

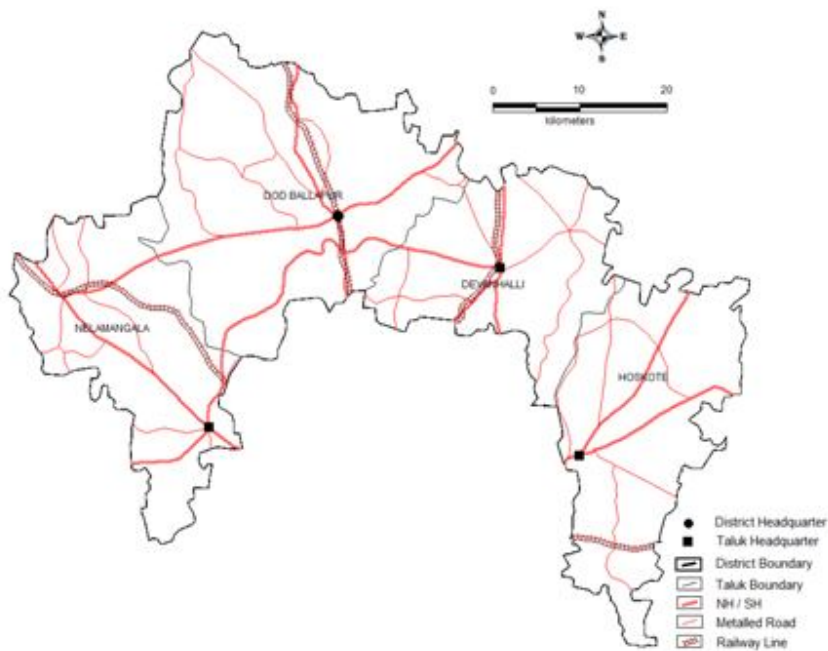


स्वच्छ सुरक्षित जल - सुन्दर खुशहाल कल
CONSERVE WATER - SAVE LIFE



GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET **BANGALORE RURAL DISTRICT, KARNATAKA**



SOUTH WESTERN REGION
BANGALORE
MARCH 2013

सुशील गुप्ता
अध्यक्ष

केन्द्रीय भूमि जल बोर्ड,
जल संसाधन मंत्रालय,
भारत सरकार,
भूजल भवन, एन एच. - 4,
फरीदाबाद.



Sushil Gupta
Chairman

Central Ground Water Board,
Ministry of Water Resources,
Government of India,
Bhujal Bhawan, NH-IV,
Faridabad.

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.

Sushil Gupta
CHAIRMAN

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, 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.

The Bangalore Rural district Ground Water Information Booklet has been prepared based on the information available and data collected from various state and central government organisations by scientists of Central Ground Water Board with utmost care and dedication. This booklet has been prepared by Dr. K.R. Sooryanarayana, Scientist under the able guidance of Dr. K. Md. Najeeb, Regional Director, Central Ground Water Board, South Western Region, Bangalore. The figures were prepared by Sri. H.P.Jayaprakash, Scientist-C and Sri.Sivaramakrishna, Assistant Hydrogeologist. The efforts of Report processing section in finalising and bringing out the report 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, hydro geologists and other engineers to plan the water resources management in a better way in the district.

(Dr. K. Md. Najeeb)
Regional Director

SI No	Items	Statistics
1	GENERAL INFORMATION	
	i) Geographical area	2259 Sq.Km
	ii) Number of tehsils/ blocks/ taluks	Four taluks Devanahalli, Doddaballapura, Hoskote and Nelamangala
	iii) Number of Panchayats/villages	98/951
	iv) Total Population	850986 (as per 2001 census),
	v) Average annual Rainfall	824 mm (1901-70)
2	GEOMORPHOLOGY	
	Major physiographic units	Rocky upland Plateau and Flat topped hills
	Major drainages	Cauvery
3	LAND USE (sq km)	
	a) Forest area	11322 hectares (2009-10)
	b) Net area sown	124958 hectares (2009-10)
4	MAJOR SOIL TYPES	(i) Loamy soil (ii) Lateritic soil (iii) Lateritic gravelly soil and (iv) Red sandy soil.
5	IRRIGATION BY DIFFERENT SOURCES (No.)	
	Dug wells	0 hectares (2009-10)
	Bore wells	27937 hectares (2009-10)
	Lift Irrigation	43 hectares (2009-10)
	Net irrigated area	27980 hectares (2009-10)
6	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (AS ON 31.3.2012)	
	No. of Dug wells	
	No. of Piezometers	
7	PREDOMINANT GEOLOGICAL FORMATIONS	Granite Gneiss
8	HYDROGEOLOGY	
	Major water bearing formations	Granite Gneiss
	Premonsoon depth to water level of piezometer during 2011(most frequent range)	The depth ranges from 5 -30 mbgl.

