

UTTAR KANNADA DISTRICT



FIG.27 UTTAR KANNADA DISTRICT

Sl.No.	CONTENTS	Page		
1)	Location	354	TABLE: COMPREHENSIVE ANALYSIS OF WATER QUALITY DATA	360
2)	Demography	354		
3)	Climate, Drainage and soil	354		
4)	Geology and Groundwater occurrence	354		
5)	Groundwater quality Characterization	355		
5.1	Physical characters	355	LIST OF FIGURES	
5.2	Chemical characters	356	FIG.27A FLUORIDE VARIATION (F)	361
5.3	Spatial variation	358	FIG.27B VARIATION OF TOTAL DISSOLVED SALTS (TDS)	362
6)	Conclusion	358	FIG.27C VARIATION OF TOTAL HARDNESS (TH)	363
			FIG.27D IRON VARIATION (Fe)	364

1. Location

Uttara Kannada district is located in the western portion of Karnataka State with geographical area of nearly 10,291 sq. km. It is bounded by Belgaum district on northern portion, Dharwad district on northeastern portion, Haveri district on eastern portion, Shimoga district on southeastern portion, Udupi District on southern portion and remaining portion of the district is surrounded by Arabian Sea. It lies between 13° 55' to 15° 31' N Latitude and 74° 05' to 75° 06' E Longitude.

2. Demography

As per the 1991 census, Uttara Kannada district has a population of 12,20,260. The total number of villages / habitations in the district are 5,640. Uttara Kannada district has 11 taluks namely, Ankola, Bhatkal, Haliyal, Honnavara, Joida, Karwar, Kumta, Mundgod, Siddapur, Sirsi, and Yellapur.

3. Climate, Drainage and soil

The most important feature of physiography is the Western Ghats, which acts as a divide between the West Coast and the adjoining hilly regions with heavy rainfall, and the areas of dry-low rainfall to the east. The Western Ghats form the main watershed from which all the east and west flowing rivers originate. The district consists of the coastal strip, the region of the Western Ghats and the Plateau region to the east of the ghats. The climate is characterized by high humidity nearly all through the year in the coastal strip and in the Western Ghats region, while in the area to the east of the ghats, the climate is drier, except in the south-west monsoon season. The rainfall is plentiful (average annual rainfall is 2741.7mm), particularly in the coastal and Western Ghats region. The district is drained by Kalinadi and Bedti or Gangavali in the north and Aghanashini or Tadri and Sharavati or Gersoppa rivers in the south. The Uttara Kannada district experiences temperature variation between 22.8 °C and 30.2 °C. Major portion of the district is covered by red lateritic and sandy, loamy soils.

4. Geology and Groundwater occurrence

Geological sequence in the district consists of gneisses, more pronouncedly along the coastal belt and northerly plunging anticlinal mass of Closepet granite. From the groundwater point of view, these rocks 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. The phyllite, quartz chlorite schist, greywacke and bands of iron formations are also exposed. The structures in the metasedimentary pile like bedding planes, folds, faults and the fractures act as conduits for water movement. Groundwater normally occurs in the water table conditions in the weathered and decomposed mantle and also under semi-confined conditions in the deeper fractures. Lateritisation on vast

scale is very prominent. Laterites have good porosity and low permeability. The porous laterites percolate rainwater to store in shallow aquifers and yield good quantity of water for a short duration. Latest event is the alluvium deposited along the coastal belt. 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, 5866 groundwater samples collected from 1951 villages / habitations in Uttara Kannada district have been analysed by RDED. These analytical reports have been used in preparing the District profile.

The water samples have been analysed for only 14 parameters such as Turbidity, Conductivity, Hydrogen ion concentration (pH), Total Dissolved Salts (TDS), Total Hardness (TH), 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

Turbidity in the analysed samples ranges between 10.2 to 550 JTU. About 1214 samples collected from 707 villages show higher turbidity and are from the taluks, Ankola (41 out of 444 samples), Bhatkal (98 out of 340 samples), Haliyal (21 out of 433 samples), Honnavar (76 out of 464 samples), Karwar (55 out of 412 samples), Kumta (302 samples out of 619 samples), Mundgod (125 out of 523 samples), Siddapur (46 out of 723 samples), Joida (21 out of 429 samples), Sirsi (172 out of 918 samples) and Yellapur (257 out of 561 samples).

