



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  
KOLAR DISTRICT, KARNATAKA**



**SOUTH WESTERN REGION  
BANGALORE  
August 2012**

डॉ. एस. सी. धीमान

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### Foreword

Groundwater is an essential component of the environment and economy. It sustains the flow in our rivers and plays an important role in maintaining the fragile ecosystems. The groundwater dependence of agrarian states like Karnataka is high. Recent studies indicate that 26 percent of the area of Karnataka State is under over exploited category and number of blocks is under critical category. In view of the growing concerns of sustainability of ground water sources, immediate attention is required to augment groundwater resources in stressed areas. Irrigated agriculture in the state is putting additional stress on the groundwater system and needs proper management of the resources.

Central Ground Water Board is providing all technical input for effective management of ground water resources in the state. The groundwater scenario compiled on administrative divisions gives a better perspective for planning various ground water management measures by local administrative bodies. With this objective, Central Ground Water Board is publishing the revised groundwater information booklet for all the districts of the state.

I do appreciate the efforts of Dr. K.Md.Najeeb, Regional Director and his fleet of dedicated Scientists of South Western Region, Bangalore for bringing out this booklet. I am sure these brochures will provide a portrait of the groundwater resources in each district for planning effective management measures by the administrators, planners and the stake holders.

**Dr. S. C. Dhiman**

## **PREFACE**

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, vulnerability area 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 30 districts of Karnataka state, incorporating the data up to the period 2011-12.

The Kolar 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 B.K.Kallapur, Scientist-D, Central Ground Water Board, South Western Region, Bangalore. The figures were prepared by Sri. J. Sivaramakrishnan, Assistant Hydrogeologist. The rainfall data provided by Shri H.P.Jayaprakash Scientist-C. 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, academicians, hydrogeologists and engineers to plan and manage the water resources in a better way in the district.

sd/-

**(Dr. K.Md.Najeeb)**  
**Regional Director**

## KOLAR DISTRICT AT A GLANCE

SL NO	ITEM	STATISTICS
<b>I</b>	<b>GENERAL INFORMATION</b>	
	i) Geographical Area	3969 Sq. Km
	ii) Administrative Divisions	Kolar
	No. Of Taluks :	5
	No of Panchayats/villages	156 /1797
	iii) Population (as per 2011 census)	15.40 lakhs Density 384 persons/sq.km
	iv) Average annual Rainfall	748 mm
2	<b>GEOMORPHOLOGY</b>	
	Major physiographic units	2
	Major Drainages	3
3	<b>LAND USE</b>	
	a) Forest Area (sq.km)	206.20
	b) Net Area Sown (sq.km)	1728.61
4	<b>MAJOR SOIL TYPES</b>	
		1. Red Loamy 2. Red Sandy 3. Mixed Red
5	<b>AREA UNDER PRINCIPAL CROPS (2010-11)in ha.</b>	
	Ragi	60690
	Paddy	5560
	Maize	1041
	Oil seeds	11207
	Pulses	12568
	Fruits	36098
	Vegetables	15706
6	<b>IRRIGATION BY DIFFERENT SOURCES (ha) (2010-11)</b>	
	Dug wells	-
	Bore wells	31090
	Tanks	00
	Canals	00
	Other Sources	0.0
	Lift Irrigation	00
	Net Area Irrigated	2007.03
7	<b>No .of Ground Water structures</b>	
	Domestic BW	3554
	Piped water supply	711
8	<b>NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.03.2012)</b>	
	Dug wells	42, Abandoned- 24
	Piezometers	18.

9	<b>PREDOMINANT GEOLOGICAL FORMATIONS</b>	Peninsular Gneissic complex (Granites, Gneisses and Kolar schist( Horn blende schist and Amphibolite schist )
10	<b>HYDROGEOLOGY</b>	
	Major water bearing formations	Weathered and fractured Granite Gneisses and schists,
	Premonsoon Depth to water level (2011)	0.47 to 19.89 mbgl (NHS OB Dugwells ) 0.15 to 67.98 mbgl (pz )
	Postmonsoon Depth to water level (2011)	0.87 to 19.89 mbgl NHS OB Dugwells 0.64 to 45.66 mbgl (pz )
	Long term water level trend (2002-2011) in m per year	62% falling trend -0.002 m to 3.477 m 38 % show rising decadel trend ranging from 0.006 m to 2.62 m
11	<b>GROUND WATER EXPLORATION BY CGWB AS ON MARCH 2012</b>	
	EW (Depth Range /Discharge range) 44	Depth -30 -500.70 m Discharge -0.5 to 15 lps
	OW(Depth Range /Discharge range) 21	Depth 30- 271.66 m Discharge -0.5- 11 lps
	PZ(Depth Range /Discharge range) 20	Depth 24.51 to 90 m Discharge -0.01 to 1.75 lps
	SH (Depth Range /Discharge range)	Nil
	Total	85
	Transmissivity (m <sup>2</sup> /day)	0.10 to 290
12	<b>GROUND WATER QUALITY</b>	
	Presence of chemical constituents more than permissible limits	Fluoride,
	Type of water	Potable in general
13	<b>DYNAMIC GROUND WATER RESOURCES (2009) IN HAM</b>	
	Annual replenishable ground water resource	29144
	Net annual ground draft	52635
	Projected demand for Domestic and Industrial use up to 2025	3234
	Stage of ground water Development (%)	180 %
14	<b>MASS AWARENWSS PROGRAMME ORGANISED</b>	
	Date	14.9.06-
	Place	Bangarpet
	No. of people participated	300
15	<b>WATER MANAGEMENT TRAINING PROGRAMMES ORGANISED</b>	12.9.06 &13.9.06- Kolar No of participants-40

16	<b>EFFORTS OF ARTIFICIAL RECHARGE AND RAINWATER HEAVING</b>	Centrally sponsored schemes in Malur and Mulbagl taluks Demonstrative artificial recharge projects
17	<b>GROUND WATER CONTROL AND REGULATION</b> No of OE Blocks	NOT NOTIFIED  5
18	<b>MAJOR GROUND WATER PROBLEMS AND ISSUES</b>	Water level depletion 80 % of the stations indicate phreatic zone dried up. Highest borewells in the state resulted in withdrawal of static reserve and ground water mining. And yield dwindling in all 5 taluks over exploited with overall 180 % ground water development. High concentration of fluoride at few pockets in the district.

# KOLAR DISTRICT

## 1.0 INTRODUCTION :

On 10<sup>th</sup> September 2007, the present Kolar district was formed by dividing the old Kolar district into Kolar and Chikballapur districts. The present Kolar district is the eastern gateway to Karnataka. It is famous for erstwhile Kolar Goldmines. It is a landlocked district and has a hard rock terrain of Karnataka in the maiden (plain) region and covers an area of 3639 sq.km. The district lies almost in the central part of peninsular India, which has immense bearing on its geoclimatic conditions. This district experiences tropical climate throughout the year, Kolar district owes its prosperity and development to the existence of ancient tanks. There are 2980 tanks which are the highest number in the state. The main occupation of people is agriculture. In the absence of surface water irrigation system ground water is the main source of irrigation. The district has about 29936 borewells which is also the highest in the state.

### 1.1 Location:

Kolar district lies between North latitude 12° 45' 54" to 13° 35' 47" and East Longitude 77° 50' 29" to 78° 35' 18". It is bounded by Bangalore and Tumkur districts on the west, Chikballapur district on north-west, Ananthpur district of Andhra Pradesh on the north, Chittoor district on the east and on the south by North Arcot and Dharmapuri districts of Tamil Nadu. The district is famous for gold exploitation at Kolar Gold Fields. Administratively the district is divided into 5 taluks, 27 hoblies, 156 gram- panchayats and 1797 villages. The population as per the 2001 census is 1387062 and the density of population is 348 per sq.km.

### 1.2: Administrative setup & Approachability:

Total geographical area of the district is 3639 sq.km. The district is divided into 5 taluks i.e. Kolar, Bangarpet, Malur, Mulbagal and Srinivasapur. The district is well connected by highways and rail. The NH-4 from Chennai to Bombay passes through this district via Mulbagal and Kolar towns. The south central railway connecting Bangalore to Chennai passes through the southern part of the district via Bangarpet and Malur towns. The administrative setup is shown in Fig -1

### 1.3 Demographic features:

The total population in the district is around 15.40 lakhs (as per 2011 census) with population density of 384 persons/sq. km. The rural population constitutes 10.57 lakhs and urban population constitutes 4.83 lakhs. The scheduled caste population constitutes 3.96 lakhs and the scheduled tribe population constitutes 68133 (as per 2001 census). The sex ratio in the district is 976 females for every 1000 males.