	Post monsoon depth to water level of piezometer during 2011 (most frequent range)	The depth ranges from 5m bgl to 40 m bgl
9	GROUND WATER EXPLORATION BY CGWB (AS ON 31.3.2012)	
	No. of wells drilled(EW, OW, PZ, SH-Total)	EW-13,
	Depth Range	33- 287mbgl
	Yield	0.1 to 9.13 lps
	Transmissivity	7 to 535 m ² /day
10	GROUND WATER QUALITY	
	Presence of chemical constituents more than permissible limit (EC, F, AS, Fe, No₃)	Presence of fluoride in pockets.
11	DYNAMIC GROUND WATER RESOURCES (March 2009) IN HAM	
	Annual replenishable Ground water resources	19394
	Gross Annual ground water draft	25653
	Projected demand for domestic and industrial uses	2463
12	AWARENESS & TRAINING ACTIVITY	
	Mass Awareness programme organized	To be organised
	Water Management Training Programme	To be organised
13	EFFORTS OF ARTIFICIAL RECHARGE & RAIN WATER HARVESTING	
	Projects completed by CGWB (NO. and Amount spent)	Nil
	Projects under technical guidance of CGWB (No.s)	Nil
14	GROUND WATER CONTROL & REGULATION	
	No. of OE blocks	04
	No. of Critical Blocks	-
	No. of Blocks notified	04
15	MAJOR GROUND WATER PROBLEMS AND ISSUES	Over exploitation of Ground water resources

BANGALORE RURAL DISTRICT

1.0 INTRODUCTION

1.1 Location.

Bangalore district is located in the southeastern part of Karnataka state. Bangalore is the district head quarters and also capital of the state. Bangalore Rural district is located in the southeastern part of Karnataka state between the north latitude 12° 15' and 13° 31' and East longitude 77° 04' and 77° 59', covering parts of the toposheets 57 G and H. The district is bounded by Kolar and Tumkur district in the north, Mandya district on the west, Chamarajanagar district on the south and towards southeast by Tamilnadu state. Bangalore district is well served by road railway and airways. The National Highways passing through the district is connecting the state capital with other major cities like Hyderabad, Pune and Chennai. The interior villages are well connected by metalled roads. Bangalore district is also well served by Railways. The railway line connects Bangalore to New Delhi, Hyderabad Bombay and Chennai.

1.2 Administrative Setup

The Bangalore rural district is divided into four taluks namely Devanahalli, Doddaballapura, Hoskote and Nelamangala taluk, having a total geographical area of 2259 sq. kms. The district has 17 hoblies, 98 grampanchayaths, 951 inhabited and 101 un-inhabited villages. There are five town/urban agglomeration and 3 Municipalities. A map showing administrative setup of the district is given as **Fig-1**.

1.3 Population

The total population in the district is 850986 (as per 2001 census), out of which rural population constitutes 658634 and urban population constitutes 192334. The schedule cast population constitutes 186602 and the schedule tribe population constitutes 43670. The sex ratio in the district is 945 females for every 1000 males. And the density of population is 377 per sq.km. The main occupation of the people in the district is cultivation and most of them are agricultural laborers. The literacy rate is 58.8% in rural parts, of which, the male literacy rate is 77.6 and female literacy rate is 56.4. In urban parts of the district the literacy rate is 67.8 %, of which, the male literacy rate is 84.8 and female literacy rate is 72.8.

1.4 Land use pattern

The district has 11322 hectares of forests (2009-10), which constitutes (5.01%) of the total geographical area of the district. Net area sown during the year is 2009-10 was around 124958 ha. Total area sown is 130519 hectares.

