

UDUPI DISTRICT



FIG.26 UDUPI DISTRICT

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1. Location

Udupi district is located in the southwestern portion of Karnataka State and has geographical area of 3,598 sq. km. It is bounded by Arabian Sea on the western side, Shimoga and Uttara Kannada districts on the northern side, Shimoga and Chikmagalur districts on the eastern side and Dakshina Kannada district on the southern side. It lies between 12° 59' to 13° 59' N Latitude and 74° 35' to 75° 13' E Longitude.

2. Demography

According to 1991 census, Udupi district has a total population of 1,060,872. There are 3,901 villages / habitations in the district. Udupi is the district Headquarters. Udupi district has three taluks viz., Coondapura, Karkala and Udupi.

3. Climate, Drainage and Soil

Udupi District experiences coastal climate. The district is drained by Swarna, Haladi, Mulki, Kollur, Sita, Chakra and Varahi rivers. The district experiences temperature variation from 22° C to 36° C. The district receives an average annual rainfall around 4035 mm and the humidity varies between 61 and 91 %. Major portion of the district is covered by lateritic red soil with coastal alluvium along the West Coast region.

4. Geology and Groundwater occurrence

Udupi district consists of basement Peninsular Gneisses exposed in the major portion of the district. From the groundwater point of view, the gneisses are classified as crystalline formations. The fracture / fissure system developed along with joints and faults traversing the rocks facilitate groundwater circulation and hold moderate quantity of water. The quality of groundwater is governed by the mineralogical composition of the rocks. Eastern portion of the district all along its border has portion of Shimoga schist belt exposed. The schist belt sequence consists of conglomerate and crossbedded quartzite. They are relatively impermeable, poor aquifers and yield very less quantity of water. Groundwater generally occurs in the water table conditions in the weathered mantle and also under semi-confined conditions in the deeper fractures. Youngest geological event is the sediment deposited all along the western part of the district in a narrow strip consisting mainly of sand dominant alluvial deposit. In the alluvial deposits, groundwater of potable quality occurs as a thin layer floating on the saline water.

5. Groundwater quality characterization

To understand and gather information on groundwater quality, 4913 groundwater samples collected from 445 villages / habitations in Udupi 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. The data is presented in the Table.

5.1 Physical characters

Turbidity

In the district, 984 samples from 176 villages/ habitations show higher turbidity ranging between 10.1 to 194 JTU. The samples showing higher turbidity are from the taluks, Coondapur (219 out of 1657 samples), Karkala (696 out of 1537 samples) and Udupi (69 out of 1719 samples).

Colour

None of the samples analysed in the entire district has shown higher colour intensity.

Electrical Conductivity (EC)

The EC values recorded in the different taluks are Coondapur 11-8350 mmhos/cm, Karkala 10-25000 mmhos/cm and Udupi 2.47-4361 mmhos/cm.

Hydrogen Ion Concentration (pH)

About 184 samples covering 89 villages have recorded variation in pH value from acidic to basic in the range of 1.8-9.3. The ranges of pH value recorded in the taluks of the district are Coondapura 6-9.3 (104 samples), Karkal 1.8-8.8 (22 samples) and Udupi 6.2-9.3 (58 samples).

5.2 Chemical Characters

Total Dissolved Salts (TDS)

Only 3 samples covering 2 villages/habitations have higher TDS content in the range of 2398-4659 ppm. The highest value of 4659 ppm is reported from Paduvarry village in Coondapur taluk. The ranges of abnormal TDS content in different taluks of the district are Coondapur, 4597 and 4659 ppm (2 samples) and Udupi, 2398 ppm (the lone sample). The samples analysed in Karkala taluk have not reported abnormal concentration of TDS.

Total Hardness (TH)

Only 4 samples covering 3 villages/habitations have higher TH content in the range of 728-1476 ppm. The highest value of 1476 ppm is reported from Haradi village of Udupi Taluk. The ranges of abnormal TH content in different taluks are -

Coondapur, 728-1328 ppm (3 samples) and Udupi, 1476 ppm (the lone sample). The samples analysed from Karkala taluk have not reported abnormal concentration of TH.

Calcium Hardness (CaH)

The district has 16 samples spread across 8 villages indicating higher CaH value ranging between 202 and 257 ppm. The maximum CaH content of 257 ppm is reported from Paduvaru village of Coondapur Taluk. The range of CaH values beyond the permissible limit in different taluks are - Coondapura, 240 and 257 ppm (2 samples), Karkal, 202-253 ppm (13 samples) and Udupi, 222 ppm (the lone sample).