Electrical Conductivity (EC)

The ranges of Electrical Conductivity values in different taluks of Uttara Kannada district are: Ankola 54-4500 m mhos/cm, Bhatkal 50-8200 m mhos/cm, Haliyal 110-2820 m mhos/cm, Honnavar 20-9920 m mhos/cm, Karwar 80-9650 mmhos/cm, Kumta 6-3552 m mhos/cm, Mundgod 110-5230 m mhos/cm, Siddapur 5-2140 m mhos/cm, Joida 50-9060 m mhos/cm, Sirsi 60-4940 m mhos/cm and Yellapur 15-3400 m mhos/cm.

Hydrogen Ion Concentration (pH)

About 695 samples covering 432 villages have shown the variation in pH value from acidic to basic in the range of 0.30-11.1 with highest (11.1) being reported from Sirsi taluk. The ranges of pH value recorded in other taluks are: Ankola 6.1-9.5(24 samples), Bhatkal 5.74-6.4 (45 samples), Haliyal 1.7-8.6 (21 samples), Honnavar 5.2-6.4 (49 samples), Karwar 6-6.4 (5 samples), Kumta 5.6-9.5

(70 samples), Mundgod 5.74-9.1 (10 samples), Siddapur 0.30-8.9 (262 samples), Joida 6-6.4 (17 samples), Sirsi 3.1-11.1 (125 samples) and Yellapur 0.6-9.7 (67 samples).

5.2 Chemical characters

Total Dissolved Salts (TDS)

38 samples covering 35 villages / habitations have higher content of TDS beyond the permissible limit of 2000 ppm. The ranges of abnormal TDS content in the affected taluks are: Ankola 2130-3600 ppm (4 samples), Bhatkal 2090 to 4920 ppm (3 samples), Honnavar 4670-6200 ppm (2 samples), Karwar 2150-8900 ppm (13 samples), Kumta 2050-6710 ppm (5 samples), Mundgod 2150-3140 ppm (4 samples), Joida 2100-6000 ppm (6 samples), Sirsi 2490 ppm (1 sample). The highest value of 4670 ppm is reported from Honnavar taluk.

Total Hardness (TH)

15 samples spread across 15 villages have indicated TH value ranging from 620 to 960 (permissible limit 600 ppm). TH values in different taluks are: Honnavar 630 ppm (1 out of 464 samples), Karwar 620-860 ppm (6 out of 412 samples), Kumta 890-940 ppm (2 out of 619 samples) and Joida 620-960 ppm (6 out of 429 samples) and the maximum TH content (960 ppm) is reported from Joida taluk. Ankola, Bhatkal, Haliyal, Mundgod, Siddapur, Yellapur and Sirsi taluks have not reported abnormal concentration of TH.

Chloride (Cl)

All the samples have Chloride concentration well within the permissible limit.

Sulphate (SO₄)

Only 3 samples covering 3 villages / habitations have SO₄ content more than the permissible limit of 400 ppm and are from Joida 420-440 ppm (2 out of 429 samples) and Sirsi 800 ppm (1 out of 918 samples) taluks. Ankola, Bhatkal, Haliyal, Honnavar, Karwar, Kumta, Mundgod, Siddapur and Yellapur taluks have not reported abnormal concentration of SO₄.

Fluoride (F)

Abnormal Fluoride content in the range of 1.6-4 ppm is reported in 27 samples from 25 villages / habitations (permissible limit 1.5 ppm). The fluoride content in the affected taluks is: Bhatkal 1.8 ppm (1 out of 340 samples), Haliyal 1.6-2 ppm (3 out of 433 samples), Honnavar 9 ppm (1 out of 464 samples), Karwar 1.6-3 ppm (7 out of 142 samples), Joida 1.6-1.8 ppm (13 out of 429 samples), Sirsi 4 ppm (1 out of 918 samples) and Yellapur 4 ppm (1 out of 561 samples). Highest

concentration of 4 ppm is reported from Yellapur taluk. Ankola, Kumta, Siddapur and Mundgod taluks have not reported abnormal Fluoride concentration.

Nitrate (NO₃)

Only 5 samples covering 4 villages / habitations have analysed NO₃ content beyond the permissible limit of 100 ppm and are from the taluks, Ankola 126 ppm (1 out of 444 samples), Kumta 168.4-251 ppm (4 out of 619 samples) and Bhatkal, Haliyal, Honnavar, Karwar, Mundgod, Joida, Yellapur, Siddapur and Sirsi taluks have not shown abnormal concentration of Nitrate in the analysed samples.