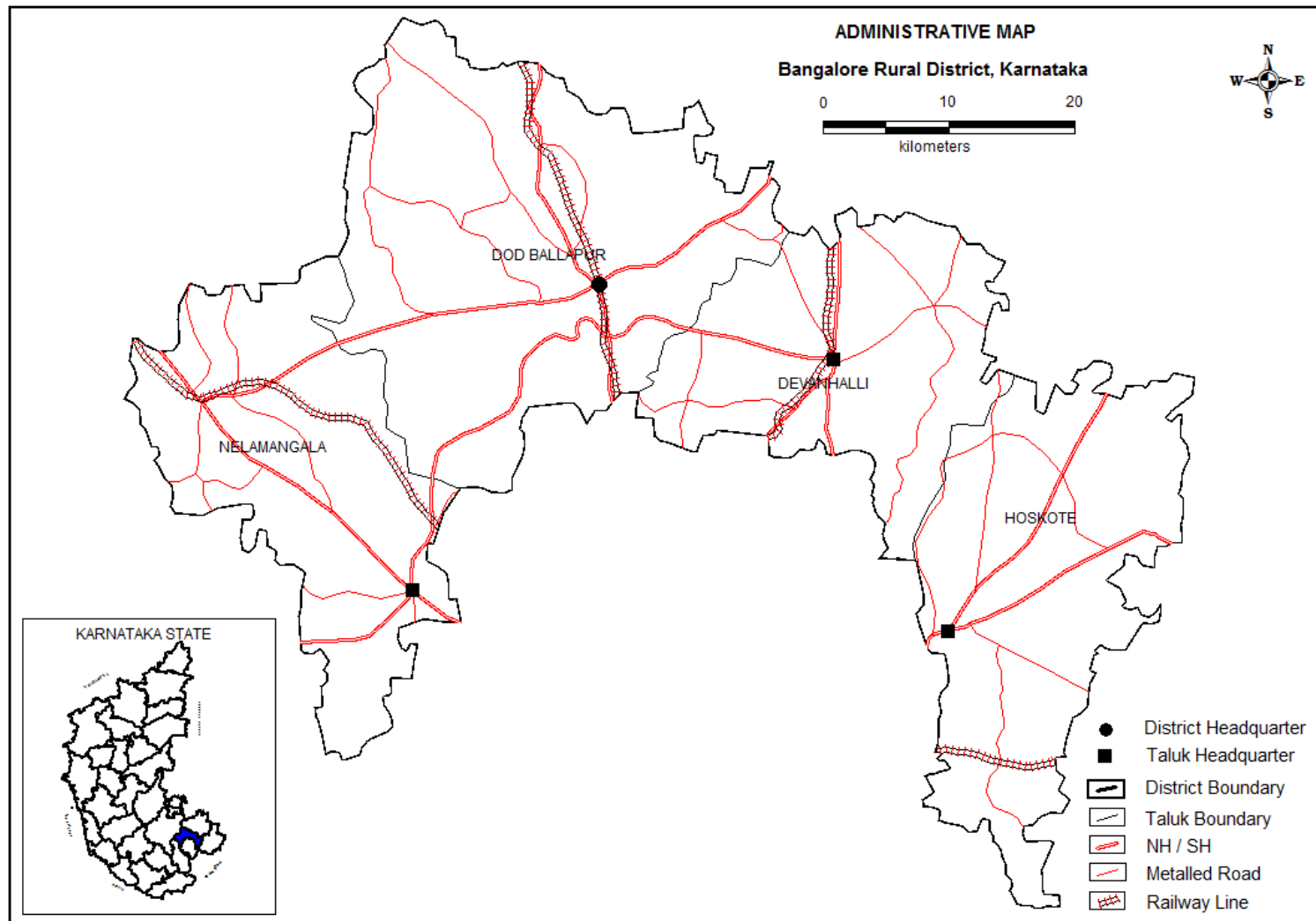


Fig.1 Administrative Map

1.5 Crops

The main crops grown in the district are Paddy, jowar, Bajara, Maize, Wheat pulses oilseeds like groundnut, sunflower vegetables fruits and cash crop like sugarcane and others.

1.6 Irrigation

The area under number of minor irrigation projects playing an important role in the development of agriculture by providing irrigational facilities particularly in the area. These schemes consist of tanks, lift irrigation anicut/pickups and others. Net area irrigated during the year 2009-10 was 27980 hectares out of which 27937 hectares was irrigated by bore wells and 43 hectares by lift irrigation.

1.7 Industries

Plenty of quarries and crushing plants are spread over the entire district Granite quarrying and crushing is going on for the past three decades and density of crushing plants in the district is high.