### 1.4 Basin and Drainage:

There are no perennial rivers in Kolar district. The district is drained by three river basins namely Palar, Ponnaiar, North Pennar (North pinakani), and South Pennar (South Pinakani). All these rivers and their tributaries are small and carry water only during rainy season. The drainage map of the district is given in Fig -2

Fig-1

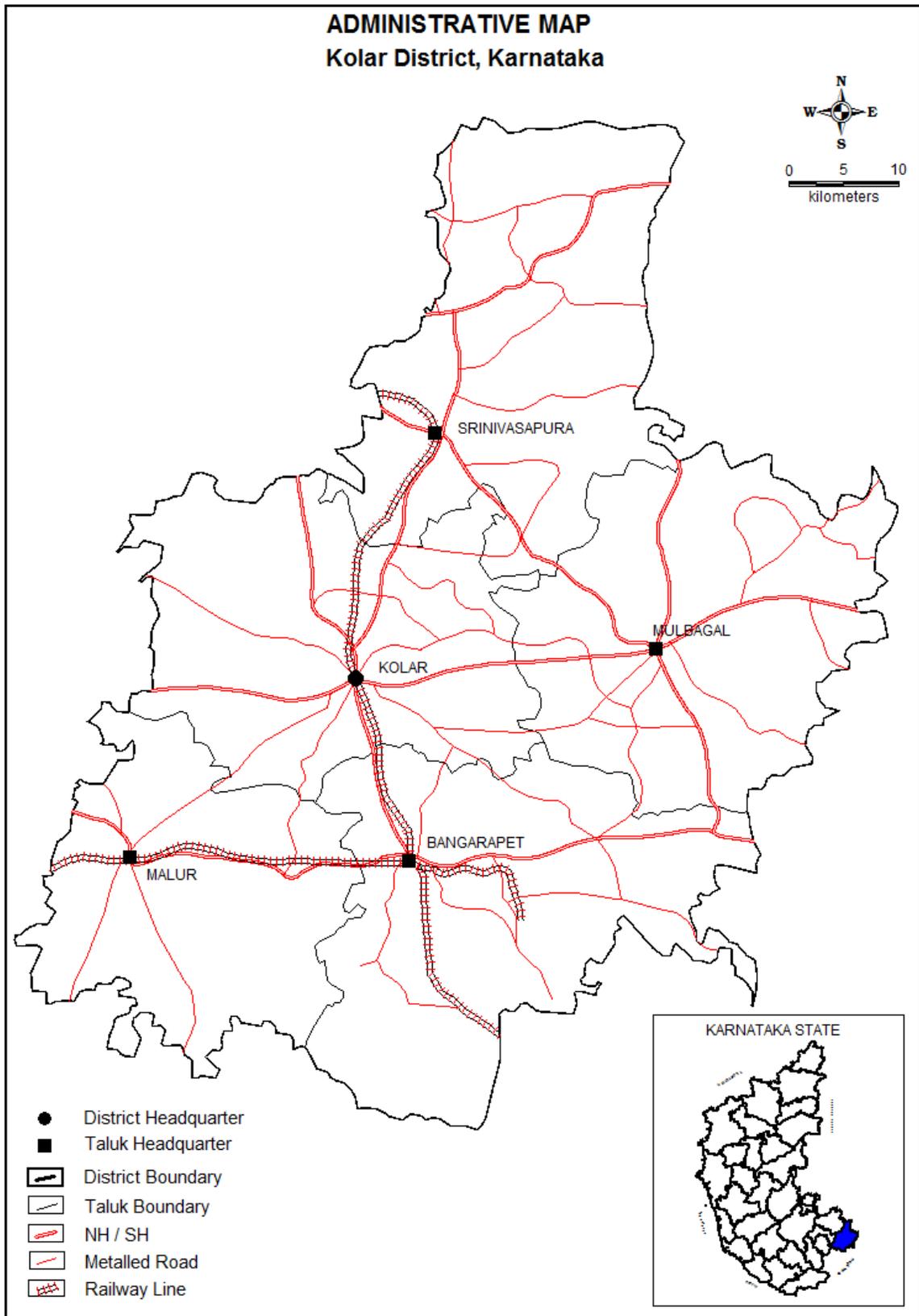
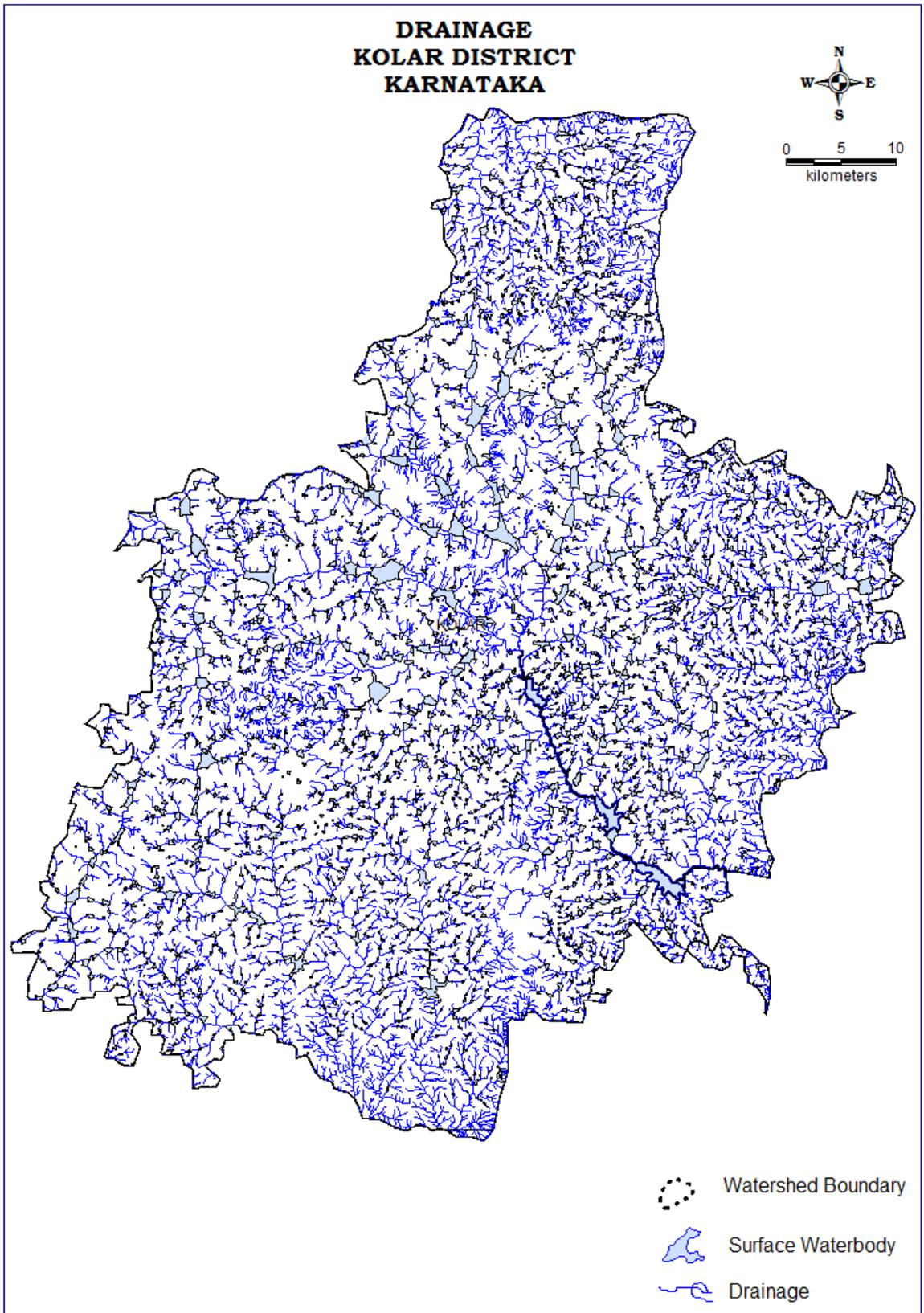


Fig-2



### **1.5 Land use pattern**

5% of the total area of the district is covered by forest and 46 % under cultivation. 28% of the area is uncultivated (2010-11). Area sown more than once in the district forms 2% of the total area of the district.

### **1.6 Agriculture and Irrigation practices :**

The predominant crops grown are finger millet, groundnut and pulses. Finger millet occupies about 45% of the total cultivated area. The important irrigated crops are paddy, mulberry, sugarcane, potato and other vegetables. The important commercial fruit crops grown are mango and grapes. The area irrigated by wells constitutes 99% of the total irrigated area. Dug well irrigation practice is largely replaced by bore-well irrigation. Irrigation is being practiced both in the valley as well as in upland areas.

