

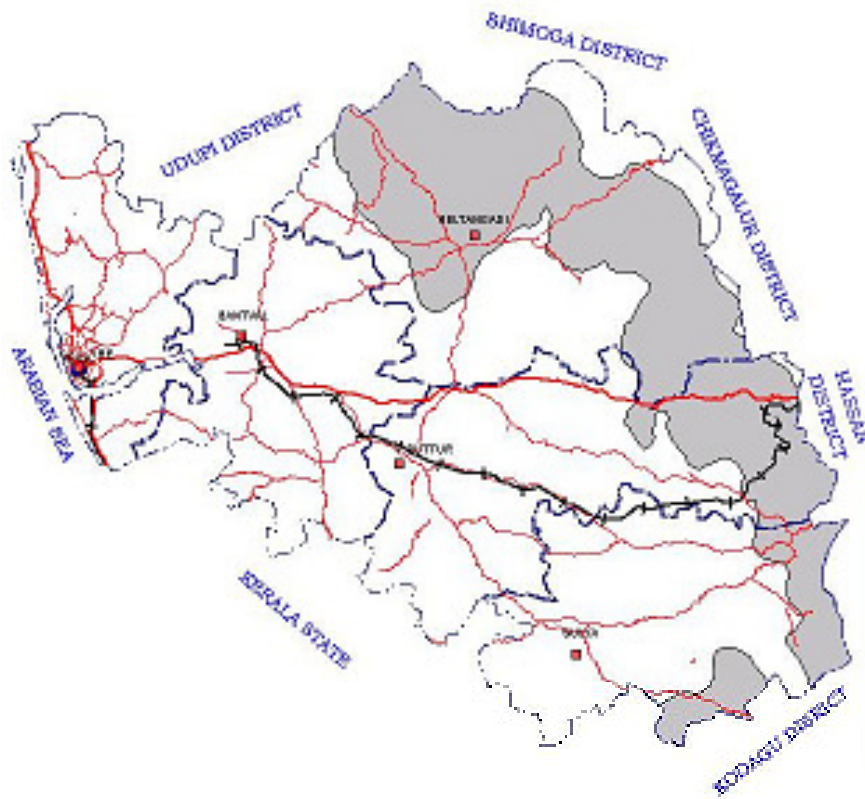


स्वच्छ सुरक्षित जल – सुन्दर खुशहाल कल
CONSERVE WATER - SAVE LIFE



GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET
DAKSHINA KANNADA DISTRICT,
KARNATAKA



SOUTH WESTERN REGION
BANGALORE
NOVEMBER 2009

FOREWORD

Ground water contributes to about eighty percent of the drinking water requirements in the rural areas, fifty percent of the urban water requirements and more than fifty percent of the irrigation requirements of the nation. Central Ground Water Board has decided to bring out district level ground water information booklets highlighting the ground water scenario, its resource potential, quality aspects, recharge – discharge relationship, etc., for all the districts of the country. As part of this, Central Ground Water Board, South Western Region, Bangalore, is preparing such booklets for all the 27 districts of Karnataka state, of which six of the districts fall under farmers' distress category.

The Dakshina Kannada **District Ground Water Information Booklet** has been prepared based on the information available and data collected from various state and central government organisations by several hydro-scientists of Central Ground Water Board with utmost care and dedication. This booklet has been prepared by **Shri S.S.Hegde, Scientist-C**, under the guidance of Dr.K.Md. Najeeb, Superintending Hydrogeologist, Central Ground Water Board, South Western Region, Bangalore. The figures were prepared by S/Sri. H.P.Jayaprakash, Scientist-C and K.Rajarajan, Assistant Hydrogeologist. The efforts of Report processing section in finalising and bringing out the report in this format are commendable.

I take this opportunity to congratulate them for the diligent and careful compilation and observation in the form of this booklet, which will certainly serve as a guiding document for further work and help the planners, administrators, hydrogeologists and engineers to plan the water resources management in a better way in the district.

Sd/-
(T.M.HUNSE)
Regional Director

GROUND WATER INFORMATION BOOKLET
DAKSHINA KANNADA DISTRICT
KARNATAKA
DISTRICT AT A GLANCE

Sl. No.	Items	Statistics
1	GENERAL INFORMATION	
	i). Geographical area (sq. km)	4770
	ii). Administrative division (As on 1.1.2007) Number of Tehsils Number of Panchayaths	5 - Bantwal, Belthangady, Mangalore, Puttur and Sulya 203
	iii). Population (as per 2001 census)	18,96,403 (Rural);11,67, 958 (Urban) 7,28,445
	iv). Average annual Rainfall (mm)	3789.9 (Av. 30 years: 1971-2000)
2	GEOMORPHOLOGY	
	i). Major physiographic units	3 Nos a). Coastal Plain b). Western Ghat Region c). Upland Pediplain area
	ii). Major Drainages	Netravathi, Gurpur, Kumaradhara, Payaswini and Shambhavi
3	LAND USE (sq. km.)	
	a). Forest area	1285
	b). Net area sown	1314
	c). Net area irrigated	725
4	MAJOR SOIL TYPES	
		Lateritic soil
5	AREA UNDER PRINCIPAL CROPS (As on 1.1.07)(in Ha.)	
	Paddy	58838
	Areca nut	27209
	Coconut	15684
	Cashew nut	29585
	Vegetables	3605
	Rubber	10113

6	IRRIGATION BY DIFFERENT SOURCES (Area in ha / number of structures) Dugwells Tube / bore wells Tanks / ponds Canals Other sources Net irrigated area	45014 9098 / 6477 nil nil 18404 72516
7	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.3.2007)	49 (dugwells) 08 (pz)
8	PREDOMINANT GEOLOGICAL FORMATIONS	Gneiss, Schist & Granite and alluvium
9	HYDROGEOLOGY <ul style="list-style-type: none"> Major water bearing formations Pre-monsoon Depth to water level during 2006, Post-monsoon Depth to water level during 2006, Long term water level trend in 10 years (1997-2006 in m/yr) 	Weathered & fractured Gneiss, Schist & Granite and alluvium 1.85 – 15.17 mbgl 1.65 – 9.40 mbgl 58% of the wells show a rise in water level ranging from 0.014 m to 0.12 m, whereas, the remaining wells (42%) show a fall in the range of 0.01m to 0.19 m.
10	GROUND WATER EXPLORATION BY CGWB (As on 31.3.2007) <ul style="list-style-type: none"> Total No of wells drilled EW and OW Depth Range (m) Discharge (Lps) Transmissivity (m²/ day) 	29 & 10 16 – 256.61 Negligible – 19.9 1 – 476
11	GROUND WATER QUALITY <ul style="list-style-type: none"> Presence of chemical constituents more than permissible limit) Type of water 	Nitrate 140ppm (Tokkuru) Ca - Mg bicarbonate to Na Chloride
12	DYNAMIC GROUND WATER RESOURCES in MCM <ul style="list-style-type: none"> Annual Replenishable GW resource Net annual GW draft Projected demand for domestic and industrial uses upto 2025 Stage of GW development 	516.30 312.90 53.07 59.5 %