Chloride (Cl)

Excepting 4 samples covering 3 villages/habitations having higher Cl content in the range of 1146-3506 ppm all the other samples contain Cl content within the permissible limit. The highest value of 3506 ppm is reported from Paduvaru village in Coondapura taluk. The ranges of abnormal Cl content in different taluks are - Coondapur, 1146-3506 ppm (3 samples) and Udupi, 1774 ppm (the lone sample). The samples analysed in the Karkala taluk have not reported abnormal concentration of Cl.

Sulphate (SO₄)

All the samples analysed in the entire district are having Sulphate content within the permissible limit of 400 ppm.

Fluoride (F)

Only 16 samples spread across 14 villages have analysed Fluoride content in excess ranging from 1.6 to 7 ppm. The highest Fluoride content of 7 ppm is reported from Paduvaru village of Coondapur Taluk. The ranges of Fluoride values in different taluks are - Coondapura, 1.6 - 1.8 ppm (7 samples) and Karkal 1.7 - 7 ppm (9 samples). The samples analysed in Udupi taluk have not reported abnormal fluoride content.

Nitrate (NO₃)

All the samples analysed from the 3 taluks in the district have recorded Nitrate content within the permissible limit.

Alkalinity (Alk)

Just 3 samples covering 3 villages have reported higher Alkalinity value ranging from 640-2160 ppm. The maximum Alkalinity content of 2160 ppm is reported from Kowrvadi village in Coondapur taluk. The ranges of Alkalinity values in different taluks are - Coondapura, 2160 ppm (the lone sample) and Karkal, 640-800 ppm (2

samples). The samples analysed from Udupi taluk have not reported abnormal concentration of Alkalinity.

Iron (Fe)

A Good number of samples, 1157 collected from 226 villages / habitations have analysed iron in excess in the range of 1.01 to 8 ppm. The concentration variation of Fe in different taluks are – Coondapura, 1.01 - 6.46 ppm (247 samples), Karakal 1.1 - 8 ppm (462 samples) and Udupi, 1.01 - 6.1 ppm (148 samples). The highest Fe value of 8 ppm is recorded from Hirgana village from Karkala taluk.

Bacteria (*E.coli*)

Nearly 468 samples covering 167 villages have shown the presence of Bacteria. The bacterial count generally varies between 1 to 9 No.s / 100 ml of water. The bacterial counts reported in different taluks are – Coondapura, 1-9 No.s / 100 ml (62 samples), Karkala 1-5 No.s / 100 ml (317 samples) and Udupi, 1- 4 No.s / 100 ml (89 samples).

5.3 Spatial Variation

Bacteria (*E.coli*)

The map depicting bacterial incidence indicates that, bacteria is common in the entire district and is spread randomly. Bacterial contamination is point specific and varies considerably.

Fluoride (F)

The isoconcentration map of Fluoride (Fig. 26A) indicates that, average Fluoride concentration of more than 1 ppm is confined to isolated patches in the eastern half and northwestern part of the district.

Total Dissolved Salts (TDS)

The spatial variation map (Fig. 26B) depicts that, TDS concentration in the analysed water samples are well within the permissible limit.

Total Hardness (TH)

The map (Fig. 26C) reveals that, Total Hardness in the analysed water samples is considerably low and mostly varies in the range of 100-200 ppm and the eastern half has relatively lowest concentration.

Iron (Fe)

Isoconcentration map (Fig. 26D) reveals that, Iron concentrations are less than 1 ppm in most part of the district. Patches of slightly higher average concentrations

are confined to the eastern half and isolated patches along the eastern and western borders.