### **1.7 Studies carried out by CGWB :**

Systematic and Reappraisal hydrogeological surveys were carried out in Kolar district during different field season programmes from 1984 to 2006. phase-I of Exploratory drilling was carried out during 1996-1998 of maximum depth of 300.69 mts and phase- II of deep exploratory drilling commenced during 2004 of 500 mts rig capacity for the first time in hard rock terrain and exploratory drilling was completed in 2008-09. A demonstrative project on artificial recharge and rain water harvesting in parts of Malur taluk, Kolar District is in progress.

## **2.0 RAINFALL AND CLIMATE:**

Kolar district falls in the Eastern dry agro climatic Zone. It experiences a semi-arid climate, characterized by typical monsoon tropical weather with hot summers and mild winters. The year is normally divided into four seasons. They are; a) dry season during Jan-Feb, b) Premonsoon season during Mar-May, c) Southwest Monsoon season during Jun-Sep and d) Post or Northeast monsoon season during Oct-Dec.

Based on rainfall data pertaining to the district, there are 5 rain gauge stations in each of the 5 taluks. Normal annual rainfall ranges from around 799 mm at Bangarpet to around 857 mm at Kolar averaging 748 mm for the district. The rain fall reordered for 2011 is 684 mm.

The southwest monsoon contributes around 55 percent of the annual rainfall. The other monsoon (NE) yields around 30 percent. The balance of around 15 percent results from the premonsoon. September and October are the wettest months with over 100mm monthly rainfall. Thunderstorms are common during the month of May. The post monsoon season often gets copious rains due to passing depressions.

On annual basis the variability coefficient are less than 30 percent indicating consistent rainfall. On seasonal basis dry season rainfall is most inconsistent where as the monsoon rainfall is least inconsistent. On a monthly basis the inconsistencies are more pronounced indicated by high coefficients of variability. The lowest annual rainfall recorded in the district is around 412 mm during 2006 at Malur station while the highest is over 1565 mm during 2005 at Bangarpeth station as per the rainfall record of last 10 years.

There is one meteorological observatory at KGF, which has long term records. The one at Kolar is of recent origin. Normally April and May are hottest months with temperatures as high as 40° C. They are generally lowest during December being as low as 10°C. Potential evapotranspiration is around 1550mm annually ranging from 170mm in Apr-May period to less than 100mm during Nov–Dec period.

### **3.0 GEOMORPHOLOGY AND SOILS:**

The topography of the district is undulating to plain. The northern and eastern parts of the district forming the valley of Palar Basin, are well cultivated. The general elevation varies from 849 to 1130 m above mean sea level

The soils of Kolar district occur on different landforms such as hills, ridges, pediments, plains and valleys. The types of soils distributed range from red loamy soil to red sandy soil and lateritic soil. Of the total area, about 73% is suitable for agriculture and horticulture; about 3% for forestry, pasture and the remaining area is suitable for quarrying, mining and as habitat for wildlife.

### **4.0 GROUND WATER SCENARIO:**

#### **4.1 Hydrogeology :**

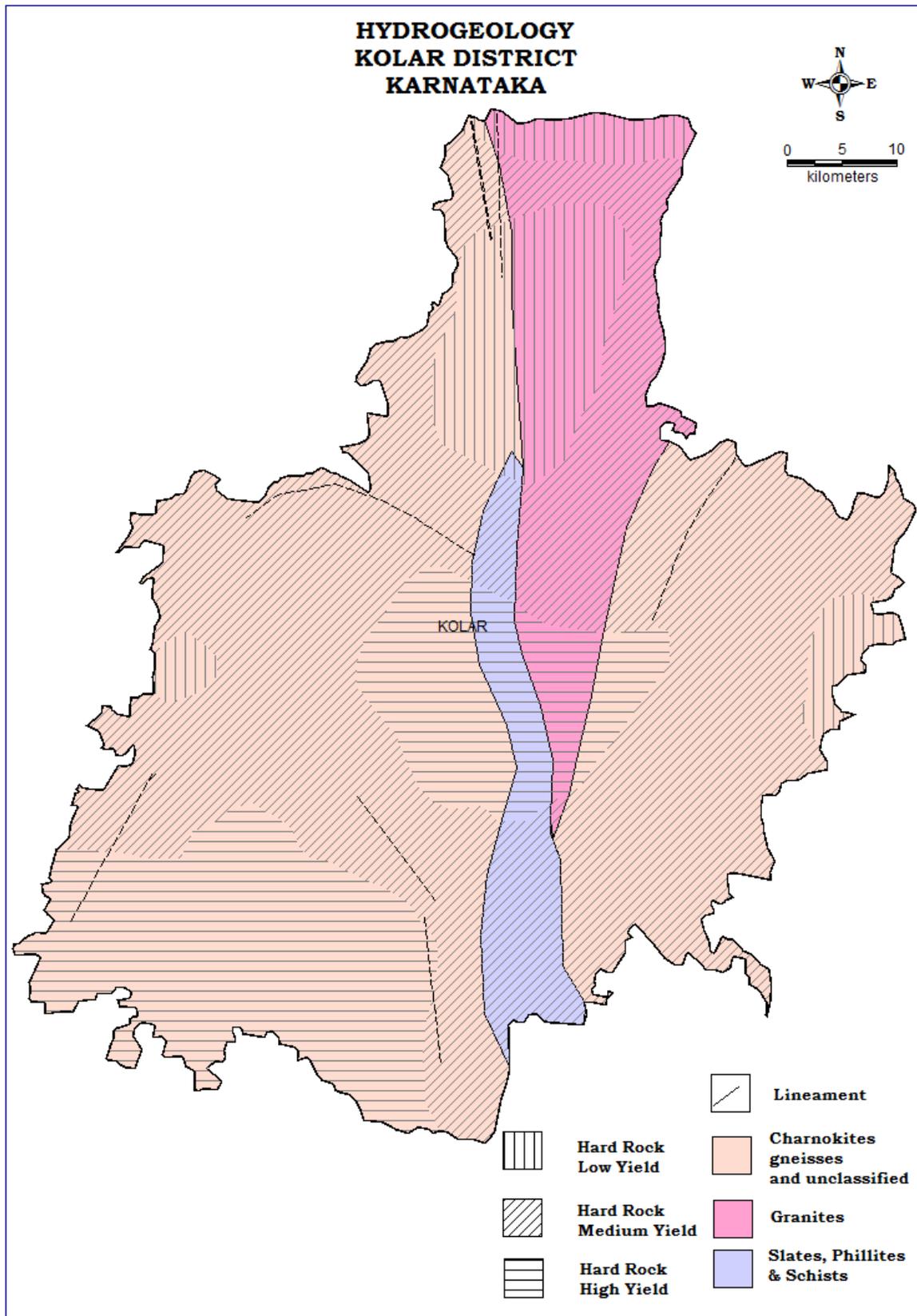
Granites, gneisses, schists, laterites and alluvium underlie the district. Basic dykes intrude the above formations at places. Granites and gneisses occupy major portion of the district. Schists are mostly confined to two places - around Kolar Gold Fields and in the northwestern part of Gauribidanur taluk. Laterites occupy small portions in Kolar, and Srinivaspura taluks. Alluvium is confined to river courses. Fractures or lineaments occupy well-defined structural valleys and majority of them trend NE-SW.

The occurrence and movement of ground water is controlled by weathered zone and fractures and fissures that exist in hard rocks. In the district, ground water occurs in phreatic and semi-confined to confined conditions. It also occurs in alluvium under water table conditions. The weathered thickness varies from 6 to 18 m in the majority of the area. The depth of water level in piezometer generally ranges from 12 to 49 mbgl. The ground water levels are essentially controlled by physiographic features and rainfall distribution. The appreciable change in ground water levels was noticed close to over exploitation areas, where local troughs are observed. The hydrogeology map of the district is given in Fig - 3

Mode of ground water extraction is through borewells. Among the abstraction structures, borewells are predominant. The yield of borewells in hard rock varies generally from 15 to 200 m<sup>3</sup>/day. The depth of irrigation borewells range in depth from 100 to 300 mbgl and the yield of borewells ranges from 0.5 to 20 m<sup>3</sup>/hour.

Semi-confined to confined aquifer is formed due to fractures in hard rock formations. This aquifer system is developed by bore wells ranging in depth up to 300m. Its yield ranges up to 1200m<sup>3</sup>/day, and specific yield ranges from 2 to 173 lpm/m.