13	AWARENESS AND TRAINING ACTIVITIES <ul style="list-style-type: none"> • Mass Awareness Programme Organised Date Place No. of participants Water Management Programmes Organised 	1 22.12.1999 Mangalore 200 Nil
14	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING <ul style="list-style-type: none"> • Projects completed by CGWB (No. & Amount spent) • Projects under the technical guidance of CGWB(numbers) 	Nil Nil
15	GROUND WATER CONTROL AND REGULATION <ul style="list-style-type: none"> • No of OE Blocks • No of Critical Blocks • No of Blocks notified 	NIL Parts of Belthangady (46%) and Mangalore (18%) taluks Nil
16	MAJOR GROUND WATER PROBLEMS AND ISSUES	Flood and coastal erosion; Saline water intrusion along the rivers, water level decline in different isolated area of small aerial extent and possibility of water logging in some isolated patches.

1.0 Introduction

Dakshina Kannada is a maritime district located in the south-western part of Karnataka adjoining the Arabian Sea. The geographical area is 4770 sq. km extending between 12°,30',00" & 13°,11',00" north latitude and 74°,35',00" & 75°,33',30" east longitude. Mangalore town is the district headquarters. Administratively, the district is divided into five taluks viz. Bantwal, Belthangady, Mangalore, Puttur and Sulya (Fig.1). Population of the district (2001 census) is 18 96,403 of which 11, 67, 958 is rural and 7,28,448 is urban. The district is drained by Netravathi, Gurupur, Mulki, Kumaradhara, Payasvini and and Shambhavi rivers which originate in the Western Ghats and flow westwards to join the Arabian Sea(Fig.2).

Agriculture is the main activity of the people in the district. The net sown area comprises 28% of the total geographical area. Major crops are paddy, areca nut, coconut, cashew nut, rubber and vegetables. About 57% of the net sown area is irrigated by different sources. Groundwater irrigates about 75% of the irrigated area and the remaining is by surface water sources.

Central Ground Water Board has carried out Systematic Hydrogeological Survey during 1983-84, Reappraisal Hydrogeological Survey and Ground water Exploration in the district during 1989-90. Under exploration programme, 26 exploratory wells, 8 observation wells have been drilled during the period between 1987 and 1991. Under Hydrology Project 8 piezometers were drilled for observing the water levels.

2.0 Rainfall

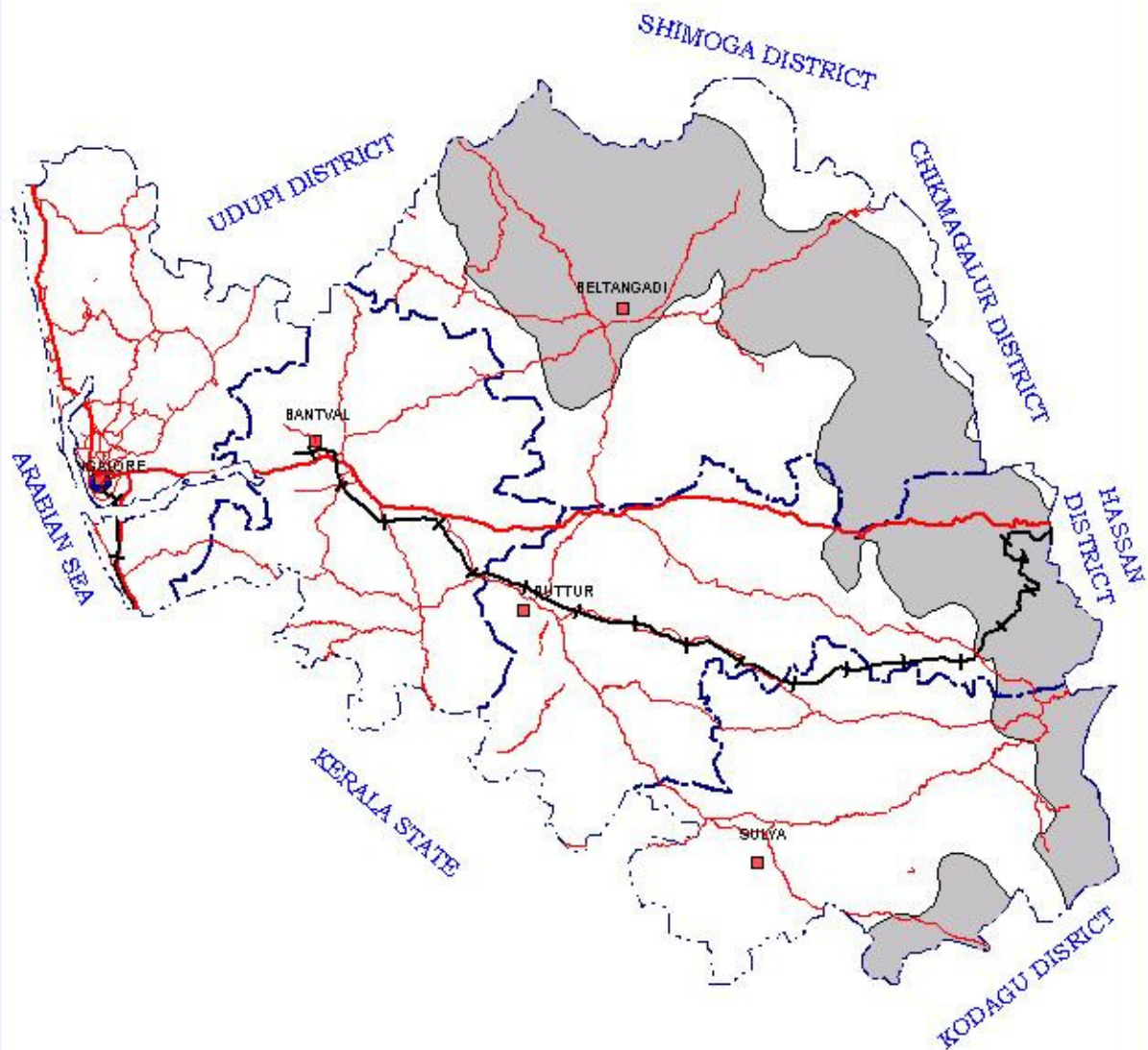
The average rainfall of the district 3789.9 mm and is received mainly during the southwest monsoon season extending from June to September. About 85% of the annual rainfall occurs during the monsoon months. Post - monsoon season yields about 8% and the balance of annual rainfall from December to March. This district on the West Coast of India experiences a typical maritime climate. The district is marked by heavy rainfall, high humidity and oppressive weather in hot season. Generally, the weather is hot and humid throughout the year. In the eastern part of the district i.e., along the Western Ghats, the weather is comparatively cooler than in the western coastal areas. In the district, all the taluk headquarters are having I.M.D. Rain gauge stations. Statistical analysis of rainfall data for the period 1971 to 2000 are presented in the table given below.