Alkalinity (Alk)

Only 7 samples from 6 villages have analysed Alkalinity in excess of 600 ppm (permissible limit). The abnormal samples are from: Bhatkal 700 ppm (1 out of 340 samples), Haliyal 610-650 ppm (2 out of 433 samples), Karwar 900 ppm (1 out of 412 samples), Mundgod 610 ppm (1 out of 523 ppm), Sirsi 630 ppm (1 out of 918 samples) and Yellapur 950 ppm (1 out of 561 samples) taluks. Ankola, Honnavar, Kumta, Siddapur and Joida taluks have not reported abnormal concentration of alkalinity.

Iron (Fe)

Nearly 191 samples from 151 villages/ habitations have analysed iron, in the range of 1.1 to 17 ppm (>1 ppm). The higher iron content in other taluks is: Ankola 1.1-1.8 ppm (19 out of 444 samples), Bhatkal 1.1-1.5 ppm (7 out of 340 samples), Haliyal 1.2-2 ppm (2 out of 433 samples), Honnavar 1.2-1.6 ppm (12 out of 464 samples), Kumta 1.1-3 ppm (15 out of 619 samples), Siddapur 1.1-1.5 ppm (8 out of 723 samples), Joida 1.2-1.6 ppm (18 out of 429 samples), Sirsi 1.1-2.2 ppm (34 out of 918 samples) and Yellapur 1.08-4.8 ppm (76 out of 561 samples). The highest Fe value of 17 ppm is recorded from Siddapur taluk.

Bacteria (*E.coli*)

2561 samples covering 1132 sampled villages have shown the presence of Bacteria. The bacterial count generally varies between 1 to 46 No.s /100 ml of water. The bacterial counts in different taluks are: Ankola 1-9 No.s /100 ml (205 samples), Bhatkal 1-6 No.s /100 ml (83 samples), Haliyal 1-19 No.s /100 ml (210 samples), Honnavar 1-46 No.s /100 ml (247 samples), Karwar 1-9 No.s /100 ml (258 samples), Kumta 1-13 No.s /100 ml (121 samples), Mundgod 1-6 No.s /100 ml (55 samples), Siddapur 1-16 No.s /100 ml (432 samples), Joida 1-9 No.s /100 ml (284 samples), Sirsi 1-20 No.s /100 ml (628 samples) and Yellapur 1-3 No.s /100 ml (38 samples).

5.3 Spatial Variation

Bacteria (*E.coli*)

The map depicting bacterial incidences indicates that, bacteria is more commonly seen in the analysed water samples in the entire district. Bacterial contamination is point specific and varies considerably.

Fluoride (F)

The isoconcentration map of Fluoride for the district (Fig. 27A) indicates that, higher fluoride concentrations are seen as isolated patches in Joida and Karwar taluks in the northwestern part, Yellapur taluk in the eastern part and Siddapur taluk in the southern portion of the district. Remaining part of the district has reported fluoride content below the permissible limit.

Total dissolved Salts (TDS)

The isoconcentration map generated for the district (Fig. 27B) depicts that, in general, the TDS content in the district is within the tolerance limit. Higher TDS content in Uttara Kannada district is observed only in small patches concentrated in the northwestern part of the district comprising of Joida and Karwar taluks. Here too TDS is mainly high along the coastal zones.

Total Hardness (TH)

The map (Fig. 27C) reveals that, the district on the whole has lower TH levels. Barring a linear correlation, TH content in the district is generally below 600 ppm and in major portion; it is even below 200 ppm. Only 3 small patches, one along the western border of Joida taluk and 2 isolated patches in Karwar taluk show TH in the range of 600-900 ppm.

Iron (Fe)

Isoconcentration map generated for iron in the district (Fig. 27D) has shown confinement of higher content of iron in the analysed samples to the southwestern and the northeastern portions of the district.

