DAKSHINA KANNADA DISTRICT

FIG.11 DAKSHINA KANNADA DISTRICT

Sl.No. **CONTENTS** **Page**

1. Location

Dakshina Kannada district is located in the southwestern part of Karnataka State with geographical area of 4843 sq. km. It is bounded by Udupi district on the northwestern side, Chikmagalur district on the northern and northeastern side, Hassan district on the eastern side, Kodagu district on the southeastern side, Kerala State on the southern and southwestern side and the western side is covered by Arabian Sea. It lies between 12° 27' to 13° 11' N Latitude and 74° 46' to 75° 41' E Longitude.

2. Demography

As per the 1991 census Dakshina Kannada district has a population of 1,633,392. The total number of villages / habitations in the district are 3,137. Dakshina Kannada district has 5 taluks viz. Bantval, Beltangadi, Mangalore, Puttur and Sulya.

3. Climate, Drainage and soil

Dakshina Kannada district forms part of the Western Ghats and Malnad region, which includes the mountainous and forested areas. Hence, it experiences quite good rainfall and relatively cooler atmosphere. The heavy rainfall, high humidity and oppressive weather in the summer season mark the climate of this district. Netravati, Swarna, Gurupur are the major rivers in the district and they are west flowing rivers draining into Arabian Sea. The annual average rainfall in the district is 3930 mm (Ref: Climate of Karnataka State, Published by India Meteorological Department, 1984). The district experiences a temperature variation between 24^0 to 35^0 C. Major portions of the district is covered by gravelly red soil, in the coastal region (Mangalore taluk), lateritic sandy soil and coastal alluvium are also occurring. The district falls in the coastal zone in the Ten fold agro-climatic zone classification.

4. Geology and Groundwater occurrence

Geology of Dakshina Kannada district is simple with Peninsular gneisses covering major portion (about 90%)of the district. From the groundwater point of view, the rock is classified as crystalline formation. The fracture / fissure system developed along with joints and faults traversing the rock facilitate groundwater circulation and hold moderate quantity of water. The quality of groundwater is governed by the mineralogical composition of the rocks. A small part of the southern most extension of Kudremukh Schist Belt consisting of metavolcanics associated with iron formations is also exposed. These rocks are relatively impermeable, poor aquifers and yield very less quantity of water. Groundwater normally occurs in the water table conditions in the weathered and decomposed mantle and also under semi-confined conditions in the deeper fractures. The alluvial deposit seen all along the coast of the district has shallow aquifer containing thin layer of fresh water floating on the saline water tapped by the dug wells.

5. Groundwater quality characterization

To understand and gather information on groundwater quality, 6647 groundwater samples collected from 591 villages/habitations in Dakshina Kannada district have been analysed by RDED.

The water samples have been analysed for 14 parameters only such as Turbidity, Colour, Conductivity, Hydrogen ion concentration (pH), Total Dissolved Salts (TDS), Total Hardness (TH), Calcium Hardness (CalH), Chloride (Cl), Sulphate (SO_4), Fluoride (F), Nitrate (NO_3), Alkalinity (Alk), Iron (Fe) and Bacteria. The data is presented in the Table.

5.1 Physical characters

Turbidity

About 700 samples from 253 villages have shown higher turbidity ranging between 10.4 to 198 JTU. The samples showing higher turbidity are from Bantval (140 out of 1415 samples), Beltangadi (30 out of 1317 samples), Mangalore (167 out of 1889 samples), Puttur (264 out of 1483 samples) and Sulya (99 out of 543 samples). Highest Turbidity of 198 JTU is recorded from Akkana village in Bantval taluk.

Colour

No abnormal Colour intensity is recorded in the entire district.

Electrical Conductivity (EC)

In Dakshina Kannada district, the EC value ranges from 0.36 to 3820m mhos/cm. The ranges of EC value recorded in the taluks are Bantval (18.34 to 978 m mhos/cm), Beltangadi (0.36 to 802.2 m mhos/cm), Mangalore (28.34 to 3820 m mhos/cm), Puttur (12.9 to 1652 m mhos/cm) and Sulya (18 to 805 m mhos/cm).