Table 1. Statistical Analysis, Seasonal and Annual Rainfall, Dakshin Kannada district

Station	Mean mm	Std. Dev. mm	Coef. Var. %	Mean mm	Std. Dev. mm	Coef. Var. %	Mean Mm	Std. Dev. mm	Coef. Var. %	Mean mm	Std. Dev. mm	Coef. Var. %
	Mar – May			Jun – Sep			Oct – Dec			Annual		
Bantwal	191.5	140.6	73.4	3358.3	675.5	20.1	292.1	116.5	39.9	3843.0	678.0	17.6
Belthangadi	234.7	223.8	95.4	3859.4	671.9	17.4	365.4	177.2	48.5	4470.2	653.6	14.6
Mangalore	191.8	165.0	86.0	3168.7	722.0	22.8	299.1	137.8	46.1	3661.4	737.3	20.1
Puttur	204.6	121.6	59.4	3338.9	653.3	19.6	372.6	127.1	34.1	3920.7	671.0	17.1
Sulya	227.5	120.9	53.1	3185.2	580.4	18.2	370.5	113.2	30.6	3790.0	590.2	15.6

Fig- 1

ADMINISTRATIVE SET-UP DAKSHINA KANNADA DISTRICT KARNATAKA



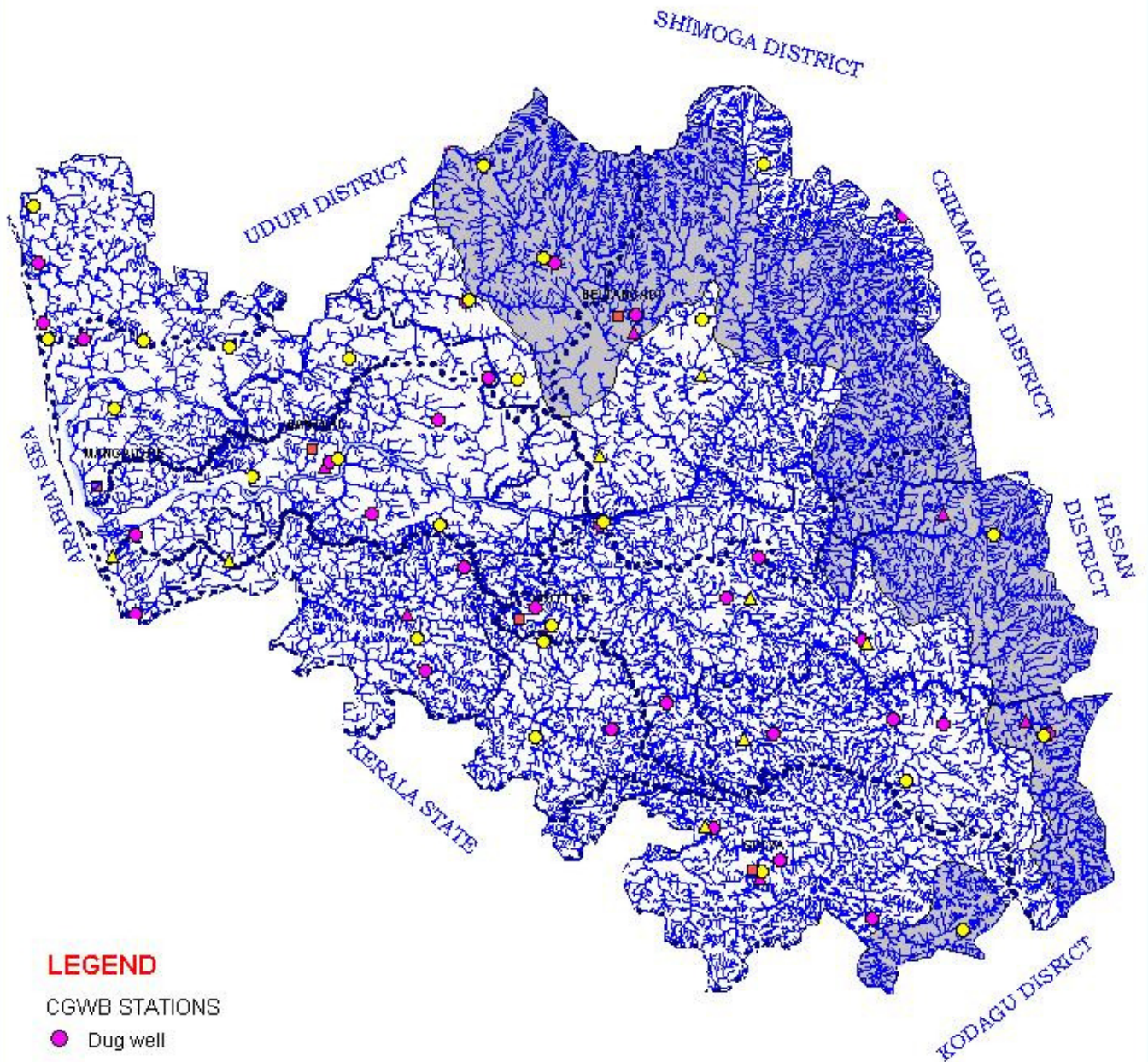
KEY MAP



LEGEND

- | | |
|------------------|-----------------------|
| Metalled road | Taluk boundary |
| National Highway | District headquarters |
| Railway track | Taluk headquarters |
| | Hilly area |

DRAINAGE & HYDROGRAPH MONITORING STATIONS DAKSHINA KANNADA DISTRICT, KARNATAKA



LEGEND

CGWB STATIONS

● Dug well

▲ Piezometer

DMG STATIONS

● Dug well

▲ Piezometer

☒ Surface waterbody

☒ Drainage

--- Watershed Boundary

3.0 Geomorphology and Soil Types.

3.1 Geomorphology:

Geomorphologically Dakshina Kannada District can be divided broadly into three well-defined physiographic units viz. i) Coastal plain ii) Upland pediplain area iii) Eastern hilly area forming part of the Western Ghats

The Coastal plain is a narrow, thickly populated and intensely cultivated area adjoining the coast. There is considerable extent of barren land along the coast partly because it is sandy, rocky, and marshy. The area near sea is covered with coconut gardens.

The Upland pediplain area interspersed with low hills between the Western Ghats and the coast, which is moderately cultivated with a considerable extent of fallow land, which can be put to agricultural use.