6. Conclusion

The interpretation of the water quality data of Uttara Kannada district has reflected the presence of excess Turbidity, iron, and Bacteria. However, Turbidity can be reduced by simple filtration. To overcome the problem 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 harmful, is the presence of Bacteria viz. *E. coli* in the drinking water. The

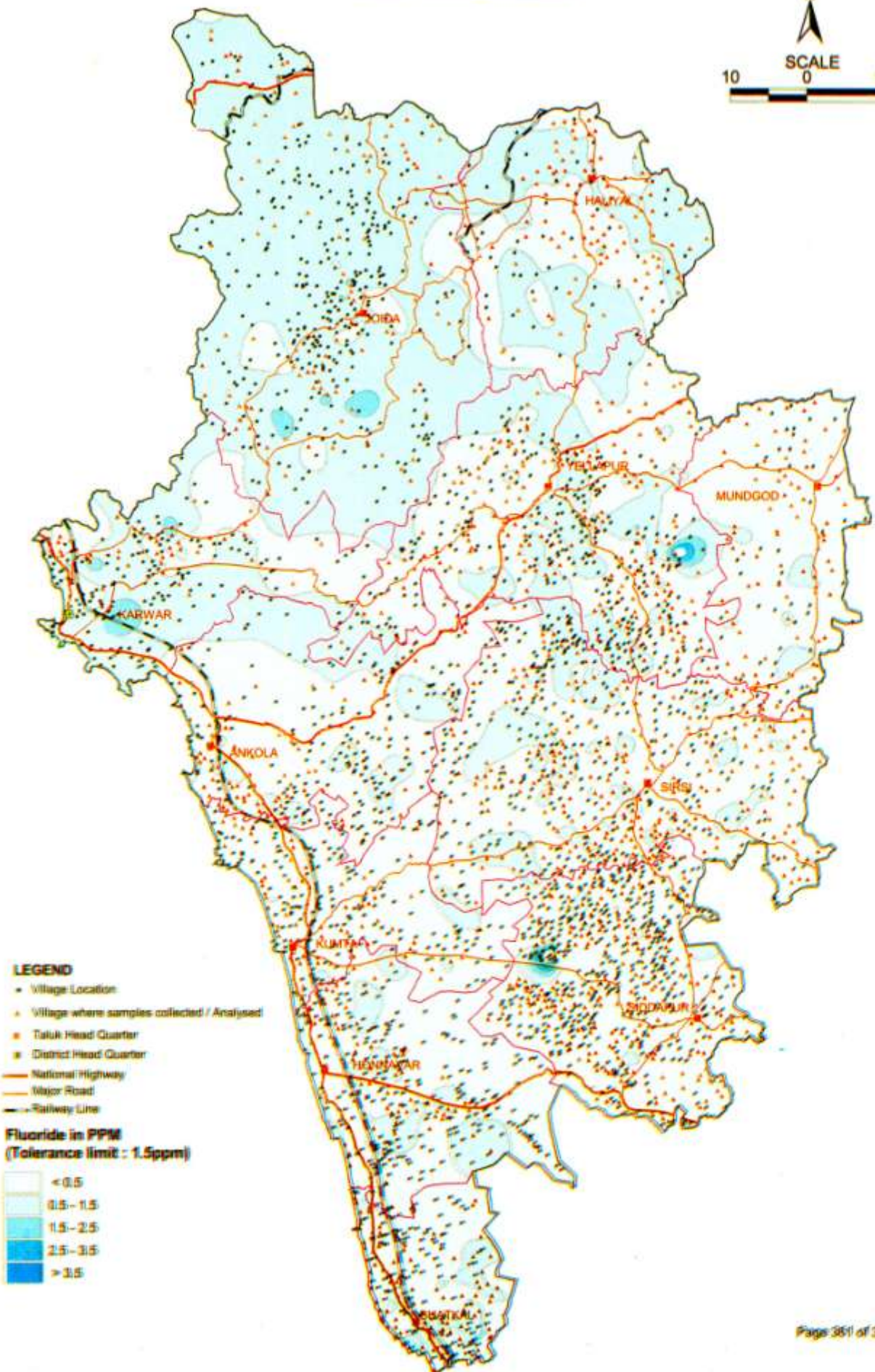
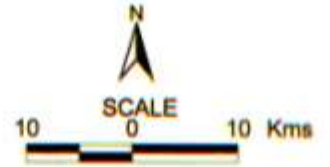
consumption of such water may cause the diseases such as Malaria, Diarrhea etc. Probably, these organisms might have been introduced into the groundwater regime by anthropogenic activities. This clearly indicates non-hygienic / poor sanitation condition prevailing at village levels. To overcome this 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 Uttara Kannada 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)	Cond - mmhos /cm	pH (6.5-8.5)	TDS (2000) ppm	TH (600) ppm	Cl (1000) ppm	SO ₄ (400) ppm	F (1.5) ppm	NO ₃ (100) ppm	Aik (600) ppm	Fe (1) ppm	
1	Ankola	293	121	444	No. of samples beyond permissible limit	205	41	-	24	4	-	-	-	-	1	-	19	
					No. of villages affected	94	30	18	3	-	-	-	-	-	-	-	-	-
2	Bhalkal	208	147	340	Range	11-26	54-4500	6.1-9.5	2130-3600	-	-	-	-	-	126	-	1.1-1.8	
					No. of samples beyond permissible limit	83	98	45	3	-	-	-	-	-	-	-	-	-
3	Halihal	161	124	433	No. of villages affected	38	62	-	33	3	-	-	-	-	-	700	1.1-1.5	
					Range	1-6	11-50	50-8200	5.7-6.4	2090-4920	-	-	-	-	-	-	-	-
4	Honnavar	356	105	464	No. of samples beyond permissible limit	210	21	-	21	-	-	-	-	-	-	1	2	
					No. of villages affected	98	14	14	-	-	-	-	-	-	-	-	-	-
5	Joida	447	160	429	Range	1-19	11-95	110-2820	1.7-8.6	-	-	-	-	-	-	610-650	1.2-2	
					No. of samples beyond permissible limit	247	76	49	2	1	-	-	-	-	-	-	-	-
6	Karwar	222	85	412	No. of villages affected	81	38	-	30	2	1	-	-	-	-	-	8	