Fig-3



### **Premonsoon water Level (2011)**

Out of 42 NHS wells ( average depth 5-20 mts ) , 71 % wells have been dried up. As per the data available for 12 stations of phreatic aquifer i.e shallow zone for May 2011 premonsoon depth to water level varies from 0.99 mts (Narasapura, Kolar taluk) to 10.14 mts (Patana, Kolar taluk) .A generalised water level map of premonsoon is given as **Fig- 4** . In general, major part of the district comes under 2 - 5 m range except in few small pockets where less than 2 m and more than 5 m water levels were recorded . The water level recorded in Piezometer stations which represent semi confined aquifer have depth to water levels ranging even up to 44.95 m.

### **Post monsoon Depth to water level (2011):**

Post monsoon Depth to water level in NHS dug wells ranges from 0.93 mts (Narasapura, Kolar taluk) to 7.86 mts (Patana Kolar taluk ) . A generalized water level map of postmonsoon is given as **Fig - 5**. In general major part of the district comes under 2-5 m range and small parts of Srinivasapur show water levels in the range of 10-20 mbgl. The water water levels in piezometers range up to 44.79 m bgl.

### **Decadal Seasonal Fluctuation ((2001-2010) with 2011)**

The decadal seasonal fluctuation of mean water levels for May 2001 to 2010 when compared with water levels of May 2011 in major parts of the area range between -2 to + 4 m (**Fig -6**). The decadal seasonal fluctuation of mean water levels for Nov 2001 to 2010 compared with water levels of May 2011 in major parts of the area is more than 4 m (**Fig -7**).

### **Long term water level trend (2001-2011)**

Out of 42 observations wells long term premonsoon water level data is available only for 14 stations and the rising trend in 5 stations range between 0.012 m/year to 0.298 m /year. In remaining 9 stations the water levels are having falling trend ranging between 0.004 to 0,298 m/year.

The postmonsson water levels in 9 of the eighteen stations have rising trends in the range of 0.025 to 0.777 m/year and in remaining nine stations the postmonsoon water levels have declining water level trends in the range of 0.31 to 0.700 m/year.

### **Aquifer parameters/well parameters of unconfined aquifer:**

Specific capacity of dugwells ranges from 0.22 to 1.69 m<sup>3</sup>/min/m with unit area sp.capacity ranging from 0.357 to 47 l/m/m/m<sup>2</sup>.

### **Aquifer parameters of confined aquifers :**

Borewells drilled by CGWB under exploration programme have given a discharge ranging from 0.5 to 15 lps. The maximum depth drilled is 500.70 mbgl. Depth to water level and depth vary from 2 to 39 mbgl. Transmissivity ranges from 0.1 to 290 m<sup>2</sup>/day. Frequent fracture depth ranges encountered are 38 to 48, 58 to 62, 108 to 120 and 148 to 151, 200, 360-370 m . which indicate the presence of deep seated fractures.The locations of the CGWB borewell sites are shown as **Fig-8**.

The average annual unit draft of bore-wells for the district is 1.1 Ha.m. As per well census 2005-06 data the well density for the different taluks ranges from 5.30 (Shrinivasapura) to 10.78 wells/sq.km. (Malur). The average well density for the district works out to be 7.54 wells/sq.km.