The Eastern hilly area in the eastern part of the district is hilly with thick forest cover, which forms part of the Western Ghats. The hills of the area range in elevation from 1200 to 1500m a.m.s.l. and are capped with laterite, which form plateau usually of oval or elongated configuration. The hill ranges are dissected by numerous streams and rivulets. The prominent peaks in the area are Balihalli (1240m), Amadikul betta (1298m) Attiberi Gudda (1522m), Banganabagile Gudda (1513m) etc.

3.2. Soil:

The soil in the district is mostly lateritic type, found distributed in the Pediplain area characterised by high iron and aluminium content. Lateritic soil is mostly red in color and yellow loamy, pale to bright red colours are also seen. Lateritic soil is suitable for Paddy, Sugarcane, Arecanut and Plantation crops, viz. crops like Cardamom & plantains. Loamy red soils are distributed in the lower reaches of valleys. Red lateritic soil is the most dominant soil type in the area. The texture of the soil varies from fine to coarse. The soil in valleys and intermediate slopes is rich in loam whereas in upper slopes it is much coarse in nature. The soil responds well to irrigation and other soil - management practices. Silty and loamy soils are of transported origin and are found mostly along river banks and in valley plains. They have good infiltration capacity and are well-suited for agriculture due to their fertility.

3.3 Surface water:

There are no major or medium irrigation projects in the district. One vented-dam has been built across the river Netravati at Tumble near Mangalore, to cater to the drinking water need of the town. MI tanks, LI schemes and temporary Mudkattas are the other types of surface water utility structures.

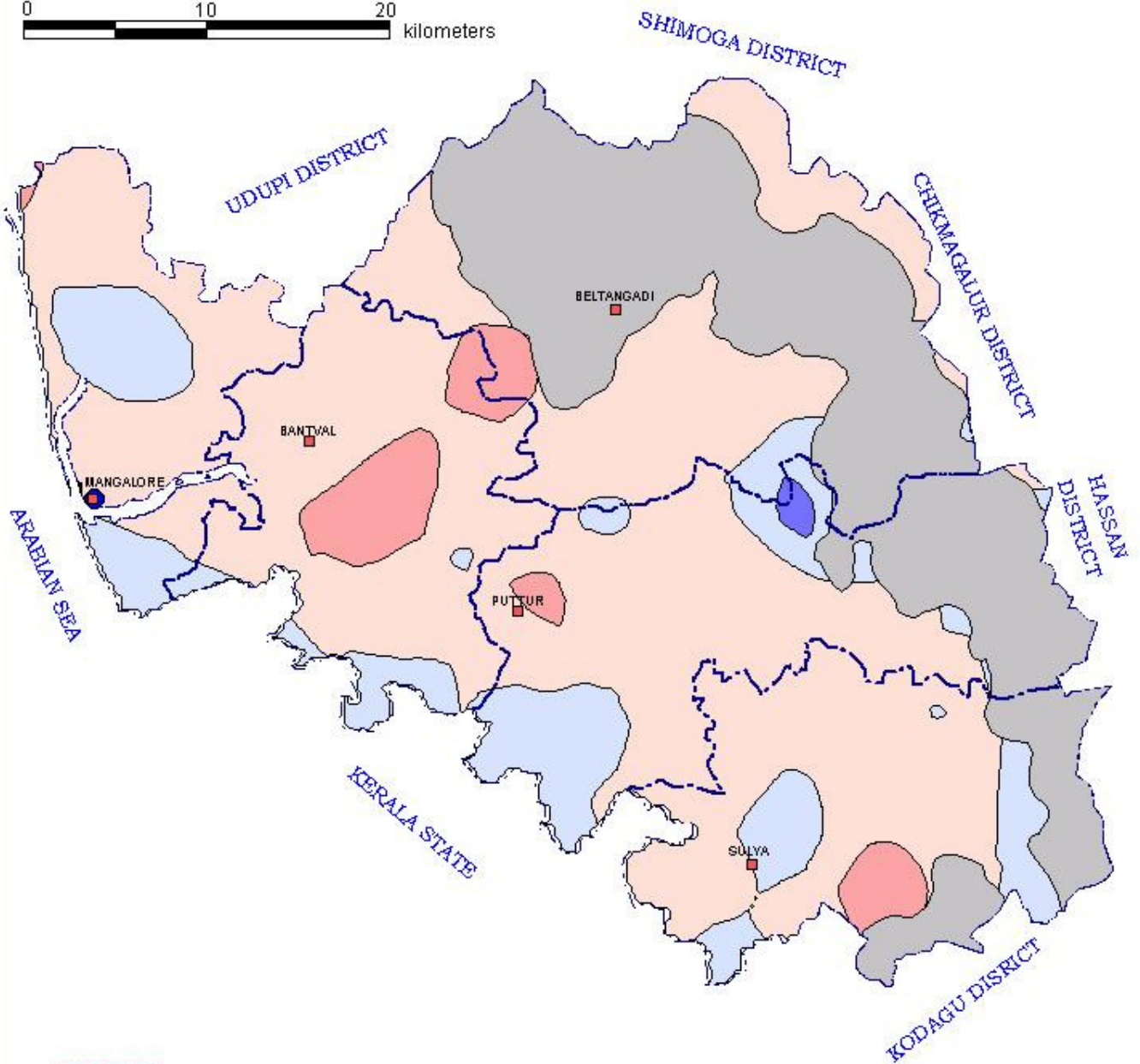
3.3.1 Spring: Seasonal and perennial springs are located in the foothills of hillocks and forests in the district. Thermal spring which is of very rare occurrence in south India has been found in the district. This is the 'lonely thermal spring of Karnataka'. It is called as 'Bendru Teertha' and located at Irde on Puttur-Panaje road at a distance of 13 km from Puttur. The rock formations exposed in and around the spring are gneisses traversed by veins of quartz and pegmatite on the southern banks of Badantadka river. The temperature of water varied from 35°C – 38°C. In the centre of the spring the temperature varies from 37°C to 38°C. The chemical analysis data of spring water shows T.D.S. of 424 ppm, SiO₂, 80.0 ppm, Cl 60 ppm, HCO₃ 196 ppm, Mg 21 ppm, SO₄ 61 ppm, CaCO₃ 121 ppm, Na 81 ppm, K 7.0 ppm and pH 8.2.