Hydrogen Ion Concentration (pH)

Nearly 165 samples covering 98 villages have shown the abnormal pH values in the range of 5 to 9.8 with highest (9.8) being reported from Mangalore taluk. The ranges of pH values recorded in the taluks are Bantval 6 to 6.4 (27 samples), Beltangadi 5 to 8.7 (42 samples), Mangalore 5.3 to 9.8 (71 samples), Puttur 6.3 to 8.9 (23 samples) and Sulya 8.82 to 8.88 (2 samples).

5.2 Chemical characters

Total Dissolved Salts (TDS)

Only 2 samples from Mangalore taluk have shown higher TDS content of 2023 and 2039 ppm. No abnormal TDS values are reported from Bantval, Beltangadi, Puttur and Sulya taluks.

Total Hardness (TH)

Only 8 samples from Mangalore taluk have shown higher TH content in the range of 692 to 1708 ppm. No abnormal TH values are reported from Bantval, Beltangadi, Puttur and Sulya taluks.

Calcium Hardness (CalH)

Excepting 4 samples from Mangalore taluk, entire district is having CalH content within the permissible limit. The range of abnormal CalH content in these 4 samples is 201.6 to 332 ppm. No abnormal CalH values are reported from Bantval, Beltangadi, Puttur and Sulya taluks.

Chloride (Cl)

Only 3 samples from Mangalore taluk have higher Chloride content of 1140 to 1420 ppm. No abnormal Chloride concentration is reported from Bantval, Beltangadi, Puttur and Sulya taluks

Sulphate (SO_4)

No abnormality is recorded in sulphate content in the entire district.

Fluoride (F)

The analytical data has revealed the higher fluoride concentration in only 3 samples from Mangalore taluk with Fluoride content of 1.78 ppm. No abnormal fluoride values are reported from Bantval, Beltangadi, Puttur and Sulya taluks.

Nitrate (NO_3)

None of the samples in the entire district have indicated Nitrate content more than the permissible limit.

Alkalinity (Alk)

In the entire district, none of the analysed samples have reported higher Alkalinity.

Iron (Fe)

In total, 786 samples covering 277 villages / habitations have analysed iron in excess of the permissible limit in the range of 1.01 to 9.46 ppm. The concentrational variation of iron in different taluks are: Bantval (107 samples from 60 villages with Fe content of 1.01 to 9.46 ppm), Beltangadi (141 samples from 59 villages with Fe content of 1.01 to 6.49 ppm), Mangalore (338 samples from 85 villages with Fe content of 1.02 to 6.92 ppm), Puttur (165 samples from 53 villages with Fe content of 1.01 to 7.5 ppm) and Sulya (35 samples from 20 villages with Fe

content of 1.01 to 5.82 ppm). The highest Fe value of 9.46 ppm is recorded from Ganemaru village in Bantval taluk.

Bacteria (*E.coli*)

Nearly 248 samples covering 200 villages have shown the presence of Bacteria. The bacterial count generally varies between 1 to 6 numbers /100 ml of water. The bacterial counts reported in different taluks of the district are - Bantval (64 samples with bacterial count of 1 to 4 numbers/100 ml), Beltangadi (45 samples with bacterial count of 1 to 3 numbers/100 ml), Mangalore (60 samples with bacterial count of 1 to 6 numbers/100 ml), Puttur (51 samples with bacterial count of 1 to 3 numbers/100 ml) and Sulya (28 samples with bacterial count of 1 to 4 numbers/100 ml).

5.3 Spatial Variation

Bacteria

The map depicting the bacterial incidence reveals that, almost half of the sampled villages are affected by the bacterial incidence and they are spread unevenly throughout the district.

Fluoride (F)

The isoconcentration map of fluoride (Fig.11A) indicates that, entire Dakshina Kannada district is having Fluoride concentration within the permissible limit.

Total Dissolved Salts (TDS)

The spatial variation map of TDS (Fig.11B) reveals that, the entire district has analysed TDS within the permissible limit.

Total Hardness (TH)

The isoconcentration map generated for TH (Fig.11C) indicates that like Fluoride and TDS, TH concentrations reported in the entire district are also within the permissible limit.