Fig-4

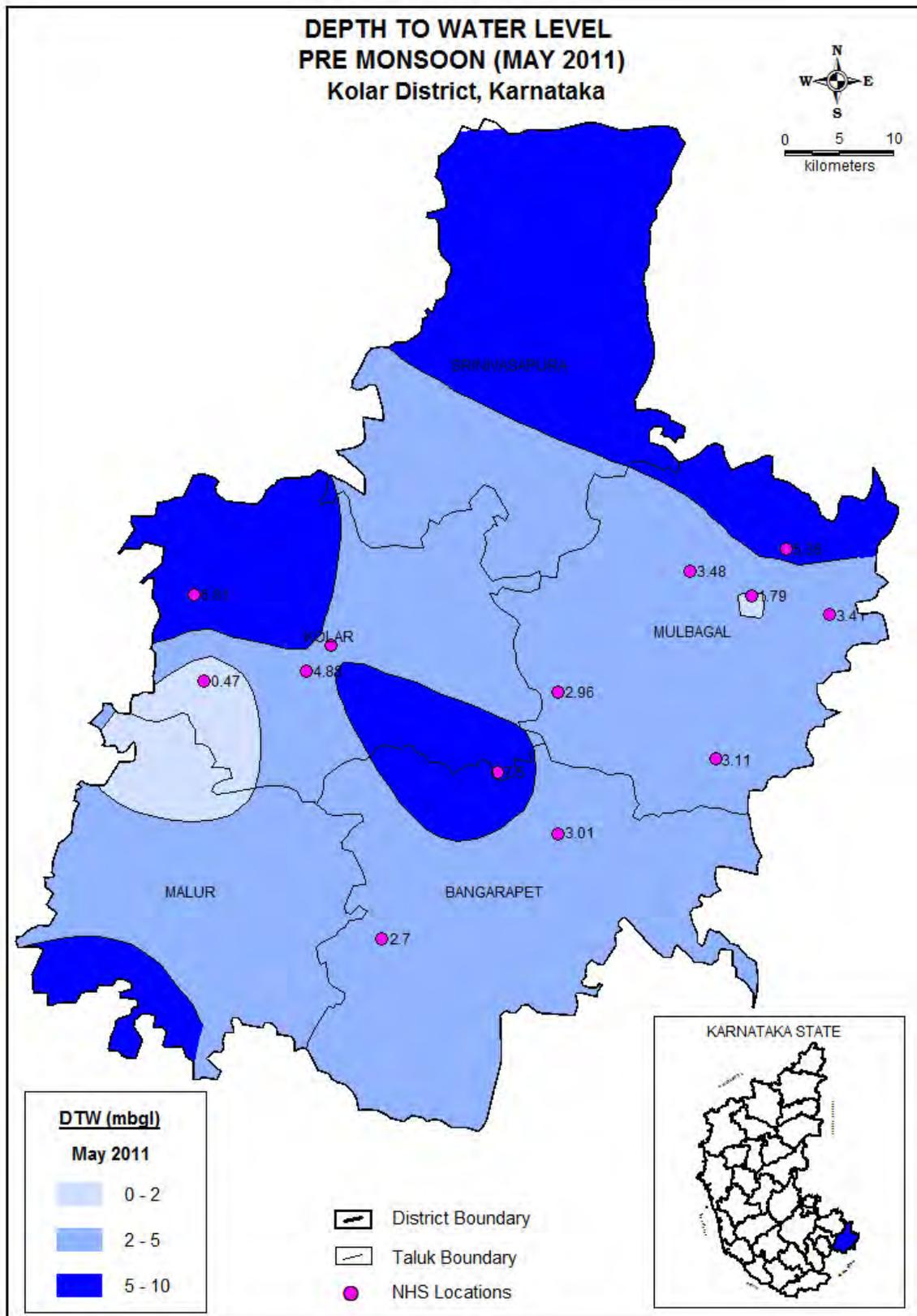


Fig 5

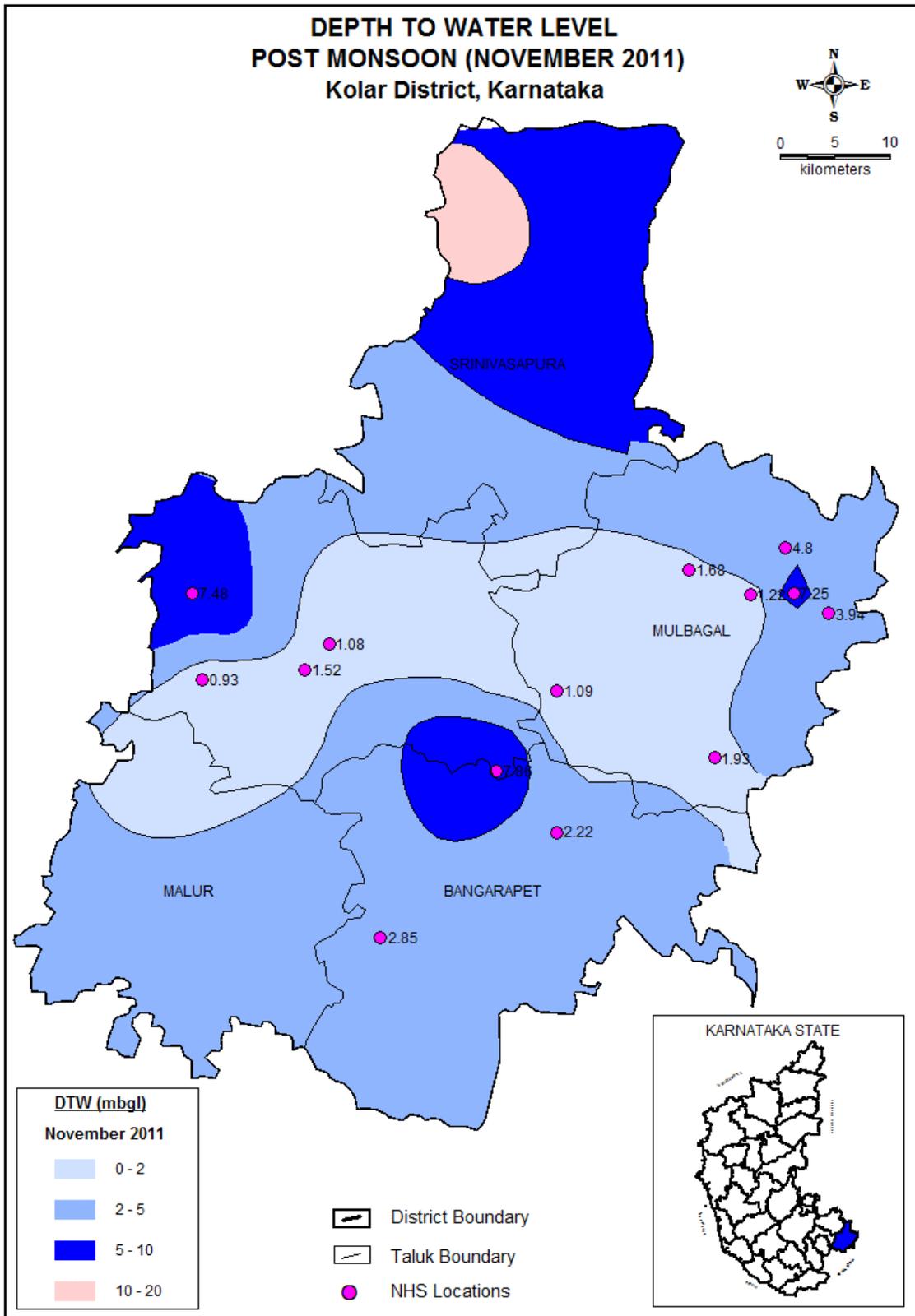


Fig 6

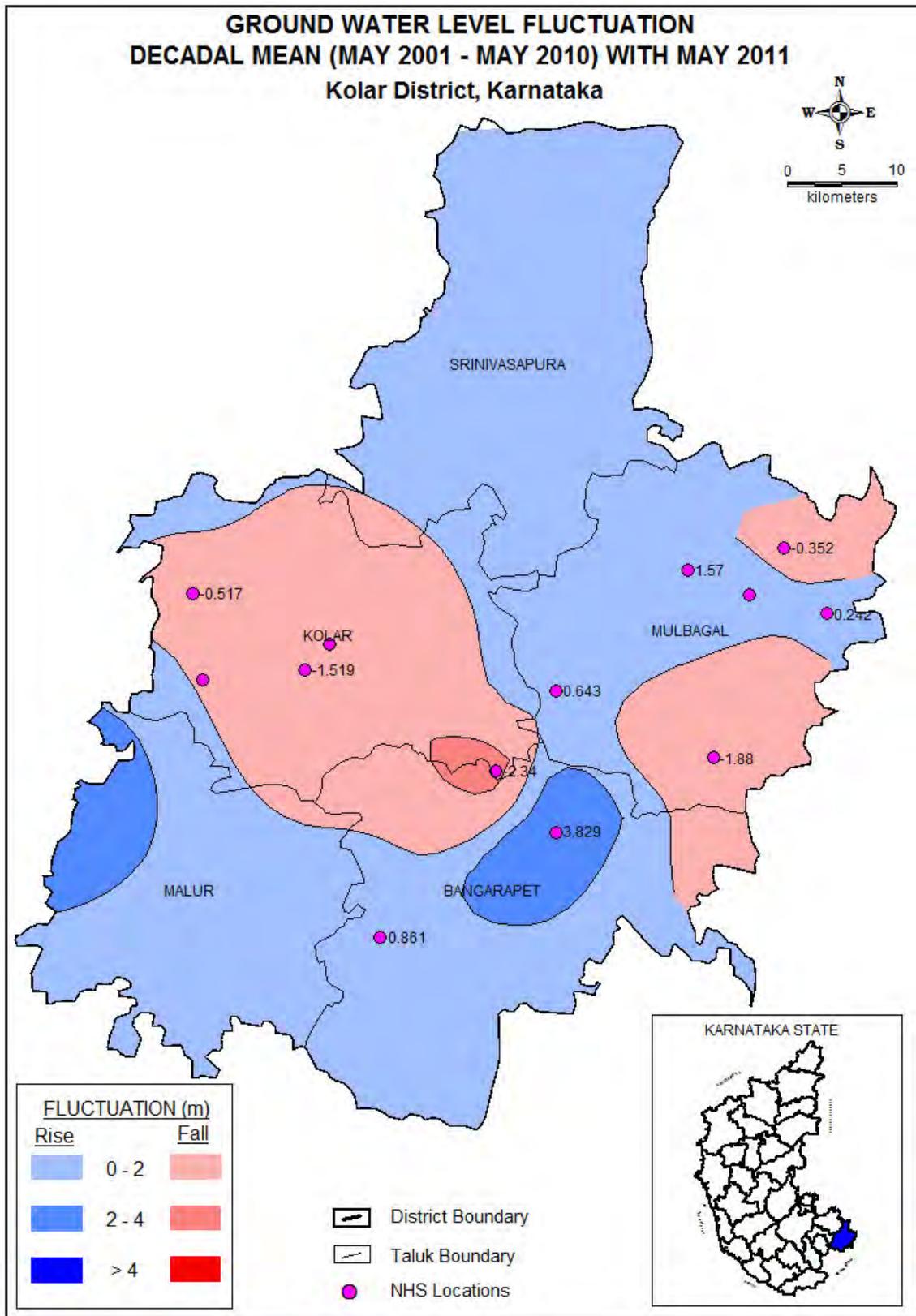


Fig 7

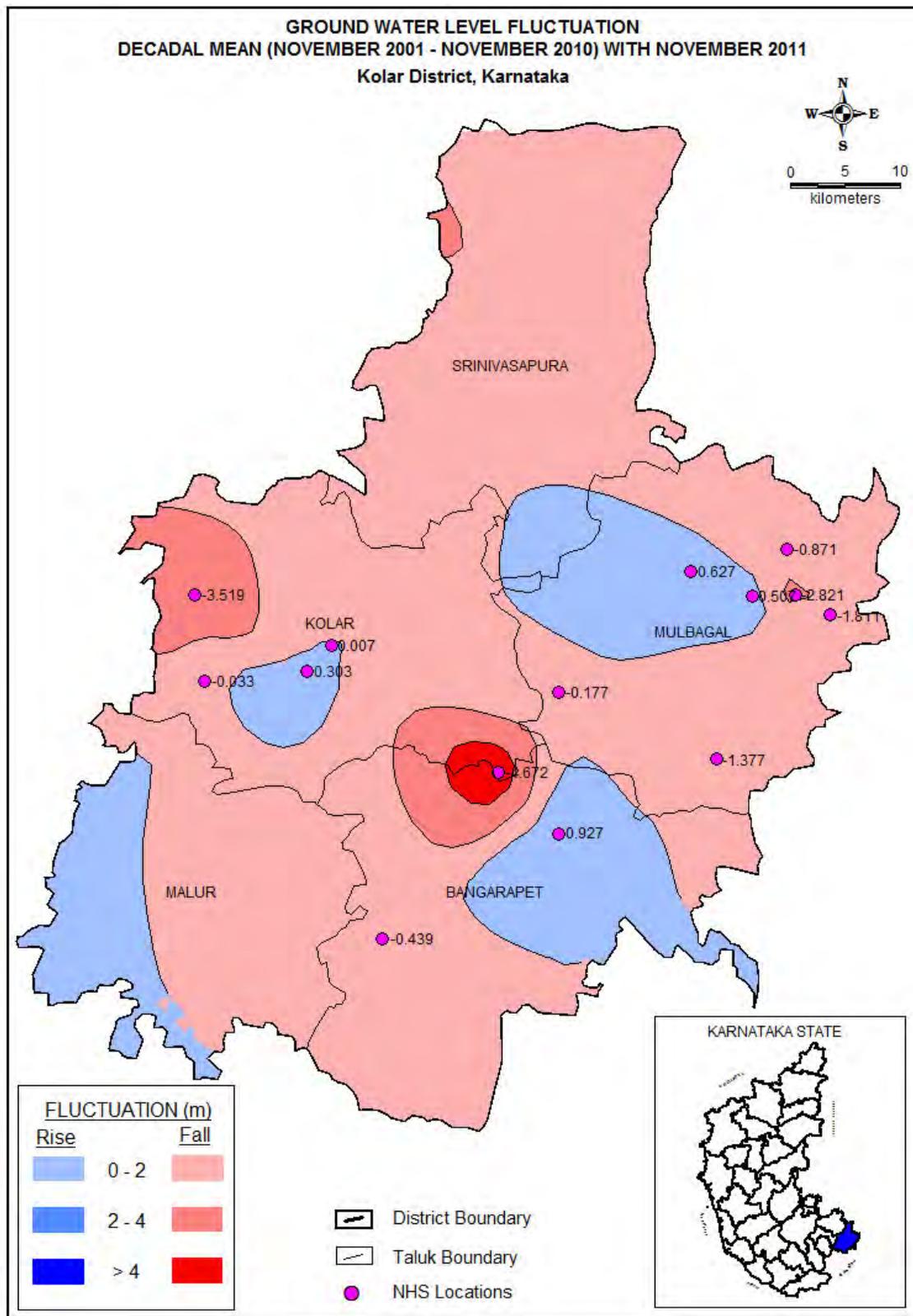
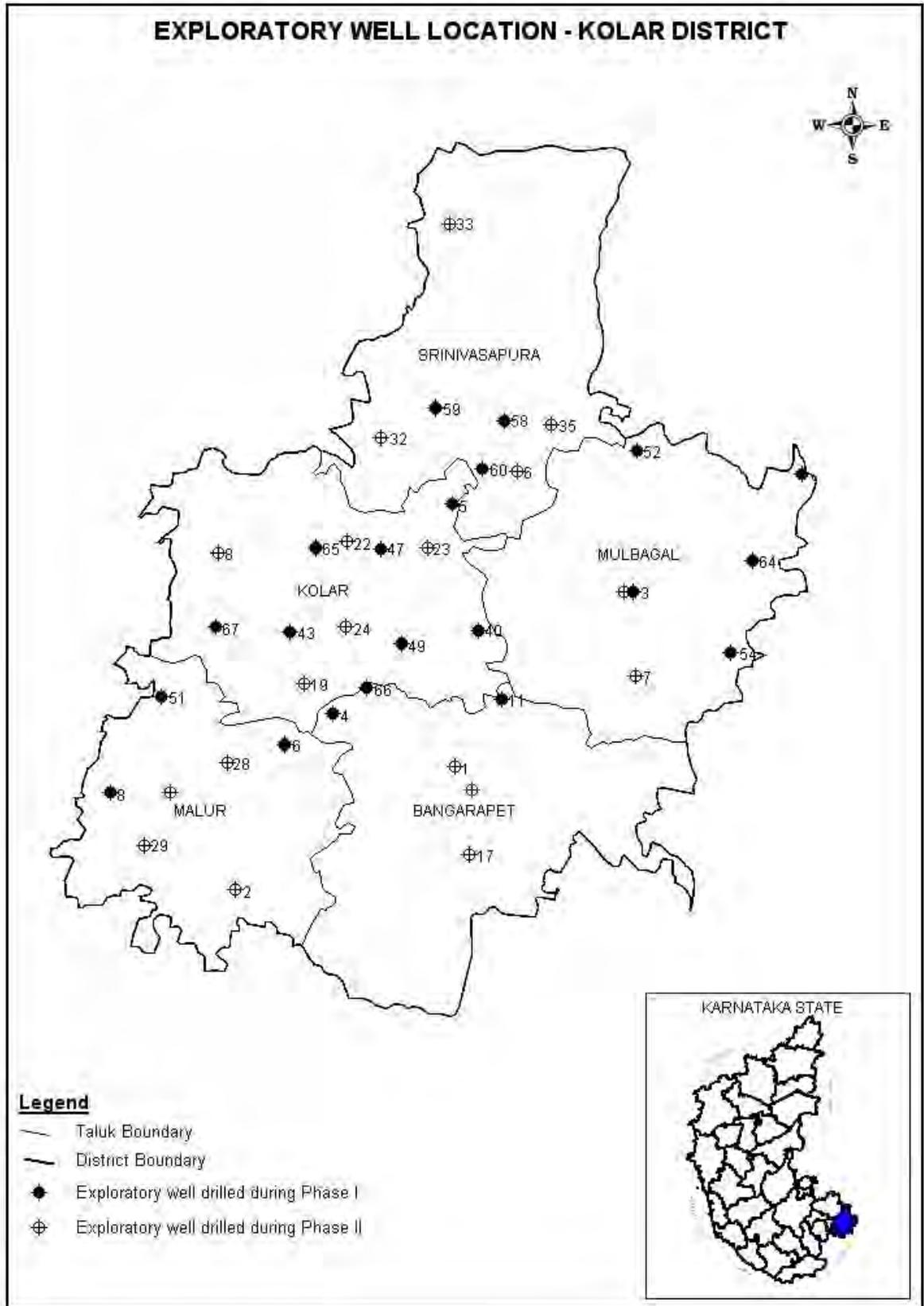


Fig 8



## 4.2 Ground water Resources:

Taluk-wise ground water resources, drafts, balance resources available and the category as on March 2009 are given in table –1.

Sl No	Taluk	Net Annual Ground water Availability (HAM)	Existing Ground water Draft for all uses (HAM)	Net Ground water Availability for future Irrigation Development (HAM)	Catagorisation based on Stage of Ground water Development (% area)			
					Safe	Semi-critical	Critical	Over Exploited
1	Bangarpet	4724	9975	0	-	-	-	100
2	Kolar	11053	18210	0	-	-	-	100
3	Malur	3844	7060	0	-	-	-	100
4	Mulbagal	4420	8895	0	-	-	-	100
5	Srinivaspur	5103	8495	0	-	-	-	100
6	<b>Total</b>	<b>29144</b>	<b>52635</b>	<b>0</b>				100

The net annual ground water availability of the district is 29144 Ham ,draft for all uses is 52635 ham and there is no water resources available for future irrigation development. All the 5 taluks are over exploited. Average stage of development is 180%. There is over draft of 23491 ham annually in the district. Taluk wise resources and categorization are given in table-1. The Unit Area annual Ground Water Recharge Map showing the very low unit area recharge for the district and status of Ground Water Utilisation map are presented as **Fig- 9 and Fig-10**.