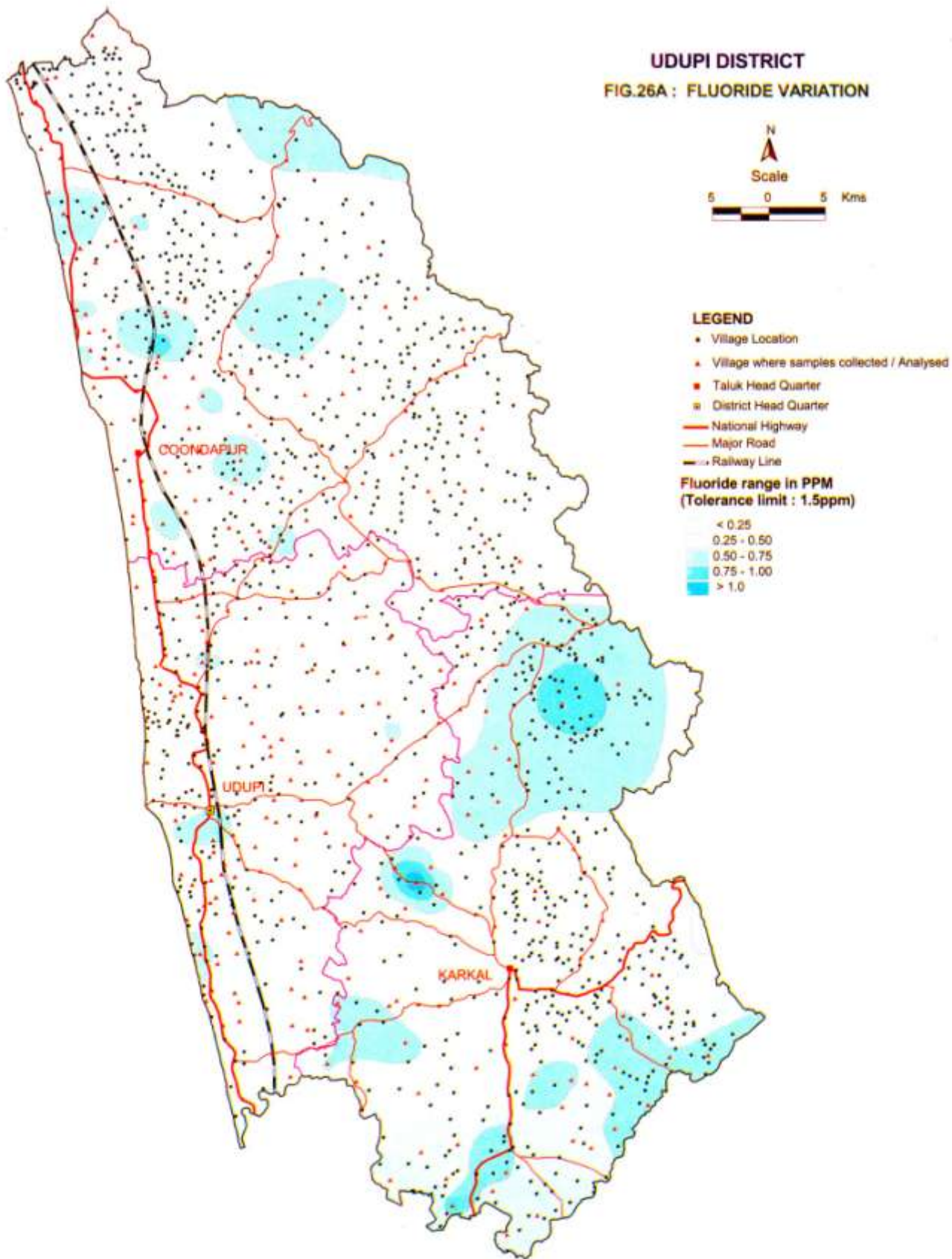
6. Conclusion

The water quality data of Udupi district has reflected the presence of excess Turbidity, Iron and Bacterial incidence. Turbidity can be reduced by simple filtration. To overcome the problems related to excess Iron content, an attention is required during the source development such as use of galvanized iron / PVC pipes and proper casing. 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 diseases such as Malaria, Diarrhea etc. These organisms might 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 Udupi District