Iron (Fe)

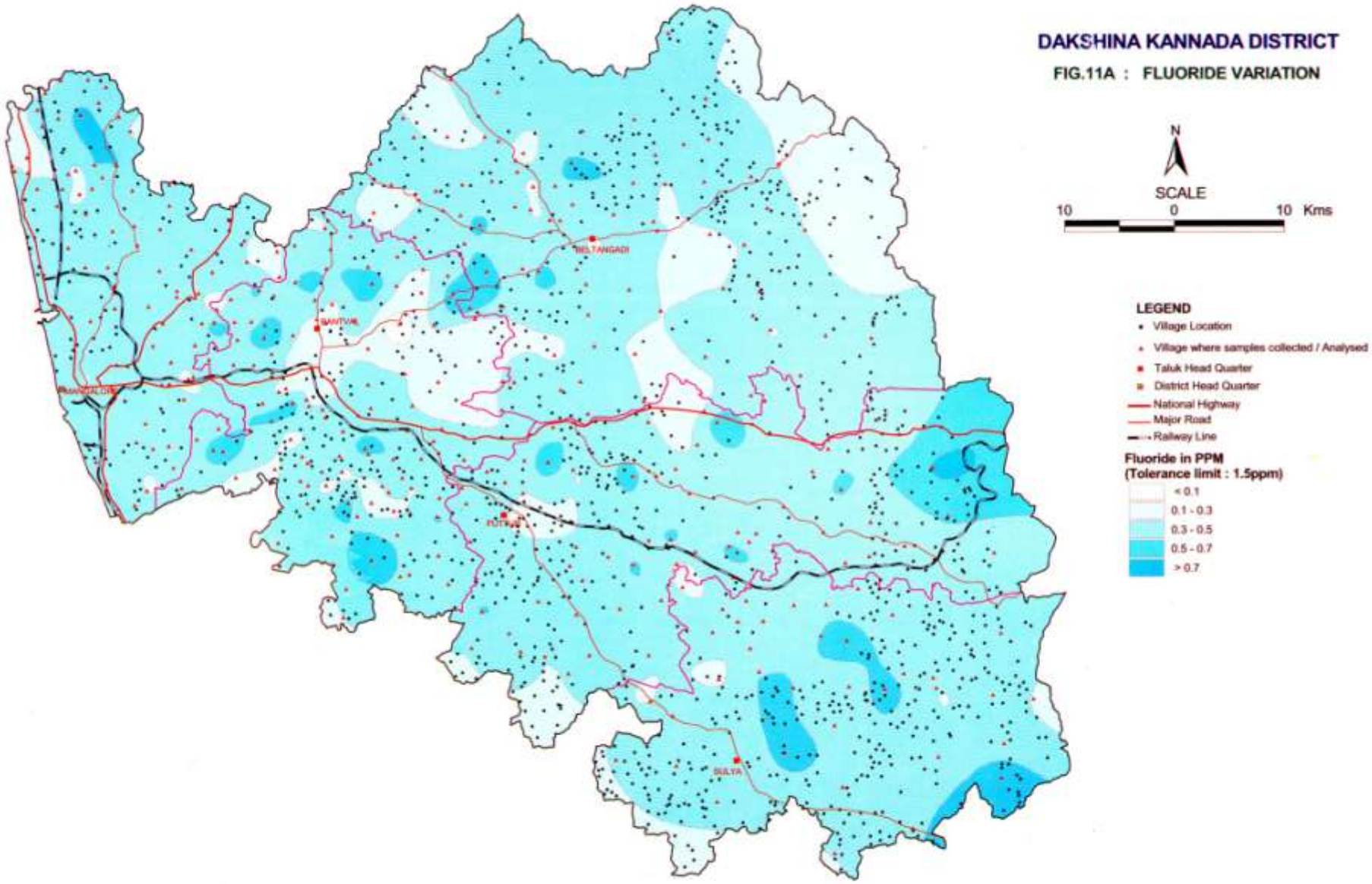
The isoconcentration map of iron (Fig.11D) shows that, excepting 6 small isolated patches - 2 located in the northern portion covering Beltangadi taluk and 4 located in the west central portion covering Bantval taluk, rest of the district has Fe content within the permissible limit.