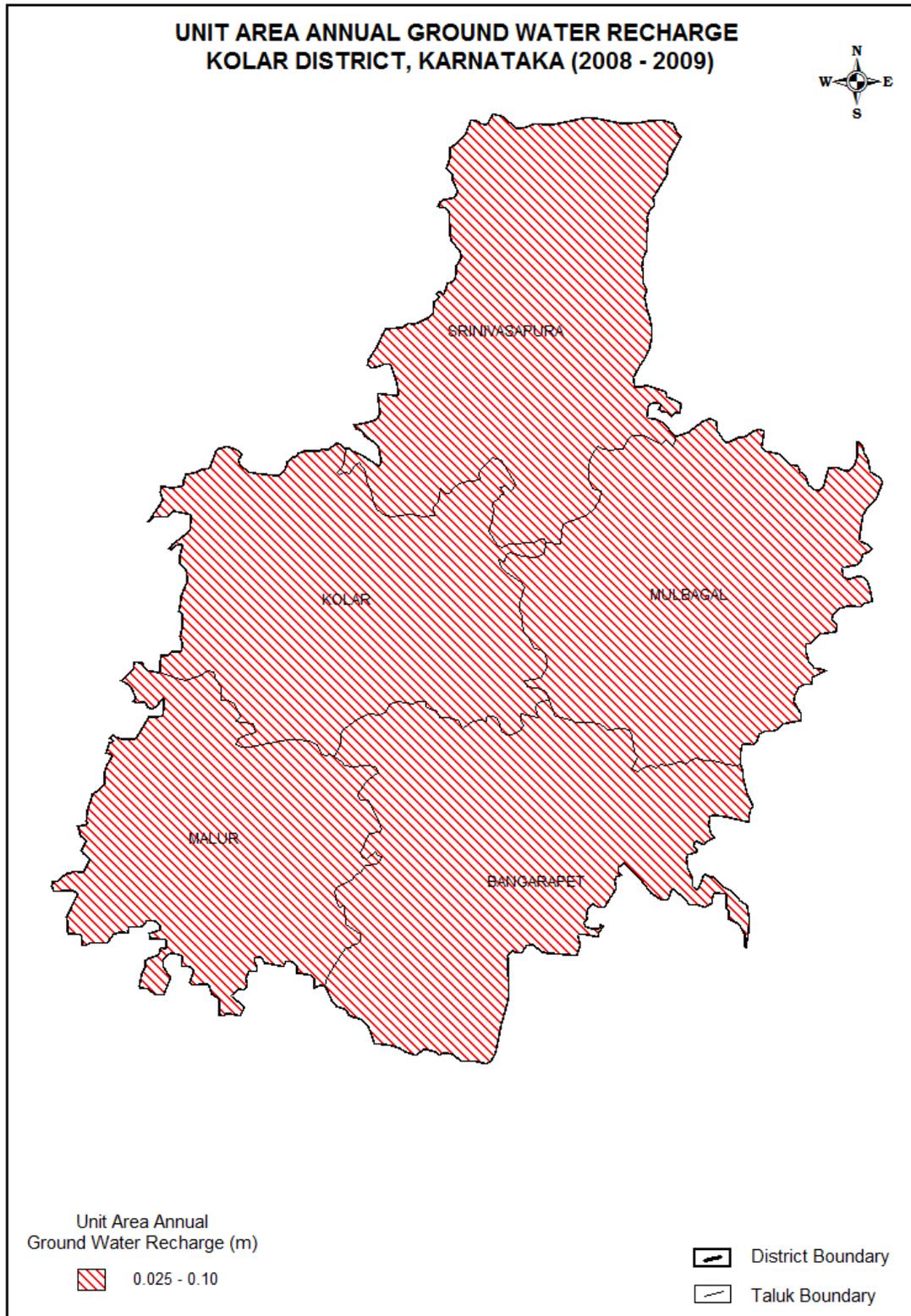
## 4.3 Ground Water Quality:

In general, the ground water is of acceptable quality for irrigation and domestic use. The pH value of ground water ranges from 7 to 8.67 indicating that the water is alkaline in nature. Fluoride concentration of more than 1.5 mg/l. is reported in pockets from most of the taluks. Nitrate concentration of more than 45 ppm is reported from parts of Mulbagal, Bangarpet and Malur taluks. A ground water vulnerability map showing distribution of excess Flouride, Nitrate and areas with intensive irrigation and over exploitation which are vulnerable for ground water contamination is presented as **Fig-11**.

## 4.4 Status of groundwater development :

Wells are the major source of irrigation in the district. There were 605 dug wells and 277730 bore wells in the district as per 3<sup>rd</sup> MI census. But as per 4<sup>th</sup> Minor irrigation census there are only 461 dug wells, but number bore wells have gone up to 29936 in the district. Taluk wise breakup of the wells is given in table 2.

Fig 9





**Table 2: Distribution of wells according to status as per MI Census 2005-06**

SI No	Taluk	Wells in Use		Wells dried up	
		Dug Wells	Shallow BW	Dug Wells	BW
1	Bangarpet	215	6599	42	98
2	Kolar	50	6181	0	23
3	Malur	91	6955	58	594
4	Mulbagal	89	5559	4	39
5	Srinivaspur	16	4642	0	19
<b>Total</b>		<b>461</b>	<b>29936</b>	<b>104</b>	<b>773</b>

## 5.0 GROUND WATER MANAGEMENT STRATEGY:

### 5.1 Ground Water Development

Ground water is developed both for the domestic and irrigation purposes. Almost the entire domestic water requirement for 13 lakh population and the live stock is met by ground water. As per MI census 2001, they are accounting for about 86% of the total wells in Karnataka. Well irrigation constitutes about 94% of total irrigation. As per 2010-11 data, there are altogether 711 piped water supply and 3454 domestic borewells in Kolar district which are wholly dependent on ground water. Even though Kolar district stands first in having the maximum number of irrigation tanks (2980 tanks) in Karnataka, their dependability for irrigation again depends upon rainfall conditions. Hence, ground water has a special significance for the all-round development of this water-starved district and plays a vital role in the development of this drought-prone area.

As per the ground water resource estimation, all taluks come under the over-exploited category as shown in Fig-10. There is no resource for further development in these taluks.

### 5.2 Water conversation and Artificial Recharge :

CGWB has carried out experimental artificial recharge studies under Central Sector Scheme in Gauribidanur and Mulbagal taluks during 1994-95 to 1998-99. Under this, desilting of two percolation tanks (at Erapothanahalli in Gauridibanur taluk and Manchiganahalli in Mulbagal taluk), watershed treatment in two areas (Basavapura, Gauribidanur taluk, and Bovibikkanahalli, Mulbagal taluk), gravity recharge experiments in two wellfields at Belchikkanahalli and Hussainpura, Gauribidanur taluk, and roof-top rain harvesting structure and point recharge studies at five locations in Hosur (2 Nos.) Baktharahalli & Sonaganahalli in Gauribidanur and Manchiganahalli in Mulbagal taluk were experimented. The above studies have shown favourable results in building up storage in the area to the tune of 3 to 7 m. and resulted in an improvement in the productivity of irrigation borewells. In the district all the area is suitable for artificial recharge schemes as shown **Fig-12**. In the district as many as 16 subsurface dams, 532 percolation tanks, 3150 Chek dams and 142 point recharge structures are feasible.