Fig-3

DEPTH TO WATER LEVEL PRE-MONSOON (MAY-2006) DAKSHINA KANADA DISTRICT, KARNATAKA



0 10 20 kilometers



LEGEND

Depth to Water

Level (m bgl)





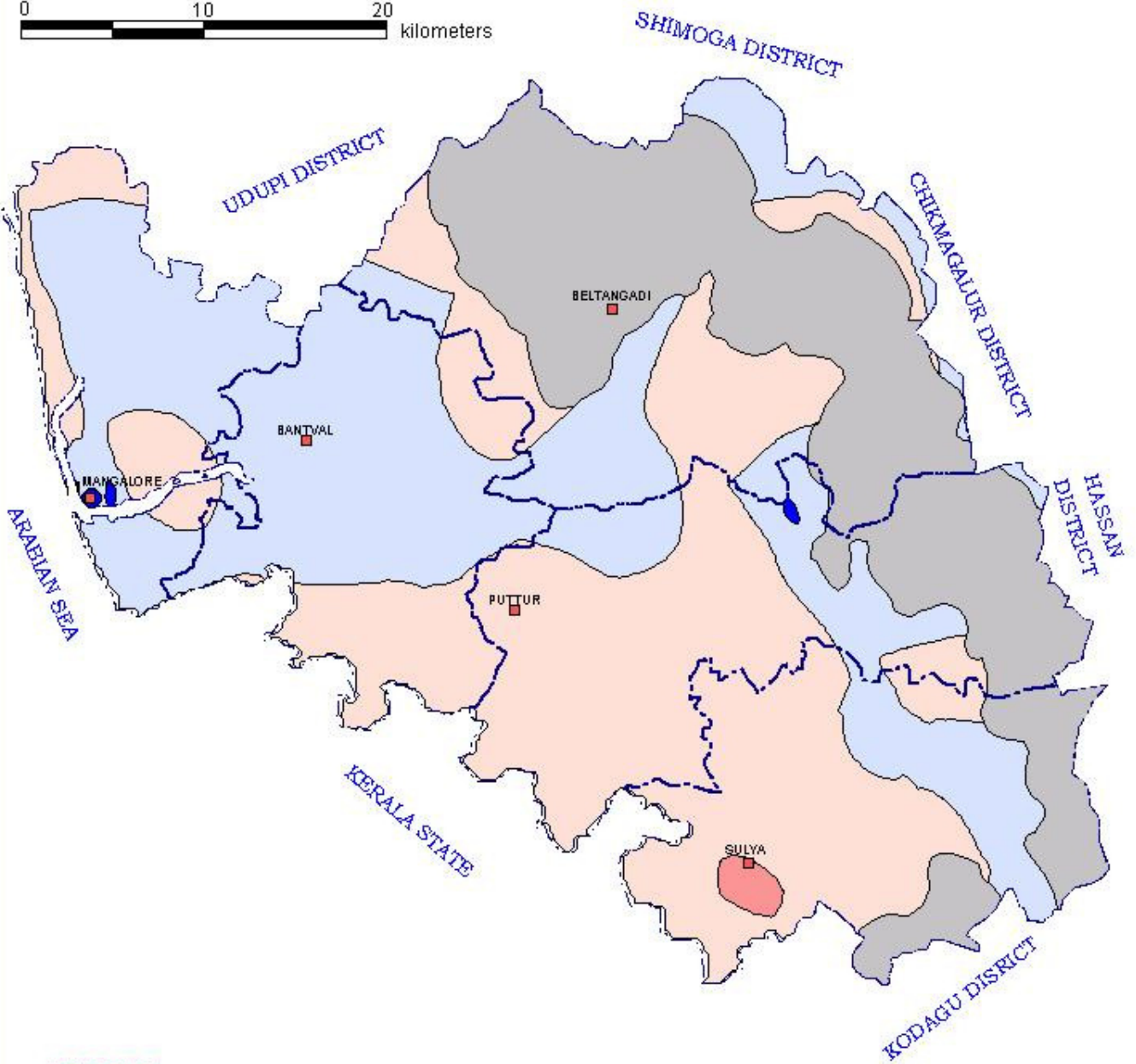
-  < 2
-  2 - 5
-  5 - 10
-  10 - 20

Fig-4

DEPTH TO WATER LEVEL POST-MONSOON (NOVEMBER-2006) DAKSHINA KANADA DISTRICT, KARNATAKA



0 10 20 kilometers



LEGEND

Depth to Water

Level (m bgl)