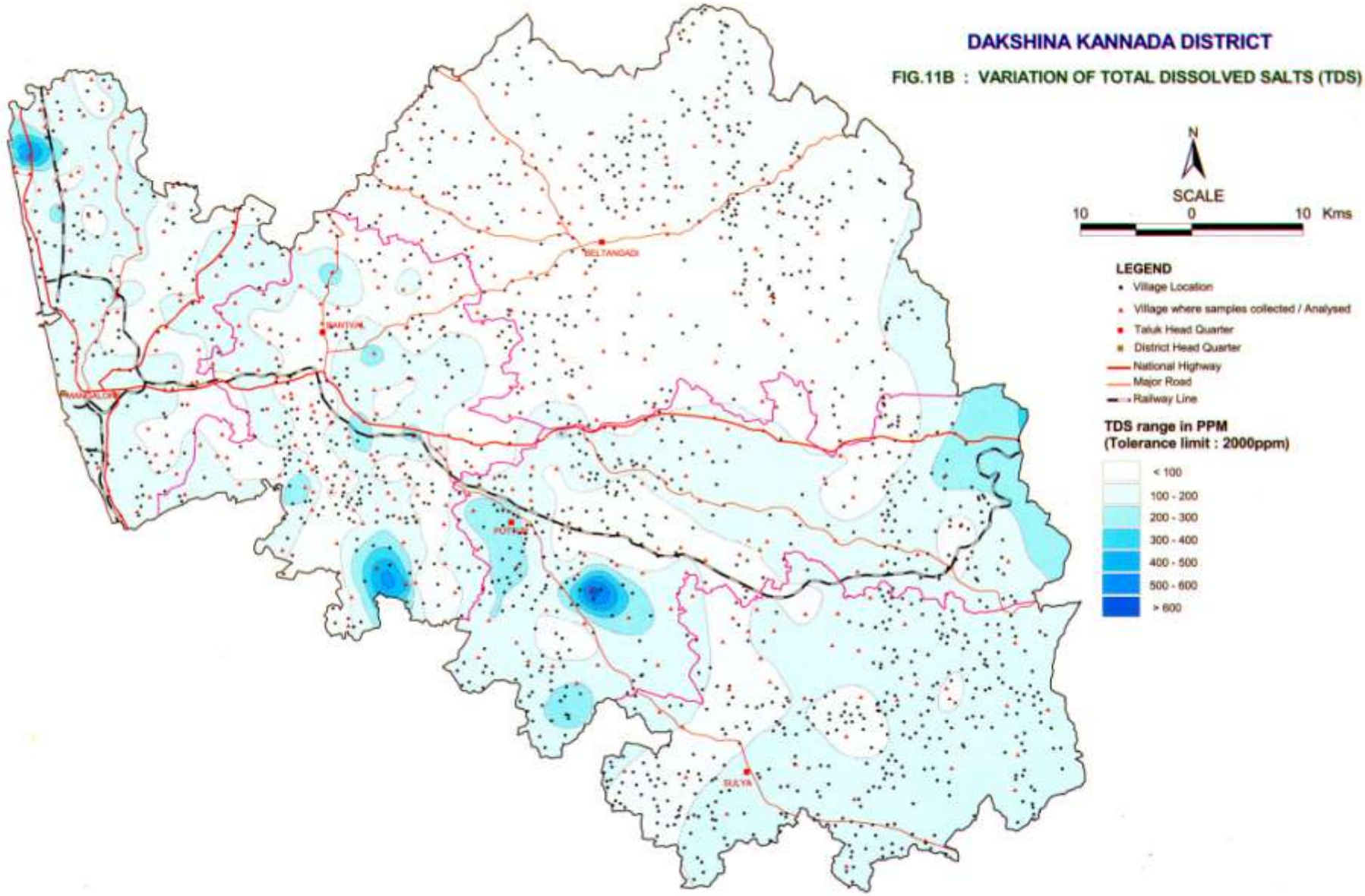
6. Conclusion

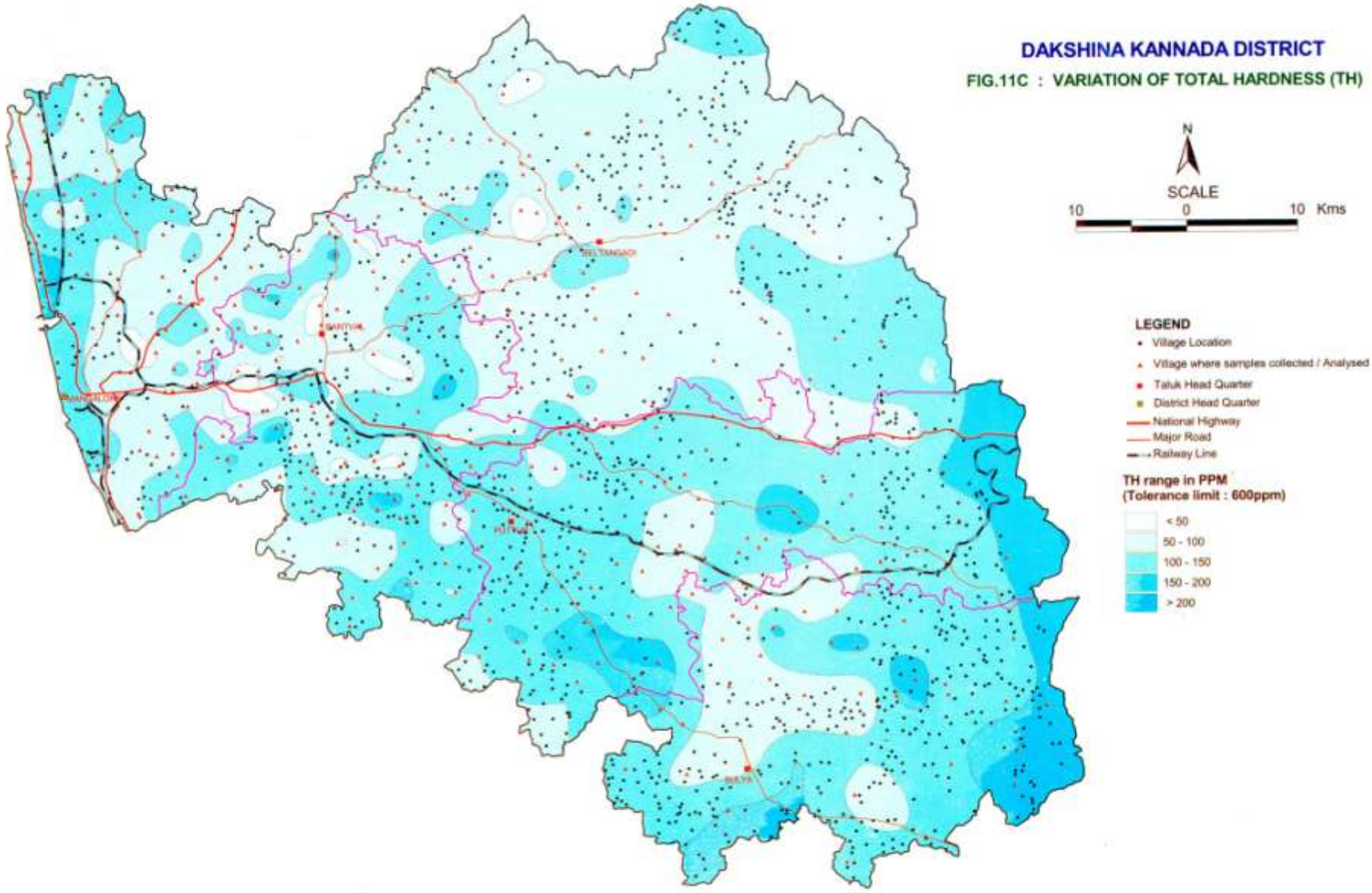
The water quality data of Dakshina Kannada district has reflected the presence of excess Turbidity, Iron and the Bacterial incidence. Turbidity can be reduced by simple filtration. To overcome from the problem related to the excess Iron content, an attention is required during the source development 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 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. In general, all the constituents in the analysed water samples are well within the permissible limit and the water is good for domestic consumption.