					Range	1-46	10.2-60.2	20-9920	5.2-6.4	4670-6200	630	-	-	-	-	-	-	-
7	Kumta	261	131	619	No. of samples beyond permissible limit	284	21	-	17	6	6	-	-	-	-	-	18	
					No. of villages affected	133	19	15	6	6	-	-	-	-	-	-	-	-
8	Mundgod	133	113	523	Range	1-9	12-20	50-9060	6-6.4	2100-6000	620-960	-	-	-	-	-	1.2-1.6	
					No. of samples beyond permissible limit	258	55	5	13	6	-	-	-	-	-	-	-	-
9	Siddapur	687	270	723	No. of villages affected	50	16	-	5	13	6	-	-	-	-	-	1	
					Range	1-9	11-31	80-9650	6-6.4	2150-8900	620-860	-	-	-	-	-	-	-
10	Sirsi	613	385	918	No. of samples beyond permissible limit	121	302	-	70	5	2	-	-	-	-	-	900	
					No. of villages affected	59	94	34	5	2	-	-	-	-	-	-	-	-
11	Yellapur	511	330	561	Range	1-13	10.2-550	6-3552	5.6-9.5	2050-6710	890-940	-	-	-	-	-	1	
					No. of samples beyond permissible limit	55	125	10	4	-	-	-	-	-	-	-	-	-
Total	3872	1951	5866	5866	No. of villages affected	40	64	-	10	2	-	-	-	-	-	-	1	
					Range	1-6	11-140	110-5230	5.7-9.1	2150-3140	-	-	-	-	-	-	-	-
					No. of samples beyond permissible limit	432	46	-	262	-	-	-	-	-	-	-	-	8
					No. of villages affected	192	38	-	133	-	-	-	-	-	-	-	-	-
					Range	1-16	12-56	5-2140	0.30-8.9	-	-	-	-	-	-	-	-	1.1-1.5
					No. of samples beyond permissible limit	628	172	-	125	1	-	-	-	-	-	-	-	-
					No. of villages affected	313	130	-	89	1	-	-	-	-	-	-	-	3
					Range	1-20	11-115	60-4940	3.1-11.1	2490	-	-	-	-	-	-	-	-
					No. of samples beyond permissible limit	38	257	-	67	-	-	-	-	-	-	-	-	1
					No. of villages affected	34	202	-	51	-	-	-	-	-	-	-	-	-
					Range	1-3	11-210	15-3400	0.6-9.7	-	-	-	-	-	-	-	-	54
					No. of samples beyond permissible limit	2561	1214	-	695	38	-	-	-	-	-	-	-	-
					No. of villages affected	1132	707	-	432	35	15	-	-	-	-	-	-	7
					Range	1-46	10.2-550	5-9920	0.30-11.1	2050-8900	620-960	-	-	-	-	-	-	-