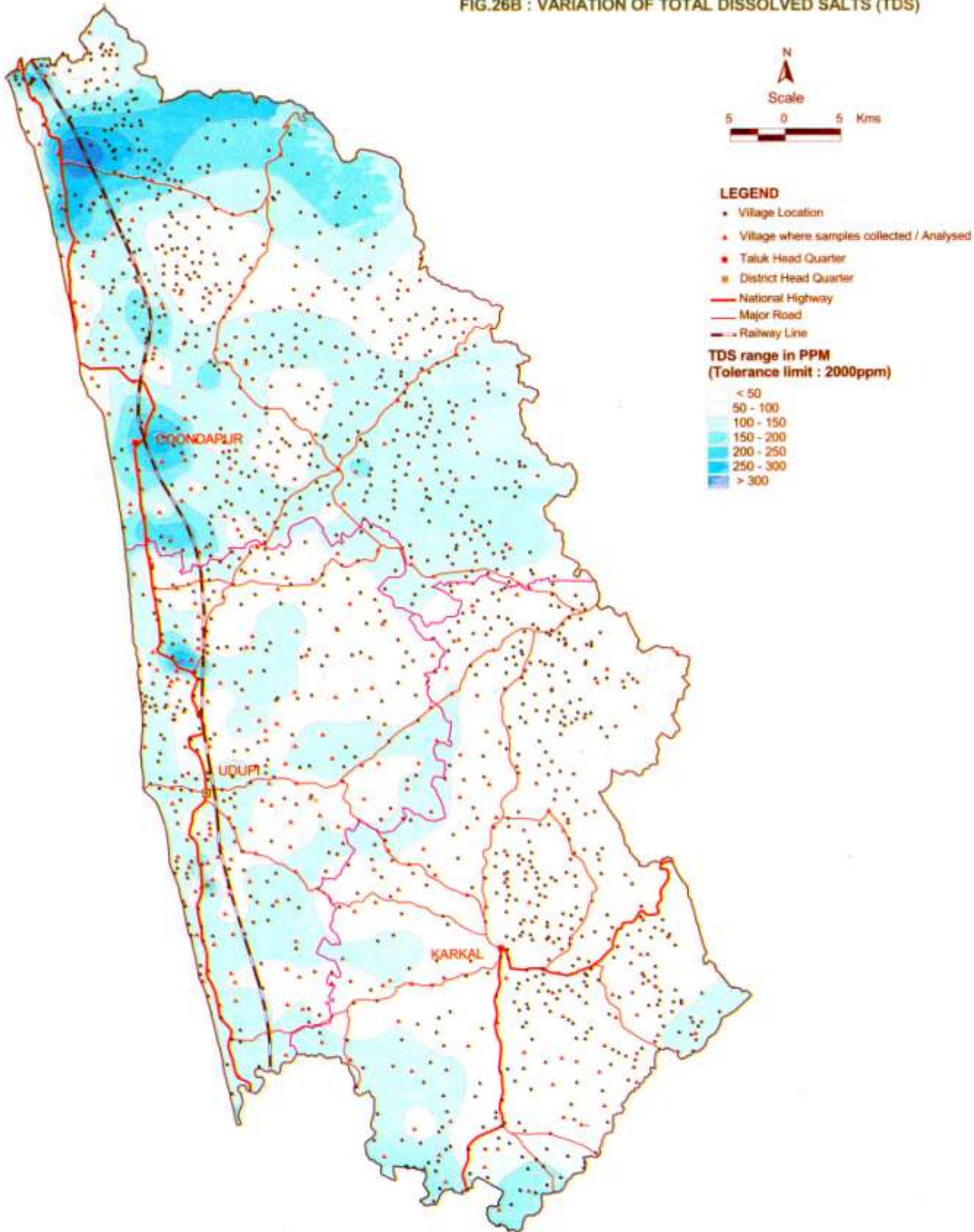
Sl. NO.	Name of the taluks	Number of villages/ habitations	Number of sampled villages	Number of samples analysed	Water quality scenario	Bact (c:100 ml)-0	Tur (10) JTU	Color (25) HU	Cond. (mmhos /cm	pH (6.5-8.5)	TDS (2000) ppm	TH (600) ppm	CaH (200) ppm	Cl (1000) ppm	SO ₄ (400) ppm	F (1.5) ppm	NO ₂ (100) ppm	Alk (600) ppm	Fe (1) ppm			
1	Coondapur	639	98	1657	No. of samples beyond permissible limit	62	219	-	-	104	2	3	2	3	-	7	-	1	247			
					No. of villages affected	51	66	-	-	50	1	2	1	2	-	6	-	-	1	77		
					Range	1.9	10.5-194	-	11-8350	6.9-3	4597-4659	728-1328	240-257	1146-3506	-	1.6-1.8	-	-	-	2160	1.01-6.46	
2	Karkala	500	70	1537	No. of samples beyond permissible limit	317	696	-	-	22	-	-	13	-	-	9	-	2	462			
					No. of villages affected	64	69	-	-	11	-	-	6	-	-	6	-	8	-	2	68	
					Range	1.5	10.1-189	-	10-25000	1.8-8.8	-	202-253	-	-	-	1.7-7	-	-	640-800	1.1-8		
3	Udupi	350	277	1719	No. of samples beyond permissible limit	89	69	-	-	58	1	1	1	1	-	-	-	-	-	148		
					No. of villages affected	52	41	-	-	28	1	1	1	1	1	1	-	-	-	-	-	81
					Range	1.4	10.1-107	-	2.47-4361	6.2-9.3	2398	1478	222	1774	-	-	-	-	-	-	-	1.01-6.1
Total	1489	445	4913	No. of samples beyond permissible limit	468	994	0	0	184	3	4	4	16	4	-	16	0	3	857			
				No. of villages affected	167	176	0	0	89	2	3	8	3	8	3	-	14	0	3	226		
				Range	1.9	10.1-194	0	2.47-25000	1.8-9.3	2398-4659	728-1478	202-257	1146-3506	-	1.6-7	0	640-2160	1.01-8				

