



FIG.6 BIDAR DISTRICT

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1. Location

Bidar district is located in the northern part of Karnataka State with geographical area of 5448 sq. km. It is bounded by Medak district and Nizamabad district of Andhra Pradesh State on eastern side, Nanded district of Maharashtra State on northern side, Latur and Osmanabad districts of Maharashtra State on western side and Gulbarga district of Karnataka State on southern side. It lies between 17° 35' to 18° 29' N Latitude and 76° 41' to 77° 39' E Longitude.

2. Demography

As per the 1991 census, Bidar district has a population of 1,255,798. The total number of villages / habitations in the district are 812. Bidar is the bigger city. Bidar district has 5 taluks namely Aurad, Basavakalyan, Bidar, Bhalki and Humnabad.

3. Climate, Drainage and Soil

Bidar district forms part of the northern maidan region. This is an extensive undulating plateau forming the northern most part of the state with elevation ranging from 350 to 650 m. and receives an annual rainfall between 700 to 1200 mm. Bidar district has an average annual rainfall of 907.5 mm. Manjara, Karanja and Mullamari rivers drain the district with Karanja reservoir being the major water source. Bidar district experiences temperature variation between 20.7^o to 40^o C. Red lateritic soils, very deep black cotton soils and red soils are encountered in this district.

4. Geology and Groundwater occurrence

The flood basalts called Deccan traps cover the entire Bidar district. Rarely, the upper portions of the exposed rocks show the volatile escape vents (voids) filled up by secondary minerals. The basalts are hard, compact, jointed and highly weathered. From the groundwater point of view, the size and interconnectivity of vesicles, the joint pattern and the intertrappean beds control occurrence and movement of water in Basalts and normally yield better quality water. Groundwater occurs in the weathered and decomposed mantle under semi confined conditions. Lateritisation of basalts on vast scale is very prominent. Laterites have good porosity and low permeability. Laterite capping generally act as shallow aquifer and yield good quantity of water for a short duration.

5. Groundwater quality characterization

To understand and gather information on groundwater quality, 2653 groundwater samples collected from 683 villages / habitations in Bidar district have been analysed by RDED.

The water samples have been analysed for only 14 parameters such as Turbidity, Colour, Conductivity, Hydrogen ion concentration (pH), Total Dissolved Salts (TDS), Total Hardness (TH), Calcium Hardness (CaH), Chloride (Cl), Sulphate (SO₄), Fluoride (F), Nitrate (NO₃), Alkalinity (Alk), Iron (Fe) and Bacteria and the data is presented in the Table.

5.1 Physical characters

Turbidity

Only 27 samples collected from 23 villages show higher turbidity in the range between 11 and 33 JTU. The samples showing higher turbidity are from: Aurad (2 out of 618 samples), Basavakalyan (3 out of 468 samples), Bhalki (5 out of 477 samples), Bidar (13 out of 598 samples) and Humnabad (4 out of 492 samples). The water with highest turbidity of 33 JTU is from Astoor village of Bidar taluk.

Colour

Only 10 samples from 9 villages have shown high colour intensity ranging between 28 to 90 HU and the abnormal samples are from: Bidar (7 out of 598 samples), Basavakalyan (2 out of 468 samples) and Bhalki (1 out of 477 samples). No abnormal colour intensity is recorded in Aurad and Humnabad taluks.

Electrical Conductivity (EC)

The EC values in the different taluks of Bidar district are: Aurad 1 to 5700 m mhos/cm, Basavakalyan 60 to 5203 m mhos/cm, Bhalki 100 to 3900 m mhos/cm, Bidar 1 to 3100 m mhos/cm and Humnabad 1 to 4830 m mhos/cm.

Hydrogen Ion Concentration (pH)

About 42 samples covering 39 villages have shown the variation in pH value from acidic to basic in the range of 6 to 9.2 with highest (9.2) being reported from Changlair village of Humnabad taluk. The range of pH values recorded in the other taluks are: Aurad 6.2 to 8.9 (13 samples), Basavakalyan 6 to 8.6 (14 samples), Bhalki 8.8 (2 samples), Bidar 6.4 to 8.7 (8 samples) and Humnabad 6.2 to 9.2 (5 samples).