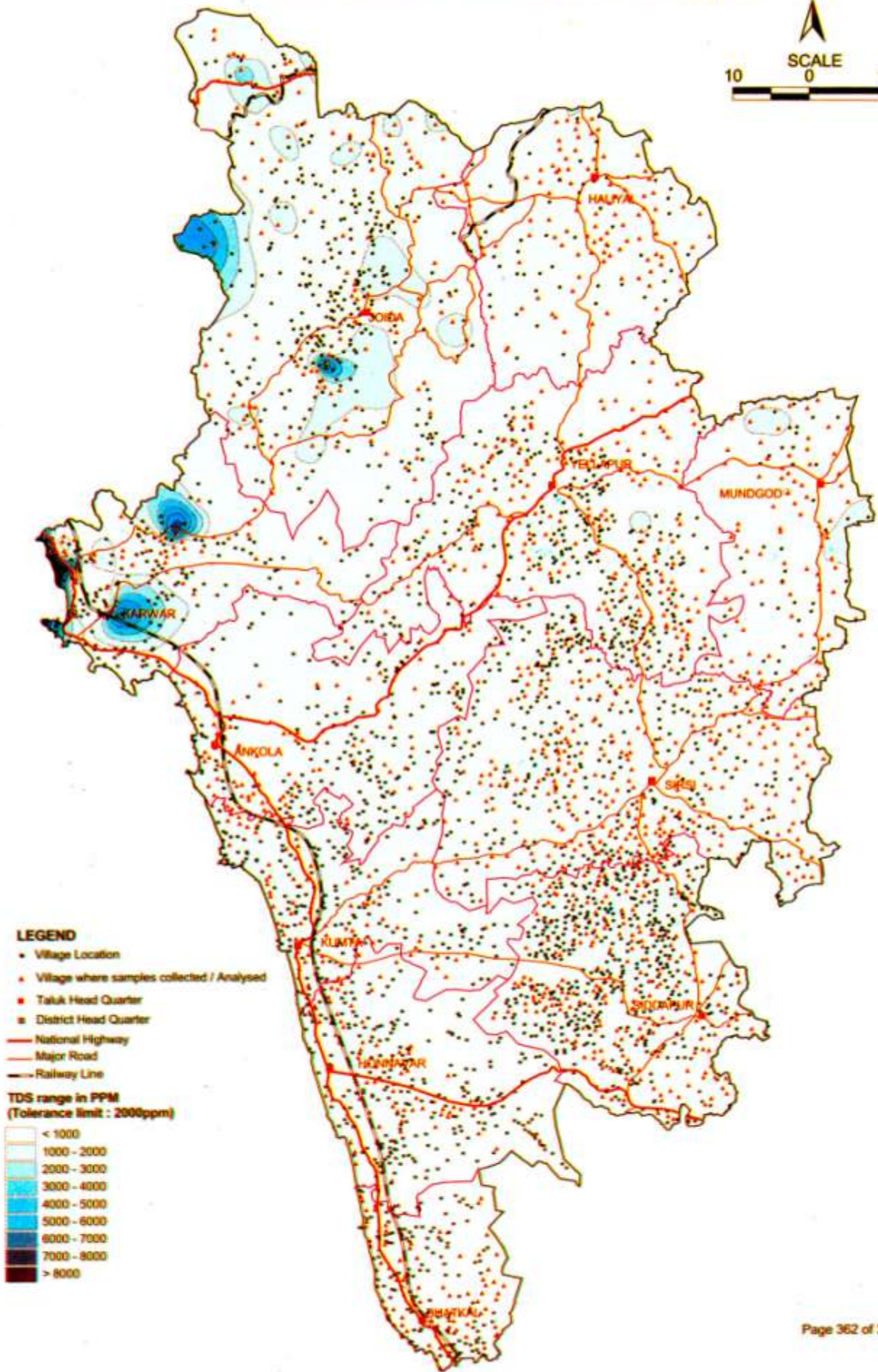
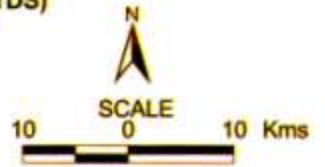
UTTAR KANNADA DISTRICT