UDUPI DISTRICT
FIG.26A : FLUORIDE VARIATION



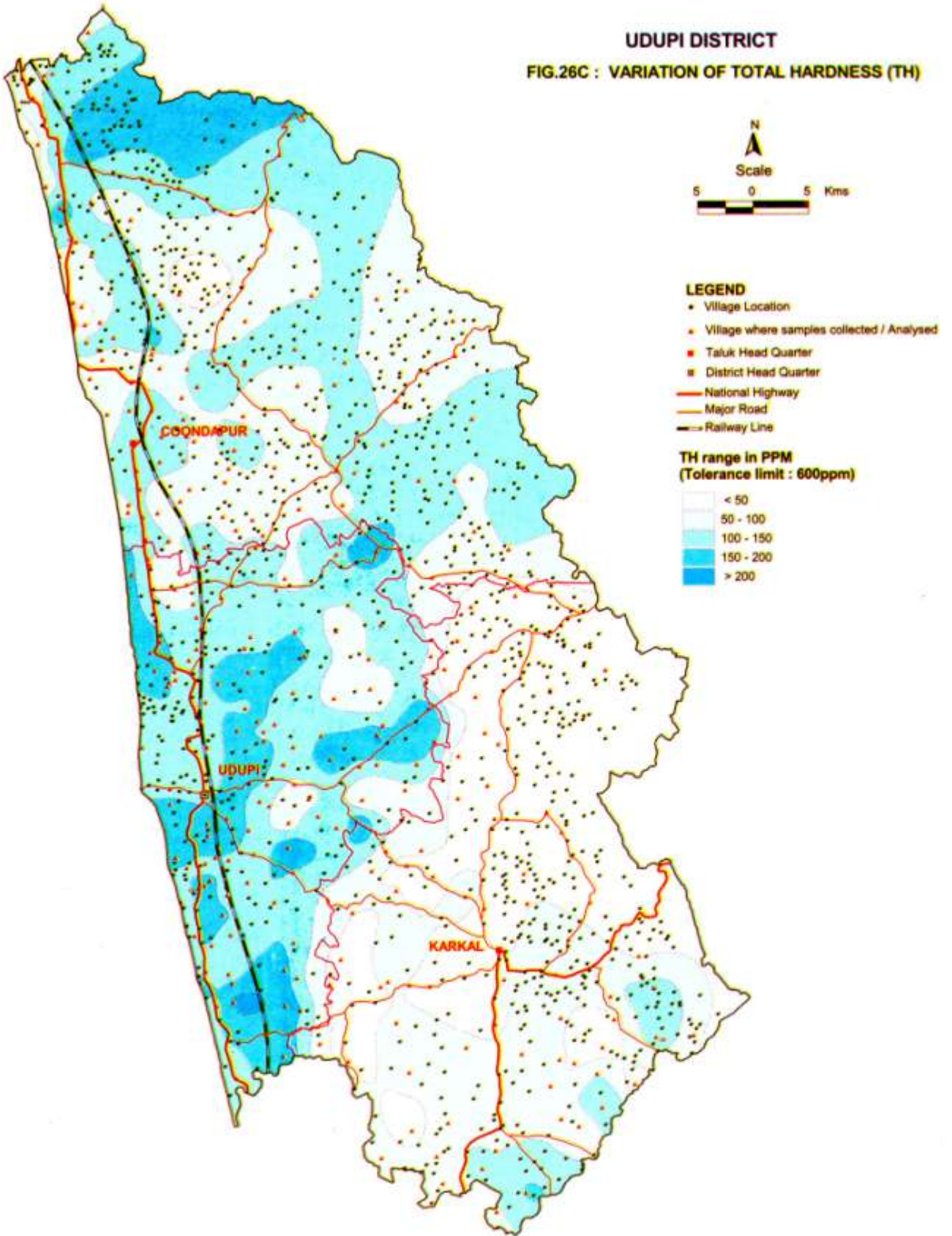
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FIG.26B : VARIATION OF TOTAL DISSOLVED SALTS (TDS)



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FIG.26C : VARIATION OF TOTAL HARDNESS (TH)



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FIG.26D : IRON VARIATION