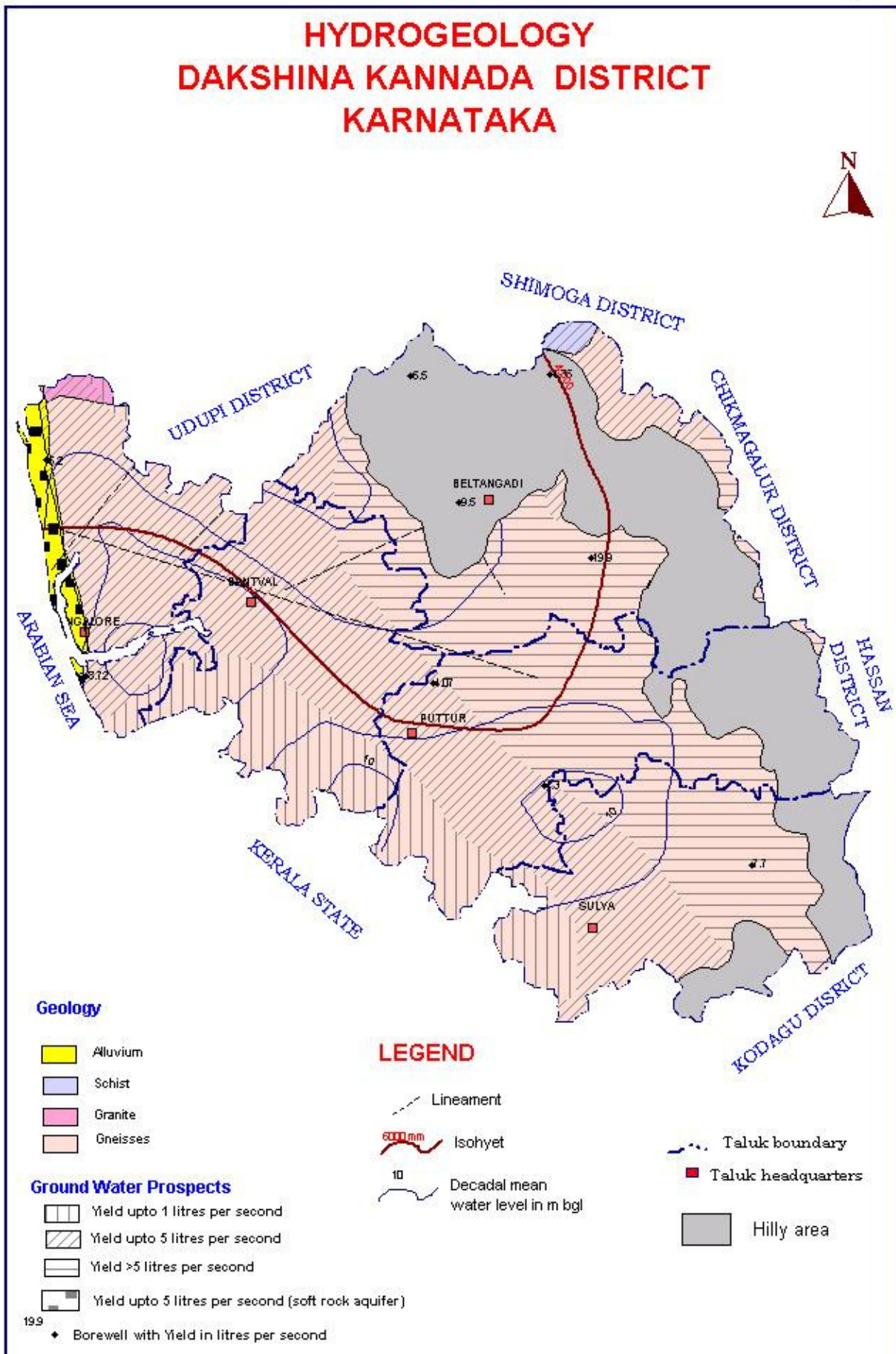
-  < 2
-  2 - 5
-  5 - 10
-  10 - 20

Fig- 5



4.0 Groundwater Scenario.

4.1 Hydrogeology:

Weathered and fractured gneiss, granite and schist are the major water bearing formations. Alluvial formation of limited thickness and aerial extent is found along the courses of major rivers. Groundwater occurs under phreatic (water table) condition in weathered zones of gneiss, schist and granite and under semi-confined to confined conditions in joints and fractures of these rocks at deeper levels. Weathered and fractured gneiss is the predominant aquifer found in the district followed by schistose and granitic aquifers, which occur as isolated patches in some taluks.

The depth to water level during pre-monsoon (May 2006) ranges from 1.85 mbgl (Nelyadi) to 15.17 mbgl (Bellare) (Fig.3). During post-monsoon (Nov 2006) it ranges from 1.65 mbgl (Nelyadi) to 9.40 mbgl (Bellare) (Fig.4). The seasonal fluctuation data reveals that 36.5% of the wells show rise while, 63.5% of the wells show a fall in water level. The rise in water level ranges from 0.15 m to 16.0 m while, the fall ranges from 0.65 m to 4.62 m. Analysis of the long-term water level trend in the last 10 years (1997-2006) reveals that 58% of the wells show a rise in water level ranging from 0.014 m to 0.12 m, whereas, the remaining wells (42%) show a fall in the range of 0.01m to 0.19 m. This means, little more than half of the total wells for which data have been analysed show a rise in the water level in the last decade (Fig.5).

Borewells drilled under Groundwater Exploration Programme of CGWB ranged between 16 and 200m. These wells have yielded from less than an lps to 19.9 lps. Though the Transmissivity ranged from 3 to 476 m²/day, it generally ranges from 3 to 20 m²/day. Good yield can be encountered by scientifically pin-pointing the borewell site.

4.2 Groundwater resources:

As per the 'Ground Water Resource Estimation (GEM-1997)', the annual ground water availability is 51632.08 Ham; the existing gross groundwater draft for all uses is 31289.77 Ham; after allocating a resource of 5307.30 Ham for future industrial and domestic uses, the net groundwater availability for future irrigation development is 18789.07 Ham. This balance resource can create a ground water irrigation potential of 25079.18 Ha. The ground water development in the district varies from 45.43% (Sulya taluk) to 88.5% (Bantwal taluk) with an average development of 59.5% for the district.

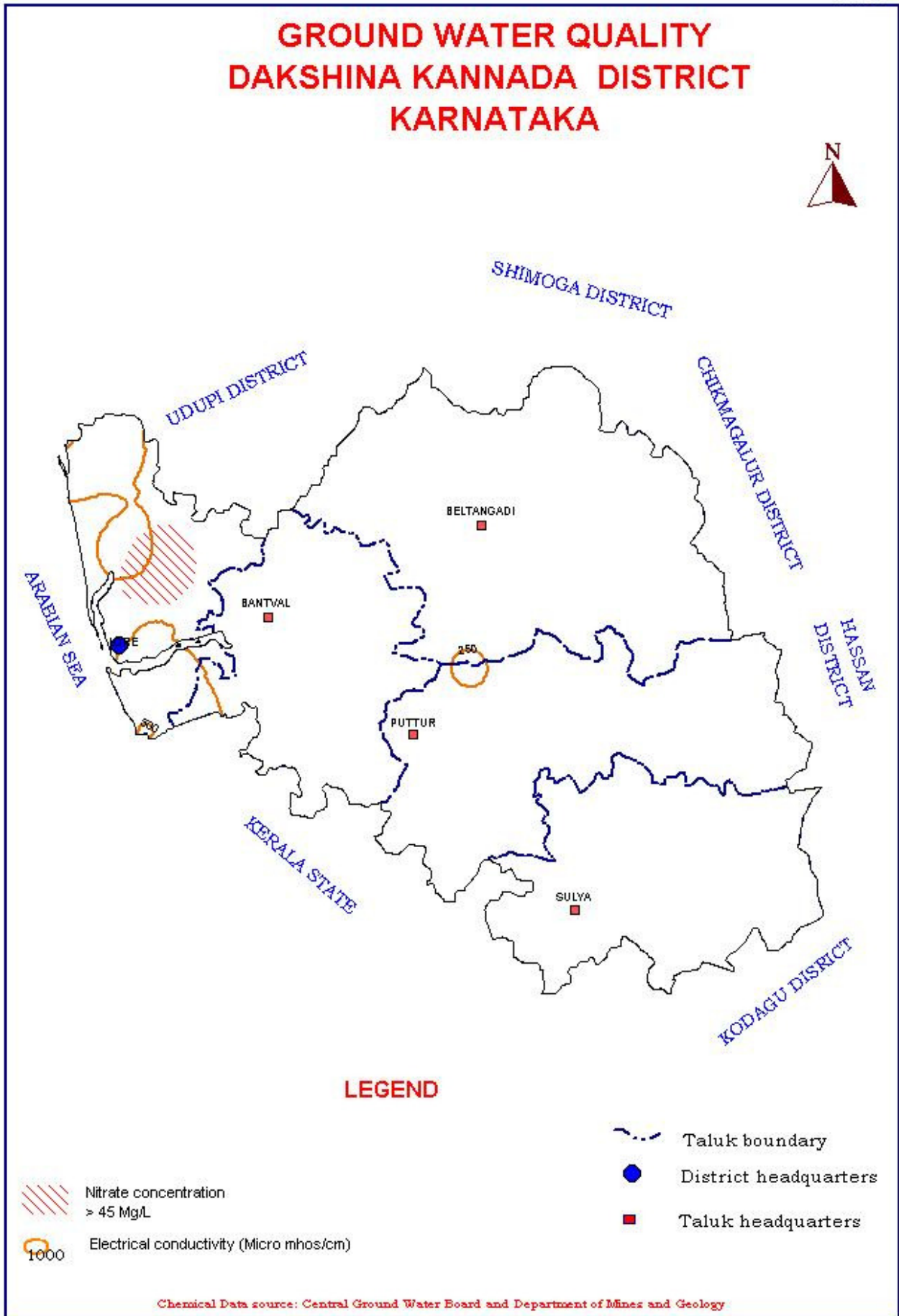
The talukwise groundwater resource (as on March 2004) is given in the table below.