5.2 Chemical Characters

Total Dissolved Salts (TDS)

Totally 20 samples covering 16 villages / habitations have higher content of TDS varying from 2020 to 3180 ppm. The ranges of abnormal TDS content in different taluks are: Aurad 2140 to 3180 ppm (9 samples), Basavakalyan 2020 to 2330 ppm (4 samples), Bhalki 2050 to 2560 ppm (5 samples), Bidar 2150 ppm (one sample) and Humnabad 2070 ppm (one sample). The highest value of 3180 ppm is reported from Belkunda village of Aurad Taluk.

Total Hardness (TH)

Only 4 samples covering 3 villages have indicated higher TH content in the range of 660 to 2400 ppm. The range of TH values above the permissible limit in the other taluks are: Aurad 2400 ppm (one sample) and Basavakalyan 660 to 960 ppm (3 samples). The maximum TH content (2400 ppm) is reported from Budankal village of Aurad taluk. No abnormal Total Hardness is recorded in Bhalki, Bidar and Humnabad taluks.

Calcium Hardness (CaH)

There are 116 samples spread across 80 villages having CaH ranging from 210 to 909 ppm. The abnormal samples are from: Bidar (48 samples with CaH 220 to 909 ppm), Bhalki (26 samples with CaH 210 to 300 ppm), Aurad (20 samples with CaH 210 to 350 ppm), Humnabad (12 samples with CaH 220 to 340 ppm) and Basavakalyan (10 samples with CaH 210 to 440 ppm). The highest TH value of 909 ppm is recorded from Kaplapur village of Bidar taluk.

Chloride (Cl)

Only one sample in the entire district has shown the higher Chloride content of 2600 ppm and is collected from Kumber Galli village of Aurad taluk.

Sulphate (SO₄)

No abnormal Sulphate content is recorded in the entire district.

Fluoride (F)

Higher fluoride content in the range of 1.6 to 9 ppm is reported in 56 samples from 37 villages / habitations. The concentration variation of fluoride reported in different taluks are: Aurad 1.6 to 9 ppm (11 samples), Basavakalyan 1.8 to 2.2 ppm (2 samples), Bhalki 1.8 to 1.9 ppm (2 samples), Bidar 1.6 to 2.5 ppm (39 samples) and Humnabad 1.6 to 1.8 ppm (2 samples). Highest concentration of Fluoride (9 ppm) is reported from Bellur (J) village in Aurad taluk.

Nitrate (NO₃)

In all, 80 samples covering 57 villages / habitations have analysed NO₃ content ranging from 101 to 420 ppm. These samples are from: Aurad (3 samples with nitrate content 121 to 165 ppm), Basavakalyan (13 samples with nitrate content 110 to 420 ppm), Bhalki (10 samples with nitrate content 102 to 167 ppm), Bidar (28 samples with nitrate content 102 to 220 ppm) and Humnabad (26 samples with nitrate content 101 to 200 ppm). The highest nitrate content of 420 ppm has been recorded from Khandala village of Basavakalyan taluk.

Alkalinity (Alk)

Only 10 samples in the entire district have analysed higher in the range of 610 to 2250 ppm. They are from: Aurad 610 & 2250 ppm (2 samples), Bidar 620 to 1240 ppm (5 samples) and Humnabad 630 to 850 ppm (3 samples). Basavakalyan and Bhalki taluks have not reported abnormal Alkalinity content.

Iron (Fe)

Just one sample in the entire district collected from Kangti village in Bidar taluk has shown higher iron content of 1.3 ppm.

Bacteria (*E.coli*)

Nearly 892 samples covering 560 villages have shown the presence of Bacteria in the analysed water samples. The bacterial count generally varies from 1 to 18 No.s /100 ml of water. The bacterial counts reported in different taluks are: 1 to 15 numbers /100 ml in Aurad taluk (283 samples), Basavakalyan 1 to 18 numbers /100 ml (160 samples), Bhalki 1 to 17 numbers /100 ml (138 samples), Bidar 1 to 17 numbers /100 ml (171 samples) and Humnabad 1 to 18 numbers /100 ml (140 samples).

5.3 Spatial Variation**Bacteria (*E.coli*)**

The map depicting the bacterial incidence in the samples for the individual villages reveals that, quite a good number of villages in the district have indicated the presence of bacteria. Bidar taluk is relatively less affected by the bacterial incidence when compared to the other taluks of the district.