FIG.27A : FLUORIDE VARIATION



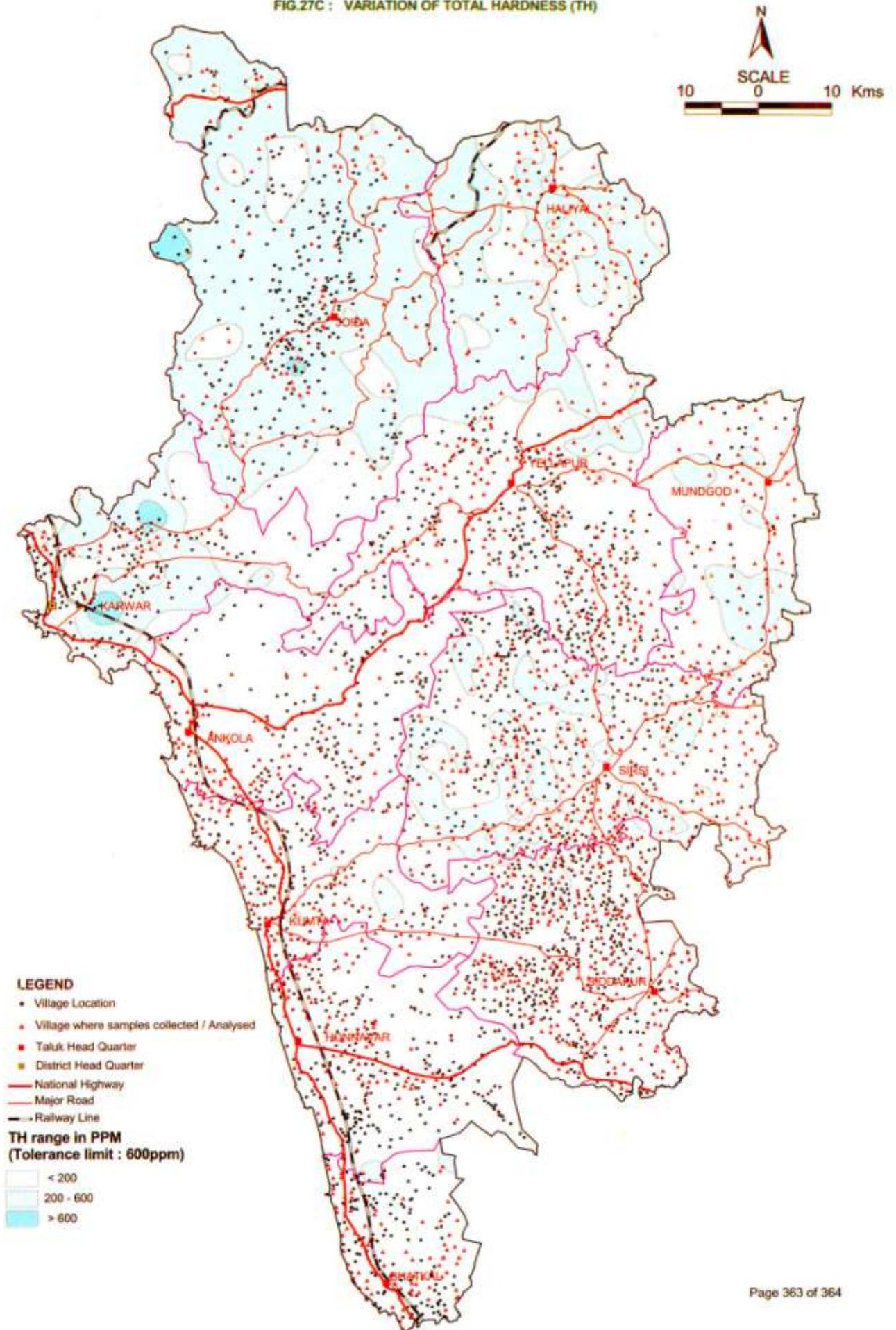
UTTAR KANNADA DISTRICT

FIG.27B : VARIATION OF TOTAL DISSOLVED SALTS (TDS)