4.3 Groundwater quality:

Groundwater quality is generally good and potable. The specific conductivity of ground water in the district varies from 70-140 micromhos/cm at 25°C. As per Willcox EC classification of ground water is as follows:

Willcox classification	EC value range micromhos/cm at 25°C	No. of samples
Excellent	< 250	27
Good	250 – 750	Nil
Permissible	750 – 2000	Nil
Doubtful	2000 – 3000	Nil
Unsuitable	> 3000	Nil

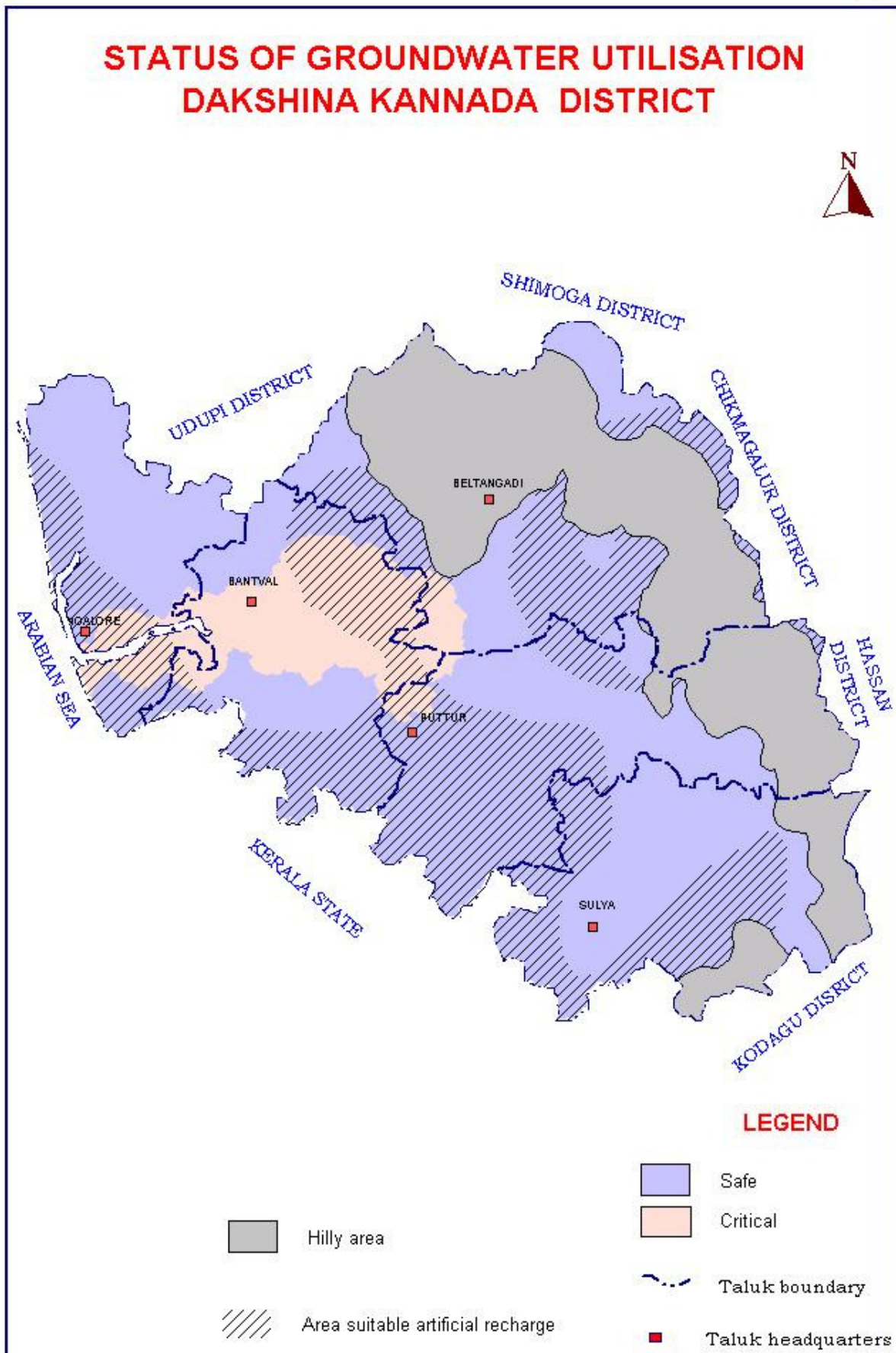
Fig- 6



Talukwise groundwater resource (as on March 2004) Dakshina Kannada district.

TALUK	TOTAL ANNUAL GROUND WATER RECHARGE	NET ANNUAL GROUND WATER AVAILABILITY	EXISTING GROSS GROUND WATER DRAFT FOR IRRIGATION	EXISTING GROSS GROUND WATER DRAFT FOR DOMESTIC AND INDUSTRIAL WATER SUPPLY	EXISTING GROSS GROUND WATER DRAFT FOR ALL USES	ALLOCATION FOR DOMESTIC AND INDUSTRIAL USE FOR NEXT 25 YEARS	NET GROUND WATER AVAILABILITY FOR FUTURE IRRIGATION DEVELOPMENT	AVERAGE CROP WATER REQUIREMENT	BALANCE GROUND WATER IRRIGATION POTENTIAL AVAILABLE	STAGE OF DEVELOPMENT AS ON MARCH 2004	SAFE AREA	SEMI-CRITICAL AREA	CRITICAL AREA	OVER-EXPLOITED AREA
	HAM	HAM	HAM	HAM	HAM	HAM	HAM	(m)	Ha	(%)	(%)	(%)	(%)	(%)
Bantwal	13308.34	12642.92	8674.97	1503.04	10178.01	2128.31	1843.77	0.82	2255.38	80.50	54	-	46	-
Belthangadi	13594.65	12914.92	5875.47	753.01	6628.48	1066.26	5973.75	0.81	7344.61	51.32	97	03		-
Mangalore	8492.78	8068.14	4502.31	732.60	5234.90	1037.36	2529.46	0.71	3568.71	64.88	82	-	18	
Puttur	11512.62	10936.99	5500.97	535.72	6036.69	758.58	4677.74	0.75	6225.92	55.20	98	-	2	-
Sulya	7441.17	7069.11	2987.97	223.72	3211.69	316.79	3764.35	0.66	5684.56	45.43	safe	-	-	-
Total	54349.56	51632.08	27541.69	3748.09	31289.77	5307.30	18789.07	-	25079.18	Av.59.5				

Fig-7



As per water sample analysis data of NHS -2003-2004, EC ranges maximum upto 310 micro mhos/cm at 25°C at Thalapady Station. Otherwise, in the district EC of ground water comes under less than 250 micro mhos/cm at 25°C, hence, it is categorised as excellent.