Fluoride (F)

The isoconcentration map of fluoride (Fig.6A) indicates that, only few isolated patches in the eastern part of the district comprising Bidar taluk have relatively higher fluoride content.

Nitrate (NO₃)

The isoconcentration map generated for nitrate (Fig.6B) indicates that, barring few small, isolated patches in Basavakalyan taluk near the southern most tip of the district, Humnabad taluk in the central part of the district and Bidar taluk in the eastern portion of the district the district has nitrate content well within the permissible limit.

6. Conclusion

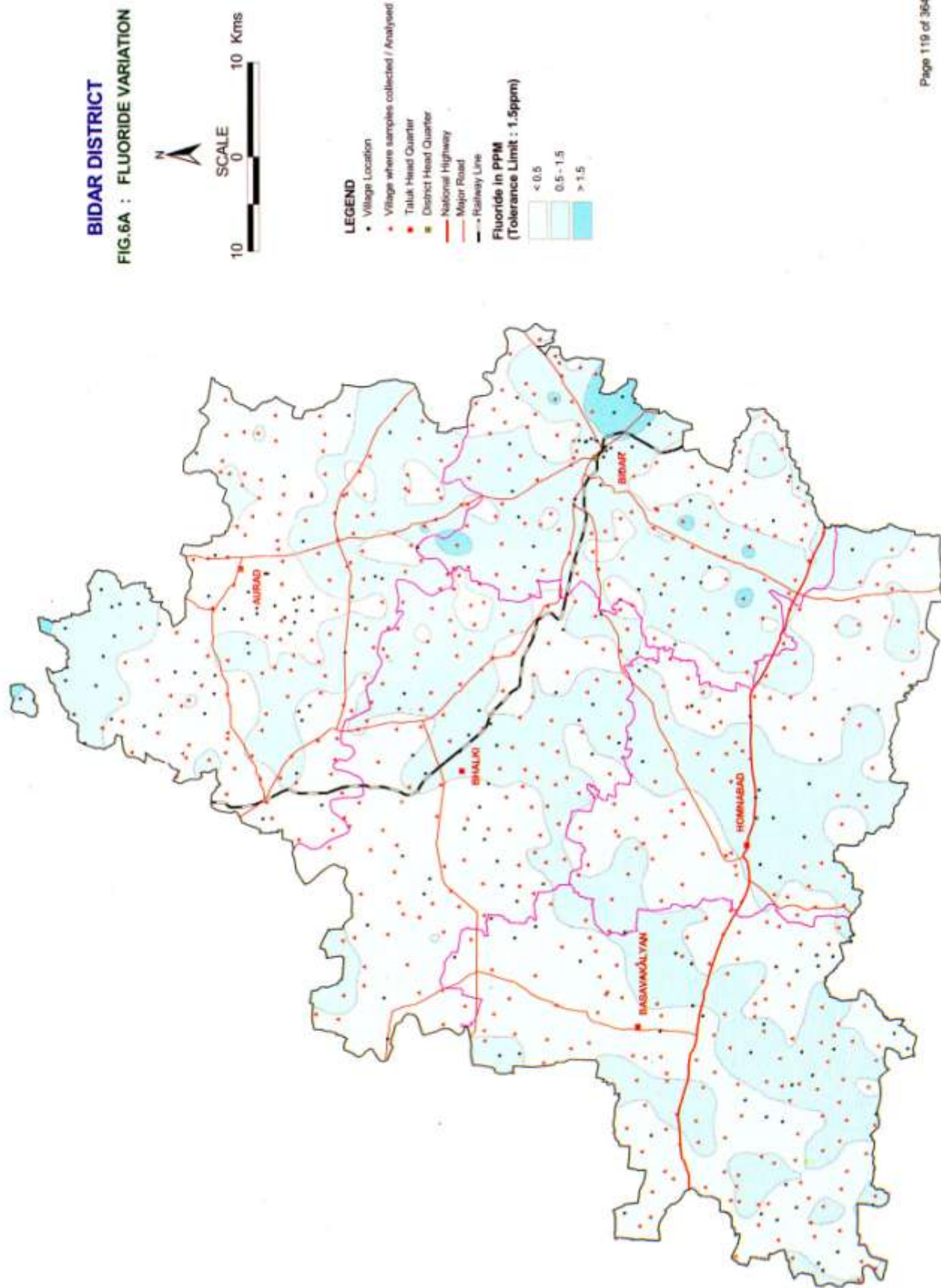
The water quality data of Bidar district has reflected the presence of excess Calcium Hardness, Fluoride, Nitrate and the Bacterial incidence. Hardness can be reduced by some conventional methods. Nitrate content can be reduced by minimum usage of fertilizers. In case of Fluoride, utmost care has to be taken. Though a little amount of Fluoride is essential for the bone development in the infants, excess consumption of Fluoride will induce physical disabilities and Dental Fluorosis. Therefore, it is very essential to treat the water to the desirable standard before it is supplied for the drinking purpose. The most important component, which is much more harmful, is the presence of Bacteria viz. *E. coli* in drinking water. The consumption of such water may cause the diseases such as Malaria, Diarrhea etc. Probably, these organisms have been introduced into the groundwater regime by anthropogenic activities. This clearly indicates non-hygienic / poor sanitation condition prevailing at village levels. To overcome this both the user and the administrator must be trained properly and awareness has to be created regarding hygienic aspects.