1.8 Studies carried out by CGWB

The Central Ground Water Board has drilled 13 bore wells under ground water exploration programme. The details of these bore wells comprising their depth range, discharge range, aquifer characteristics etc are compiled. The periodic monitoring of ground water levels from observation wells in the district are also being carried out by CGWB during the months of January, May, August and November every year. Systematic, reappraisal and ground water management surveys/studies were also carried out in the district during various field seasons. Central Ground Water Board has also carried out feasibility studies for implementing rainwater harvesting artificial recharge structures in areas occupied BIAL.

2.0 RAINFALL AND CLIMATE

The climate in Bangalore rural district is quite salubrious, with three different seasons. The pre-monsoon starts from January to May. This period can be divided into winter (January to February) and summer (March-May). Winter is characterized by generally clear skies and very little rainfall. From April onwards-erratic thunderstorms occur in the area which increases during May. The temperature is lowest during December and January.

2.1 Rainfall:

The mean annual rainfall of the district is 824 mm. Doddaballapur taluk receives the lowest rainfall of 680 mm where as Hoskote and Nelamangala taluk receives the highest rainfall Of 776 mm. Further details are shown in Table.1

Table.1: Annual and mean Annual rainfall for Bangalore Rural District.

Sl No	Taluk	Rain gauge stations	Normal Rainfall (mm) 1901-70	Actual Rainfall (mm) 2009	Normal Rainy days 1901-70	Actual Rainy days 2009
1	Devanahalli	5	744	807	46	59
2	Doddaballapura	8	680	766	46	54
3	Hoskote	4	776	556	47	37
4	Nelamangala	3	776	742	51	50

3.0 GEOMORPHOLOGY AND SOIL TYPES

3.1 Geomorphology

Physiographically, the district can be divided into rocky upland, plateau and flat-topped hills at an elevation of about 900 m. amsl. Flat-topped Laterite hills are seen in the northern part at an elevation of 900 m. amsl. The pediplains form major part of the district underlain by gneisses and granites with the highest pediplain in the range of 850m and 950m amsl. Rocky upland pediplain and plateau constitute erosional topography. Major part of the pediplain is dissected by streamlets flowing in southerly direction. In northern part of Doddaballapur taluk, the pediplains have northerly slope dissected by various streamlets. The major part of the district lies in Cauvery basin.

Important rivers draining the area are Cauvery, south Pennar, North Pennar and Palar, Cauvery with its tributaries like Arkavathi is draining in the area. The other important rivers Kumudavathi and Pinakini. The tributaries of Pennar River, drain northeastern part of the district. The drainage pattern is trellis to sub-dendritic.

3.2 Soil types

The soils of Bangalore Rural districts are broadly classified into four categories viz (i). Loamy soil (ii) Lateritic soil (iii) Lateritic gravelly soil and (iv) Red sandy soil. Red loamy soils generally occur on hilly to undulating land slope on granite and granite gneisses. Lateritic soil occurs in undulating terrain forming plain to gently sloping topography of peninsular gneiss region. Lateritic gravelly soils occur in upland regions of lateritic soils, Red sandy soil occurs in undulating land slopes. These soils are derived from acidic rocks granites and granitic gneiss.

4.0 GROUND WATER SCENARIO

4.1.1 Occurrence of Ground Water

Geology of the Bangalore rural district is broadly described under two groups (i) the dominating Archaean crystalline formation comprising peninsular gneissic complex with a small patch of hornblend schist in the northern part and intrusive closepet granite all along the western part of the district (ii) smaller stretches of unconsolidated sediments. The granite gneisses are mainly of

migmatitic type, highly banded in composition from granite to diorite.

The ground water occurs in the open spaces of weathered fractured gneisses and granites. In these rocks the water bearing and yielding properties are primarily due to weathering and fracturing. In the weathered zone, ground water occurs under water table conditions and in the fractured and jointed formations it occurs under semi-confined conditions. In Laterite ground water occurs under phreatic condition. Alluvium along the river courses, though limited in thickness and aerial extent possess substantial ground water potential.

4.1.2 Depth to water levels

The pre-monsoon depth to water level map of the district for the year 2011 is presented as **Fig-2**. The most frequent depth to water level in the district ranges from 2 to 10 mbgl. Water level up to 20 m bgl are also observed in isolated patches. The post-monsoon depth to water level map of the district for the year 2011 is presented as **Fig-3**. The most frequent depth to water level in the district ranges from 5 to 10 mbgl.