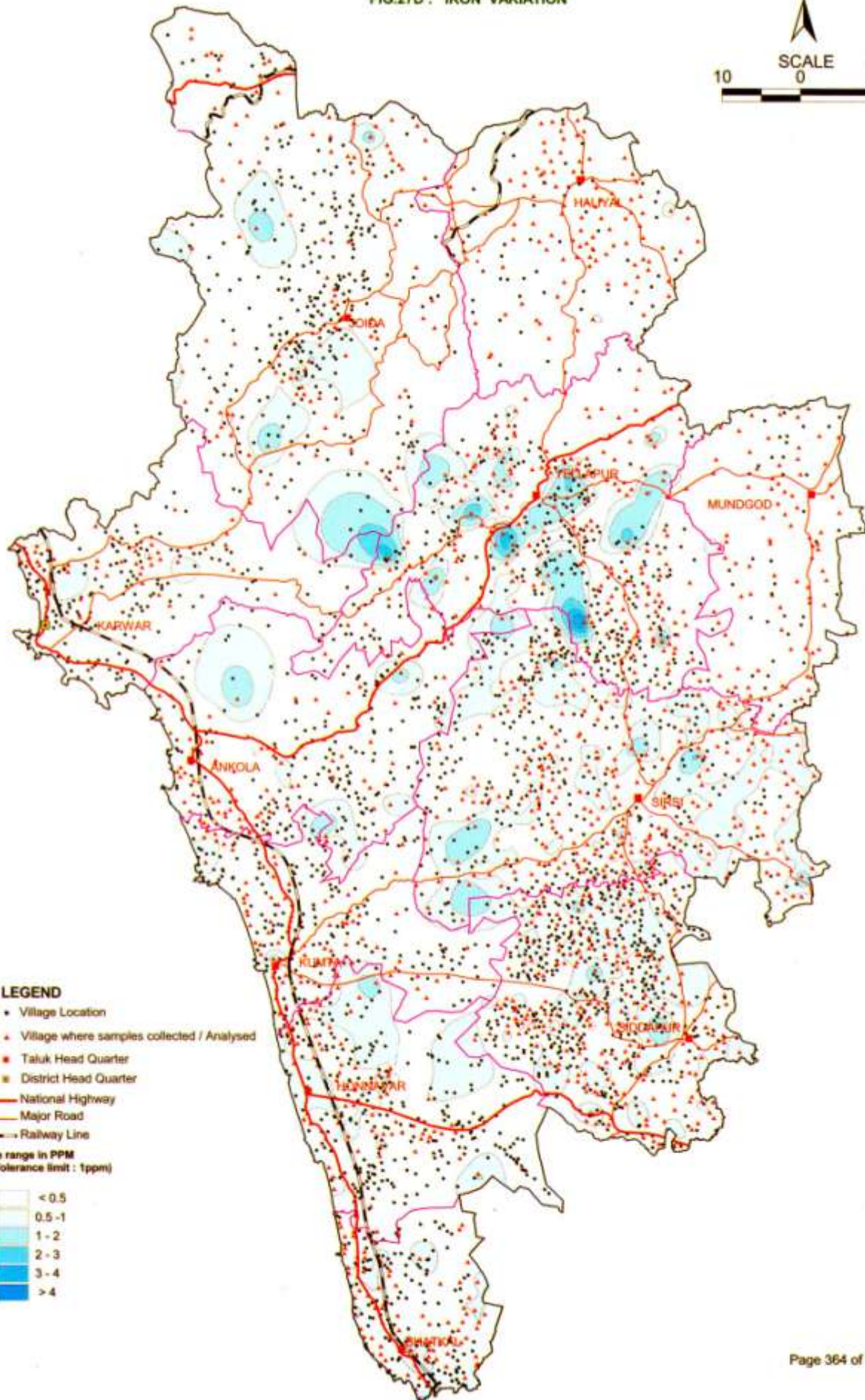
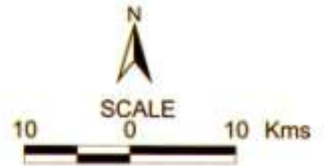
UTTAR KANNADA DISTRICT

FIG.27C : VARIATION OF TOTAL HARDNESS (TH)



UTTAR KANNADA DISTRICT

FIG.27D : IRON VARIATION



LEGEND

- Village Location
- Village where samples collected / Analysed
- Taluk Head Quarter
- District Head Quarter
- National Highway
- Major Road
- Railway Line

Fe range in PPM
(Tolerance limit : 1ppm)