Table: Comprehensive analysis of water quality data of Bidar District

S.L.NO.	Name of the taluks	Number of villages/habitations	Number of sampled villages	Number of samples analysed	Water quality scenario	Bact (c/100 ml)-0	Tur (10 JTU)	Color (25) HU	Cond - mmhos /cm	pH (6.5-8.5)	TDS (2000) ppm	TH (600) ppm	CaH (200) ppm	Cl (1000) ppm	SO ₄ (400) ppm	F (1.5) ppm	NO ₃ (100) ppm	Aik (600) ppm	Fe (1) ppm		
1	Aurad	194	159	618	No. of samples beyond permissible limit	283	2	-	-	13	9	1	20	1	-	11	3	2	-		
					No. of villages affected	135	1	-	-	13	6	1	15	1	-	10	3	2	-	-	-
					Range	1-15	11-12	-	1-5700	2140-3180	2400	210-350	2600	-	1.6-9	121-165	610-2250	-	-	-	-
2	Basavakalyan	173	159	468	No. of samples beyond permissible limit	160	3	2	-	14	4	3	10	-	-	2	13	-	-		
					No. of villages affected	117	3	1	-	10	4	2	9	-	2	11	-	-	-	-	
					Range	1-18	12-18	50-60	60-5203	6-8.6	2020-2330	660-960	210-440	-	1.6-2.2	110-420	-	-	-	-	
3	Bhalki	154	138	477	No. of samples beyond permissible limit	138	5	1	-	2	5	-	26	-	-	2	10	-	-		
					No. of villages affected	110	4	1	-	3	4	-	19	-	2	9	-	-	-	-	
					Range	1-17	11-15	80	100-3900	8.8	2050-2560	-	210-300	-	1.8-1.9	102-167	-	-	-	-	
4	Bidar	152	132	598	No. of samples beyond permissible limit	171	13	7	-	8	1	-	48	-	-	39	28	5	1		
					No. of villages affected	111	12	7	-	8	1	-	31	-	22	15	5	1	-	-	
					Range	1-17	11-33	28-90	1-3100	6.4-8.7	2150	-	220-909	-	1.6-2.5	102-220	620-1240	1.3	-	-	-
5	Hummabad	106	95	492	No. of samples beyond permissible limit	140	4	-	-	5	1	-	12	-	-	2	26	3	-		
					No. of villages affected	87	3	-	-	5	1	-	6	-	1	19	3	-	-	-	
					Range	1-18	11-15	-	1-4830	6.2-9.2	2070	-	220-340	-	1.6-1.8	101-200	630-850	-	-	-	-
Total	779	683	2653	No. of samples beyond permissible limit	892	27	10	-	-	42	20	4	116	1	-	56	80	10	1		
				No. of villages affected	560	23	9	-	39	16	3	80	1	-	37	57	10	1	-	-	
				Range	1-18	11-33	28-90	1-5700	6-9.2	2020-3180	660-2400	210-909	2600	-	1.6-9	101-420	610-2250	1.3	-	-	-

BIDAR DISTRICT

FIG.6A : FLUORIDE VARIATION



BIDAR DISTRICT

FIG.6B : VARIATION OF NITRATE (NO_3)