4.3.1 Suitability for irrigation use: Suitability of ground water occurring in the area was assessed based on the plotting of Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) on USSL diagram. The analysis of SAR data shows that all the well waters fall under low sodium hazard (S₁) class, such waters do not cause sodium hazard to any soil when used for irrigation. The majority of the well water fall under low salinity hazard (C₁) class, such waters can be safely used for all crops and soils having normal permeability. Villages like Sambila, Polali, Jeppu, and Kadri fall under medium to high salinity (C₂ and C₃) class; such waters may be used for medium to high salinity tolerant variety of crops and on soils having adequate permeability (Fig.6).

5.0 Groundwater Management Strategy

5.1 Groundwater Development: The average groundwater development of the district is 59.50%. The resource estimation reveals that the extent of development is the highest in Bantwal taluk (80.5%) and the least in Sulya taluk (45.43%). In others taluks it is 64.88 % in Mangalore taluk , 55.20% in Puttur taluk and 51.32% in Belthangadi taluk. Net ground water availability for future irrigation development as on March, 2004 in Bantwal taluk is 4209.02 ha.m., Belthangadi taluk is 7611.89 ha.m., Mangalore taluk is 4034.68 ha.m, Puttur taluk is 5461.74 ha.m and Sulya taluk 2551.90 ha.m.

Categorisation: which is based on stage of groundwater development as well as long-term trend of ground water level indicates that except the Bantwal taluk, the entire Sulya taluk and major parts of Puttur (98%), Belthangadi (97%) and Mangalore are in SAFE category. In these areas groundwater development is on a low-key and hence enough scope exists further groundwater development. of level of development. 3 % of the geographical area of Belthangadi taluk is in Semi-Critical category where groundwater development is to made cautiously. About 46% of Bantwal taluk, 18 % of Mangalore taluk and 2% of Puttur taluk areas are in Critical category where there is no much scope for development and groundwater regime is to be closely monitored. In these areas, resource augmentation measures are to be implemented (Fig.7).

5.2 Water conservation and Artificial Recharge:

The average rainfall of the district is 3789 mm and average rainy days are 126. The average groundwater development is nearly 60%. In spite of copious rainfall, during summer season many parts of the district face acute scarcity of water due to highly undulating nature of the terrain and unfavourable sub-surface conditions. However, there is scope for arresting the sub-surface flow at suitable locations through the construction of sub-surface dams. The surface runoff can also be arrested

by constructing check dams, vented dams etc throughout the district at appropriate places. This can assure availability of water during peak requirement period. Such measures are necessary in areas of Bantwal and Mangalore taluks which are categorised as **critical**. Insitu Rainwater Harvesting can provide a solution to seasonal water - scarcity areas and saline water affected areas of coastal stretch.

6.0 Groundwater related issues and problems

The district receives more than 3000 mm rainfall annually. However, inspite of a good amount of rainfall, there are certain problems which need a proper water management strategy. The major problems are i). Flooding and coastal erosion ii). Salinity ingress of coastal aquifers and Inland salinity along river course. iii). Water logging

Flooding and coastal erosion: is the problem in the coastal tract and adjacent the major rivers like Netravati and Gurupur rivers due to incessant rains. The problem worsens during high tide time. Though a complete solution is not possible, construction of a series of checkdams across the rivers and coastal erosion measures along the coast can alleviate this problem during medium intensity rainfall.

Salinity ingress of coastal aquifers : Salinity ingress of coastal aquifers and the inland salinity problem along the major river sides mainly during summer months when seaward fresh water flow in the rivers dwindle are prevalent on a minor scale. To check the movement of saline water ingress inland through river and protect the groundwater. Construction of dams across rivers and streams can reduce the problem. Dams are constructed at many locations already in the area.

Water logging: The observation well data of CGWB for May 2006 and November 2006 reveals that, there are very few areas of limited extent which have depth to water level with in 2 mbgl. However, in the coastal tract and along the main rivers groundwater lies within 2 to 5mbgl which can be considered to be 'prone for water logging'.

The NHS water level data of CGWB collected during pre-monsoon indicates water level between 2 to 5 mbgl in the coastal plains and alongside the river in Mangalore and Bantwal taluks. Such water logging prone areas are found indifferent talus at topographic lows. Proper drainage and exploitation of groundwater will help in improving the situation.

7.0 Awareness and Training Activity:

7.1 Mass Awareness Programme & Water Management:

Training Programme: One 'Mass Awareness Programme' was conducted in Mangalore during 2001. Lectures on rainwater harvesting and artificial recharge to ground water were given and brochures are distributed.

7.2 Participation in Exhibition, Mela, Fair etc: Nil

7.3 Presentation and Lectures delivered in public forum, Radio/ TV, Institute of repute/ Grassroot associations/ Academic institutions etc; Nil

8.0 Areas Notified by CGWA/SGWA : No area is notified either by CGWA or SGWA.

9.0 Recommendations:

After analyzing the present groundwater scenario in Dakshina Kannada district, the following recommendations are made to develop and manage ground water on sustainable basis in different parts of the district.

- a) Dugwells which are currently in use in the high groundwater development areas may be further deepened to tap more saturated part of the phreatic aquifer and increase the yield.
- b) Pinpointing of sites for wells and borewells in feasible areas should be tried after taking up scientific investigations. Otherwise, farmers have to suffer heavy financial burden in case of failures of wells.
- c) In water-logging prone areas, conjunctive use of surface and groundwater should be practiced. Withdrawing more groundwater through dugwells and shallow borewells reduces the water-logging problem in the command area by declining the groundwater level.
- d) Water use efficiency should be achieved by adopting water economy methods like drip irrigation and sprinkler irrigation in a large way in irrigated agriculture to save water.
- e) Insitu rainwater harvesting in the villages where ground water carries excess nitrate content, salinity affected coastal stretches and water scarcity prone hilly areas will offer a solution for drinking water problem.
- f) Artificial recharge measures like checkdams, percolation tanks, point recharge structures should be implemented on extensive scale especially in Critical areas (especially Bantwal taluk). Suitable artificial recharge structures should be constructed in different terrains which will arrest and store the run-off in rainy season which will otherwise goes waste. This stored water will recharge groundwater and will helping arresting soil erosion and also flood control.
- g) Rejuvenation of existing MI tanks by de-silting would enhance their storage and percolation capacities.
- h) Institutional financial assistance should be provided to poor farmers for deepening of dugwells and for new borewells. Incentives should be given for those who are interested in implementing Rain Water Harvesting schemes and construction of different Artificial Recharge Structures.