Table: Comprehensive analysis of water quality data of Dakshin 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	Color (25) HU	Cond - mmhos /cm	pH (6.5-8.5)	TDS (2000) ppm	TH (600) ppm	CalH (200) ppm	Cl (1000) ppm	SO_4 (400) ppm	F (1.5) ppm	NO_3 (100) ppm	Alk (600) ppm	Fe (1) ppm
1	Bantval	320	238	1415	No. of samples beyond permissible limit	64	140	-	-	27	-	-	-	-	-	-	-	-	107
					No. of villages affected	53	80	-	-	16	-	-	-	-	-	-	-	-	60
					Range	1-4	10.9-198	-	18.34-978	6-6.4	-	-	-	-	-	-	-	-	1.01-9.46
2	Belthangadi	413	82	1317	No. of samples beyond permissible limit	45	30	-	-	42	-	-	-	-	-	-	-	-	141
					No. of villages affected	39	20	-	-	26	-	-	-	-	-	-	-	-	59
					Range	1-3	11-40	-	0.36-802.2	5-8.7	-	-	-	-	-	-	-	-	1.01-6.49
3	Mangalore	190	103	1889	No. of samples beyond permissible limit	60	167	-	-	71	2	8	4	3	-	3	-	-	338
					No. of villages affected	51	56	-	-	38	1	5	2	2	-	3	-	-	85
					Range	1-6	10.6-192	-	28.34-3820	5.3-9.8	2023-2039	692-1708	201.6-332	1140-1420	-	1.78	-	-	1.02-6.92
4	Puttur	393	66	1483	No. of samples beyond permissible limit	51	264	-	-	23	-	-	-	-	-	-	-	-	165
					No. of villages affected	37	46	-	-	16	-	-	-	-	-	-	-	-	53
					Range	1-3	10.4-196.4	-	12.9-1652	6.3-8.9	-	-	-	-	-	-	-	-	1.01-7.5
5	Sulya	380	102	543	No. of samples beyond permissible limit	28	99	-	-	2	-	-	-	-	-	-	-	-	35
					No. of villages affected	20	51	-	-	2	-	-	-	-	-	-	-	-	20
					Range	1-4	10.8-180	-	18-805	8.82-8.88	-	-	-	-	-	-	-	-	1.01-5.82
	Total	1696	591	6647	No. of samples beyond permissible limit	248	700	-	-	165	2	8	4	3	0	3	0	0	786
					No. of villages affected	200	253	-	-	98	1	5	2	2	0	3	0	0	277
					Range	1-6	10.4-198	-	0.36-3820	5-9.8	2023-2039	692-1708	201.6-332	1140-1420	0	1.78	0	0	1.01-9.46