4.1.3 Decadal water level fluctuation

The decadal pre-monsoon water level fluctuation (May 2001-May 2010 with May 2011) shows both rise and fall in water levels. (**Fig.4**). The decadal post-monsoon water level fluctuation (November 2001-November 2010 with November 2011) shows both rise and fall in water levels. (**Fig.5**)

4.1.4 Ground Water Exploration

Ground water exploration was undertaken in the district between the period from 1990 to 1996 (First Phase of ground water Exploration) to ascertain the presence of productive aquifer zones, quality of ground water, yield of aquifer zones and determine aquifer parameter. The map showing the locations of exploratory bore wells drilled by CGWB is shown in **Fig.6**

4.1.5 Results of ground water exploration

On the basis of the hydrogeological surveys followed by geophysical resistivity surveys, a total of 13 exploratory wells were drilled in Bangalore rural district. The drilling results available indicated the fractures at 14.0m, 108 m, 110m and 123 m, 134m, 136m, 138m depth. The depth of exploratory bore drilled ranges from 33.0 to 287.09m. The yield cum recuperation tests conducted on the wells show that the discharge of the wells ranges from 0.10 to 9.13 lps. The transmissivity (T) in general ranges from 7.4 to 535.72 m²/day.

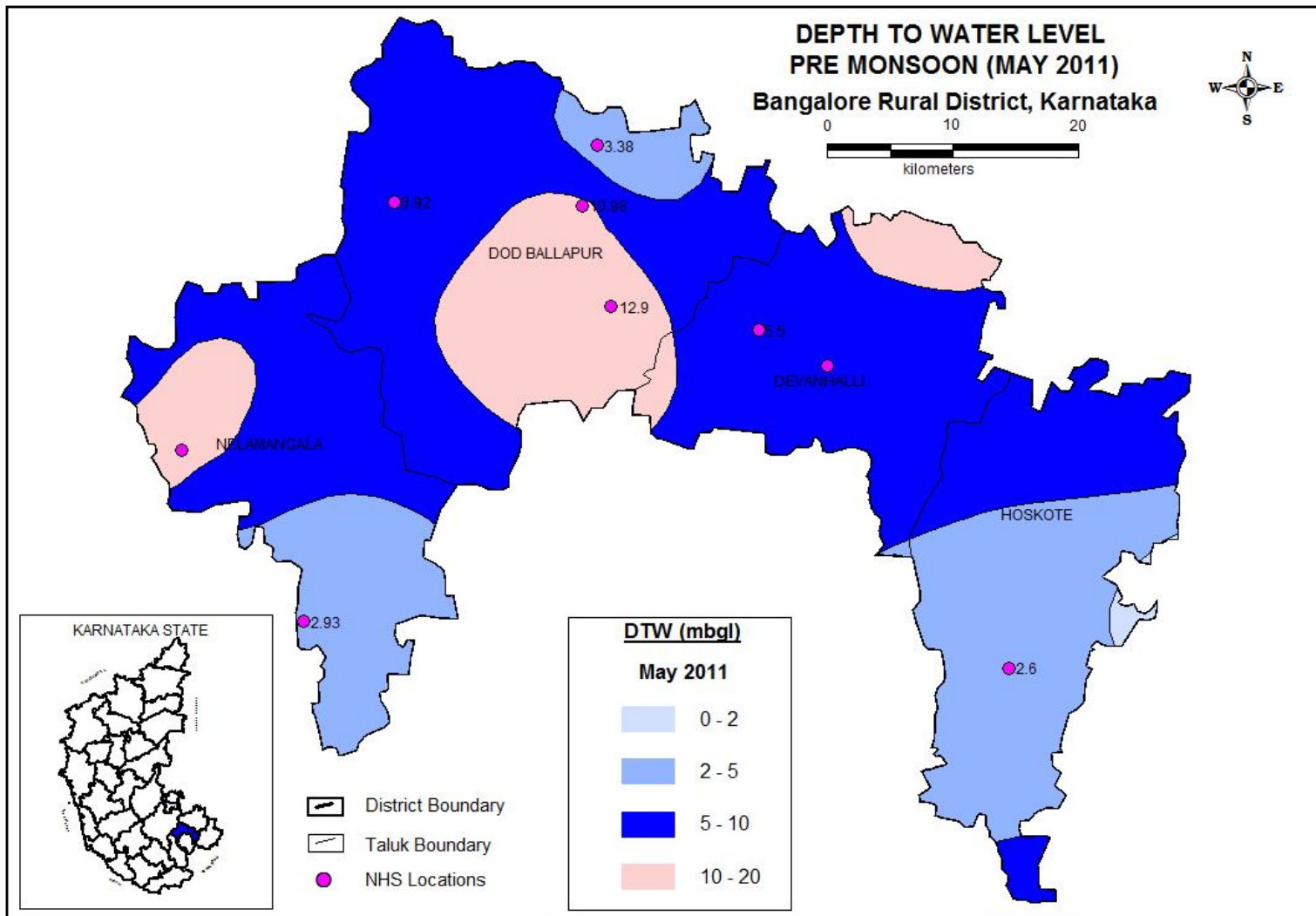


Fig.2 Pre monsoon depth to water level map (May 2011)

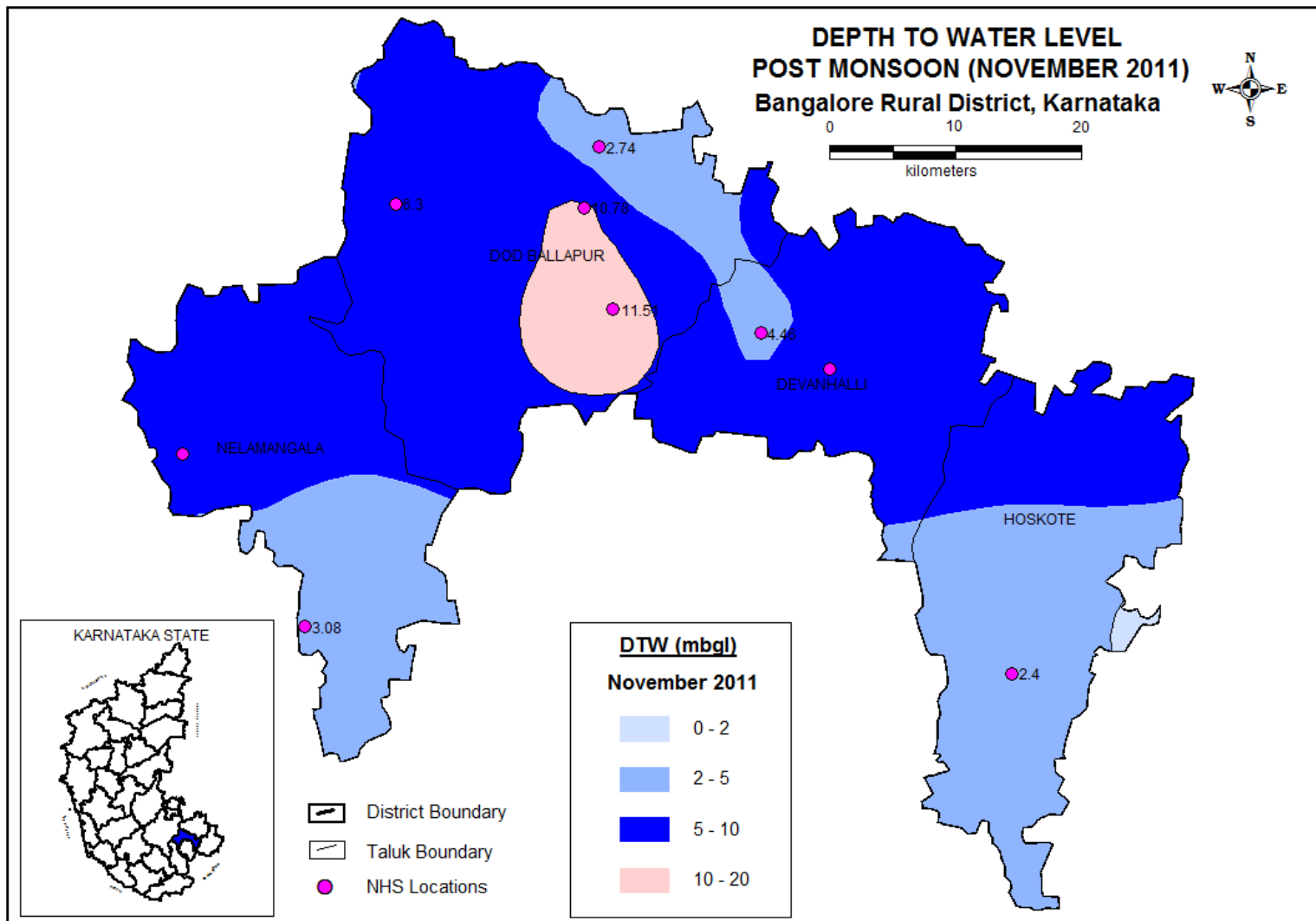


Fig.3 Post monsoon depth to water level map (November 2011)