Fig.11

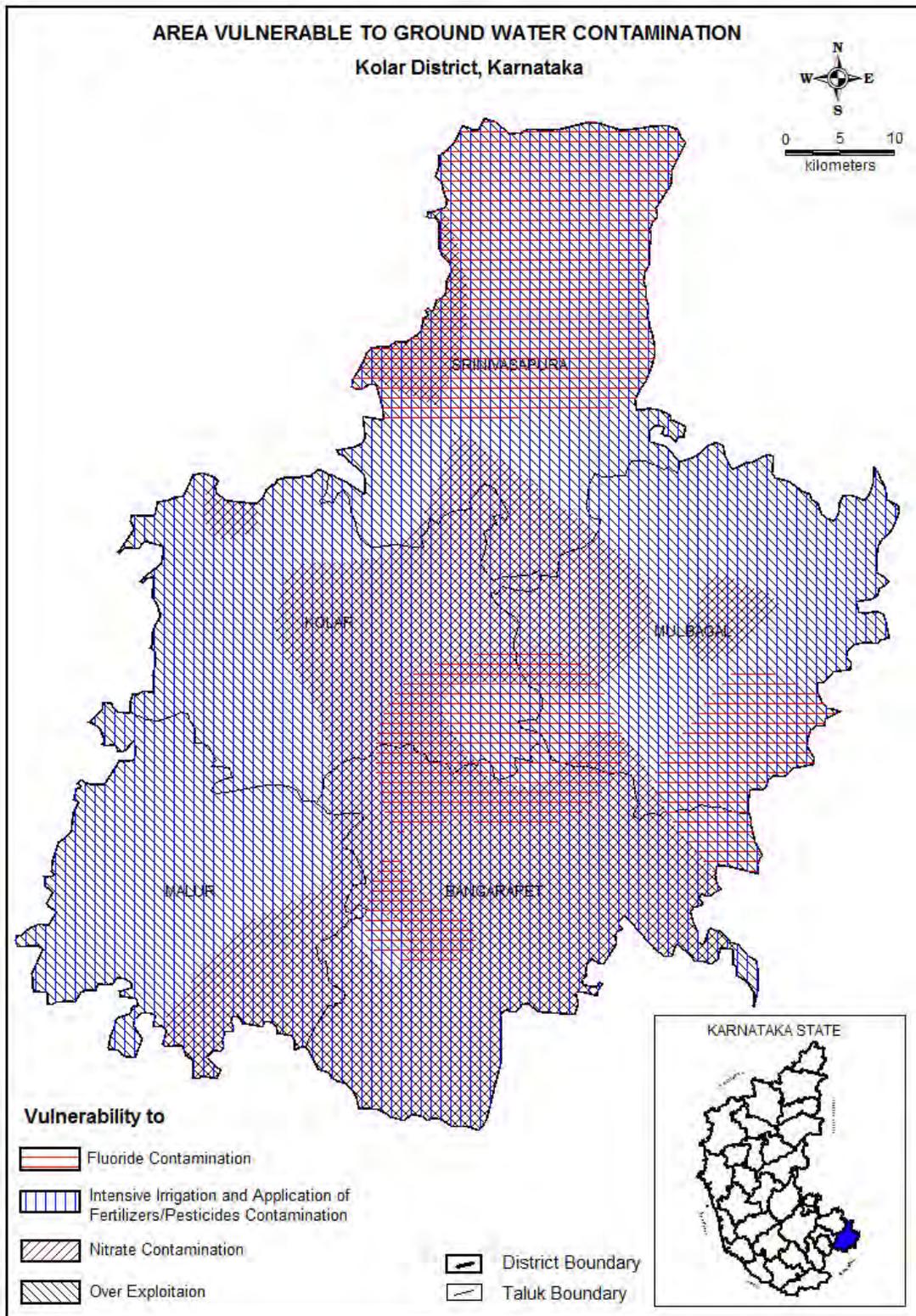
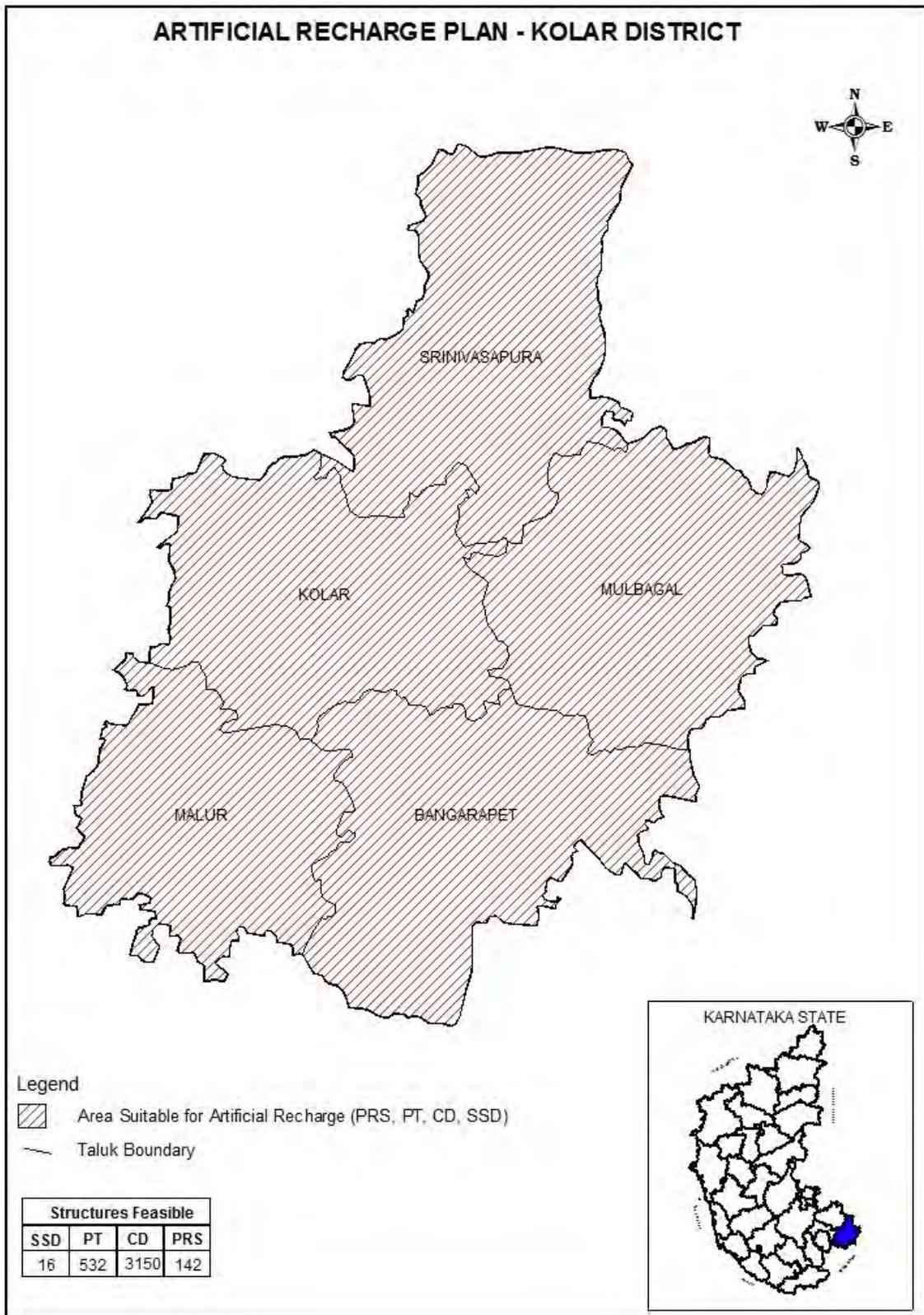


Fig. 12



## **6.0 GROUND WATER ISSUES AND PROBLEMS:**

Ground water plays an important role in the economy of the farmers of the Kolar district. This district is popularly known as land of Silk and Milk. Agriculture was mainly dependent on irrigation facility by numerable widely distributed tanks during earlier days. Due to drought situations farmers are now mainly depending upon borewells for their agriculture needs. There are about 29936 bore wells in the district, which reflects on the dependency of farmers on ground water

Taluk-wise ground water resources, drafts, balance resources available and the category as on March 2009 show no scope for further ground water development. All the taluks are over exploited. On an average over draft of 23491 ham per year is occurring in the district which results in continuous lowering of water table.

Even though Kolar district stands first in having the maximum number of irrigation tanks in Karnataka, their dependability for irrigation again depends upon rainfall conditions. Hence, ground water has a special significance for the all-round development of this water-starved district and plays a vital role in the development of this drought-prone area.

Fluoride concentration of more than 1.5 mg/l. is reported from many parts in the district. However, some of the exploratory borewells also have recorded fluoride concentration of 2mg/l. and above. Nitrate concentration of more than 100 ppm is reported from parts of Mulbagal, Bangarpet and Malur taluks.

## **7.0 AWARENESS TRAINING ACTIVITY:**

### **7.1 Mass awareness and Water Management Training programmes :**

Central Ground Water Board, SWR, Bangalore organized “ Mass awareness programme on use and conservation of Ground Water” on 14.9.06 at Bangarpet, Kolar district, Karanataka, as apart of national level programme. The programme was well attended by administrators, local farmers. Display of slogans in local language (Kannada) highlighting to the attributes to ground water were arranged apart from technical maps/ (Reports) charts etc., pertaining to the area. The programme was attended by about 300 persons.

Water Management Training programme on artificial recharge techniques was conducted between 12/09/06 and on 13/09/2006 at Kolar and participated by around 40 trainees from various state government departments, NGOs and progressive farmers of the district.

### **7.2 Participation in Exhibition , mela , fair etc :**

An exhibition stall was arranged by CGWB on participating in Bharat Nirman campaign organized by Press Information Bureau at Mulbagal town .The stall exhibited various aspects of ground water management, rainwater harvesting and artificial recharge to Ground water with help of models, posters, charts and documentaries. Film shows were also organized during the five days exhibition. CGWB officers delievered lectures and participated in workshops arranged by PIB in connection with Rajiv Gandhi Drinking water scheme and Rain water harvesting and artificial recharge to ground water at Mulbagal town .

## **8.0. Areas notified by CGWA/SGWA – Nil**

### **9.0 . Recommendations :**

Considering the prevailing scenario of the groundwater resources and development the following recommendations are made for the optimum drawl with sustainable development of resources in the area.

1. Construction of 3150 No of check dams, 532 No of percolation tanks, and 16 No of sub surface dykes at appropriate places across the nallahs and streams in the water table depleting areas and the areas where water quality problem exists may be taken on priority basis.
2. Considering the fresh water scarcity in the district, a comprehensive programme should be formulated to harvest rain water through roof top, check dams, surface tanks, bunds and subsurface which in turn to arrest the sub surface flows and augment the groundwater resources.
3. The ground water worthy areas such as topographic lows, valley portions low fluctuations zones should be developed with an adequate soil conservation measures to prevent the soil erosions during rainy seasons.
4. Constant monitoring of ground water quality should be carried out in the fluoride-contaminated areas to prevent further deterioration and related problems. The determination of trace elements and organic compound be done to help in categorizing the quality of water.
5. A detailed geophysical study with the help of the state of the art technology should be conducted to demarcate the extent of potential aquifers and its geometry, especially in central plain region.
6. All the taluks of the district come under over exploited category. In these taluks further ground water draft should be monitored and governed to avoid further adverse effects on the ground water system.
7. In semi-urban areas like Kolar town and other taluk Head quarters a lot of roof area is available for rooftop rain water harvesting. So in these semi-urban areas rooftop rainwater harvesting practices may be encouraged. This will help in reducing the stress on urban water supply systems.