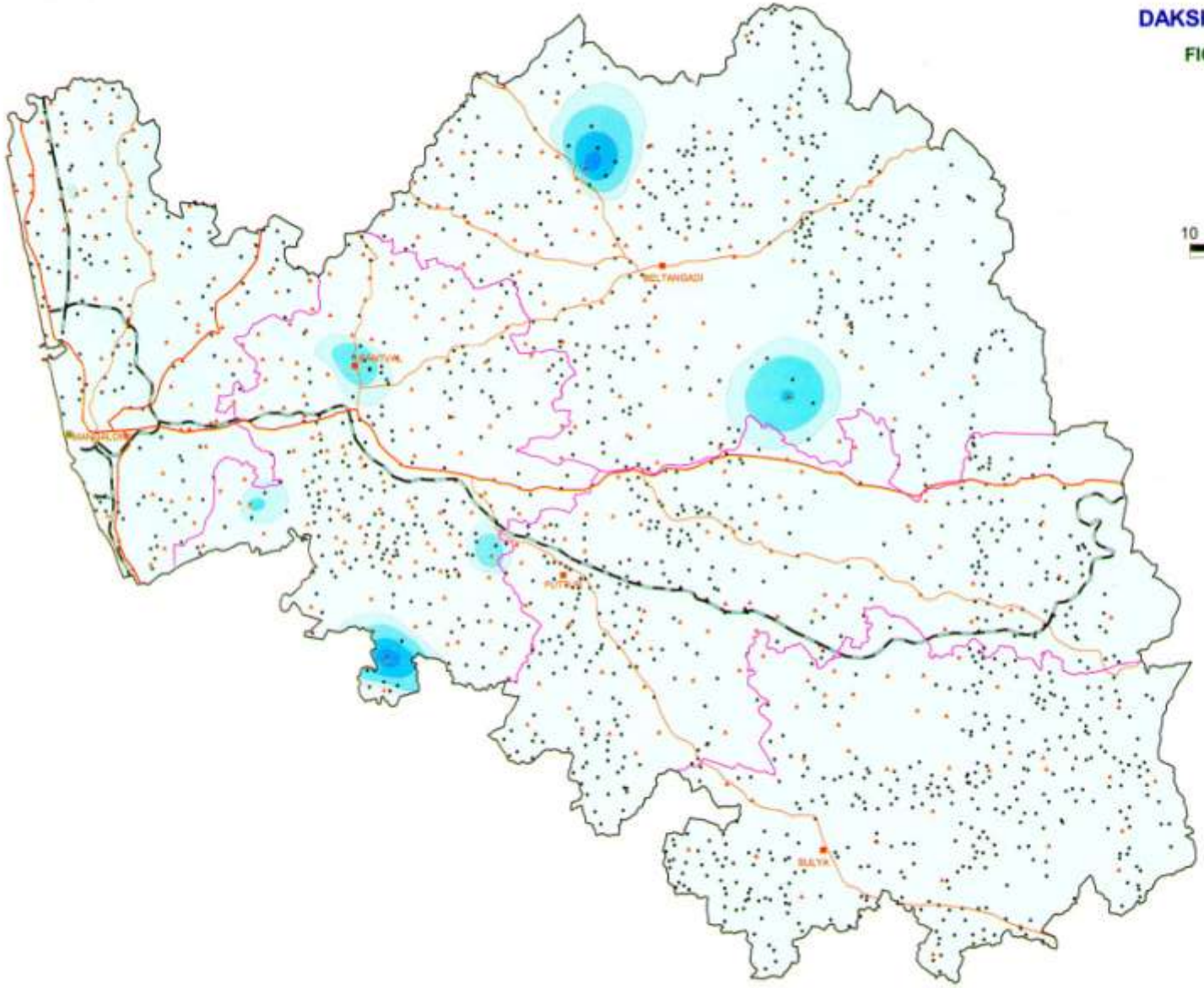

DAKSHINA KANNADA DISTRICT
FIG.11A : FLUORIDE VARIATION
N
SCALE
10 0 10 Kms
BELTANGADI
BANTWAL
MANGALORE
PUTTUR
SULYA
LEGEND
Village Location
Village where samples collected / Analysed
Taluk Head Quarter
District Head Quarter
National Highway
Major Road
Railway Line
Fluoride in PPM
(Tolerance limit : 1.5ppm)
< 0.1
0.1 - 0.3
0.3 - 0.5
0.5 - 0.7
> 0.7


DAKSHINA KANNADA DISTRICT
FIG.11B : VARIATION OF TOTAL DISSOLVED SALTS (TDS)
N
SCALE
10 0 10 Kms
BELTANGADI
PUTTUR
SULYA
LEGEND
Village Location
Village where samples collected / Analysed
Taluk Head Quarter
District Head Quarter
National Highway
Major Road
Railway Line
TDS range in PPM
(Tolerance limit : 2000ppm)
< 100
100 - 200
200 - 300
300 - 400
400 - 500
500 - 600
> 600


DAKSHINA KANNADA DISTRICT
FIG.11C : VARIATION OF TOTAL HARDNESS (TH)
N
SCALE
10 0 10 Kms
BELTANGADI
PUTTUR
SULYA
LEGEND
Village Location
Village where samples collected / Analysed
Taluk Head Quarter
District Head Quarter
National Highway
Major Road
Railway Line
TH range in PPM
(Tolerance limit : 600ppm)
< 50
50 - 100
100 - 150
150 - 200
> 200

DAKSHINA KANNADA DISTRICT

FIG.11D : IRON VARIATION



N

SCALE

10 0 10 Kms

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)

- < 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- > 3.0