"	71	83 B/16	18.29	NA	0.56
39	TW	Padumpukhuri	26°01' 43.6"	92°56' 49.2"	74	83 B/16	36.58	NA	0.73
40	TW	Kariani Tiniali	26°01' 11.5"	92°59' 28.8"	76	83 B/16	42.37	NA	0.73
41	TW	Bamungaon forestgate	25°54' 44.8"	92°58' 33.1"	83	83 C/12	33.53	NA	0.26
42	TW	Udali	25°53' 31.6"	93°0' 44.6"	90	83 C/12	54.86	NA	
43	TW	2 no Chambaria	25°54' 15.7"	92°56' 9.8"	79	83 C/13	18.9	NA	0.2
44	TW	Bordolong Kharikhana	25°53' 15.3"	92°54' 16.6"	79	83 C/13	13.72	NA	0.12
45	TW	Mubarak Basti	26°04' 39.8"	92°53' 26.1"	99	83 B/16	33.53	NA	0.83
46	TW	UttarAsli Nagar,	26°04' 4.9"	92°52' 40.5"	61	83 B/16	32	NA	0.8
47	TW	Niz doboka	26°05' 58"	92°51' 03"	63	83 B/16		NA	0.5
48	TW	Bedoati	26°04' 58.7"	92°49' 40.4"	58	83 B/16	30.48	NA	BDL
49	TW	Charlock	26°05' 11.2"	92°47' 29.4"	61	83 B/16	54.86	NA	BDL
50	TW	Jamunamukh 1	26°06' 20.2"	92°44' 59.9"	62	83 C/12	27.43	NA	BDL
51	TW	Rahdhola	26°06' 24.8"	92°45' 7.2"	60	83 C/12		NA	0.79
52	TW	Kohargaon	26°07' 12.9"	92°43' 47.5"	60	83 C/12	38.1	NA	0.16
53	TW	Mohgaity	26°11' 16.6"	92°39' 48"	59	83 C/12	21.34	NA	0.18
54	TW	Borkola1	26°30' 02.0"	92°39' 17.3"	61	83 C/12	45.72	NA	0.17
55	TW	Jagial Bebejia	26°15' 51.3"	92°38' 37.3"	56	83 C/12	20.12	NA	0.13
56	Tw	Gahimukh	26°16' 59.1"	92°38' 38.2"	53	83 C/12	36.58	NA	0.26

Table2: Chemical analysis of water samples

Ions	Ranges in dug wells	Ranges in Hand tube wells	WHO Standard		BIS standard	
			Desirable	permissible	Desirable	permissible
Fluoride mg/l	0.05-0.79	0.1-5.4	1.0	1.5	1.0	1.5
Arsenic mg/l	BDL	BDL-0.02	0.05	No relaxation	0.05	No relaxation
Co ₃ mgs/l	0	8.36-40.48	300	600	300	600
HCo ₃ mgs/l	20.24-473.24	60.82-339.22	300	600	300	600
Total Fe mgs/l	0.384-5.027	traces-26.06	0.3	1.0	0.3	1.0
Hardness mgs/l	18.96-286.56	45.56-284.4	100	500	300	600
Chloride mgs/l	3.54-42.13	7.09-319.5	250	600	250	1000
Ca mgs/l	3.02-55.72	6.36-44.57	75	200	75	200
Mg mgs/l	3.27-57.25	6.28-37.95	30	150	30	100
Specific conductance mgs/l	50.2-785	97-909				
TDS mgs/l	44-400	112-578	500	1500		
pH at 25 °C	6.9-7.8	6.2-8.3	7	9.2	6.5	9.2
SO ₄ (mg/L)	0-145.17	0-49.26	200	600	200	400

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