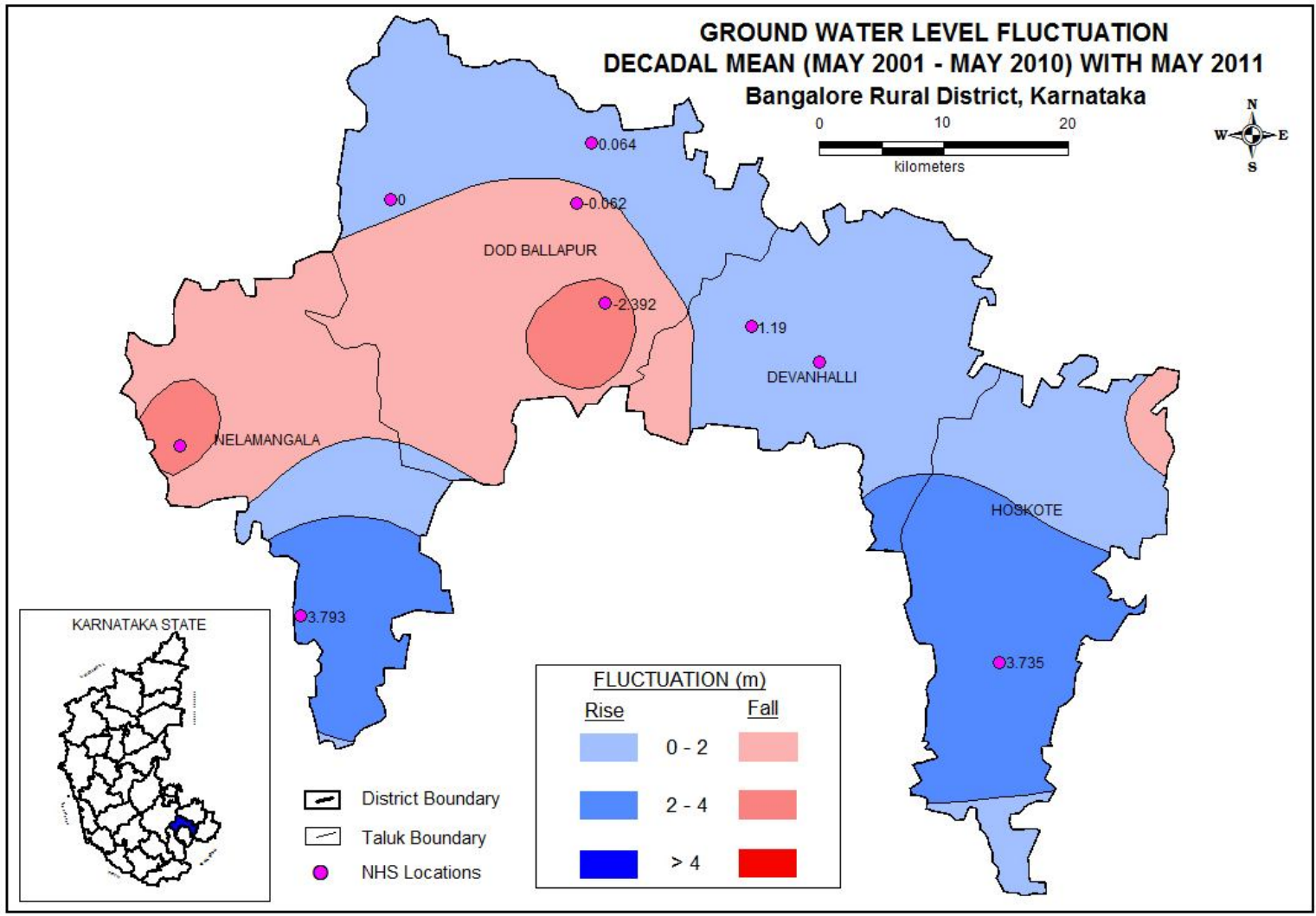


Fig.4 -Decadal Ground water level fluctuation (pre-monsoon)

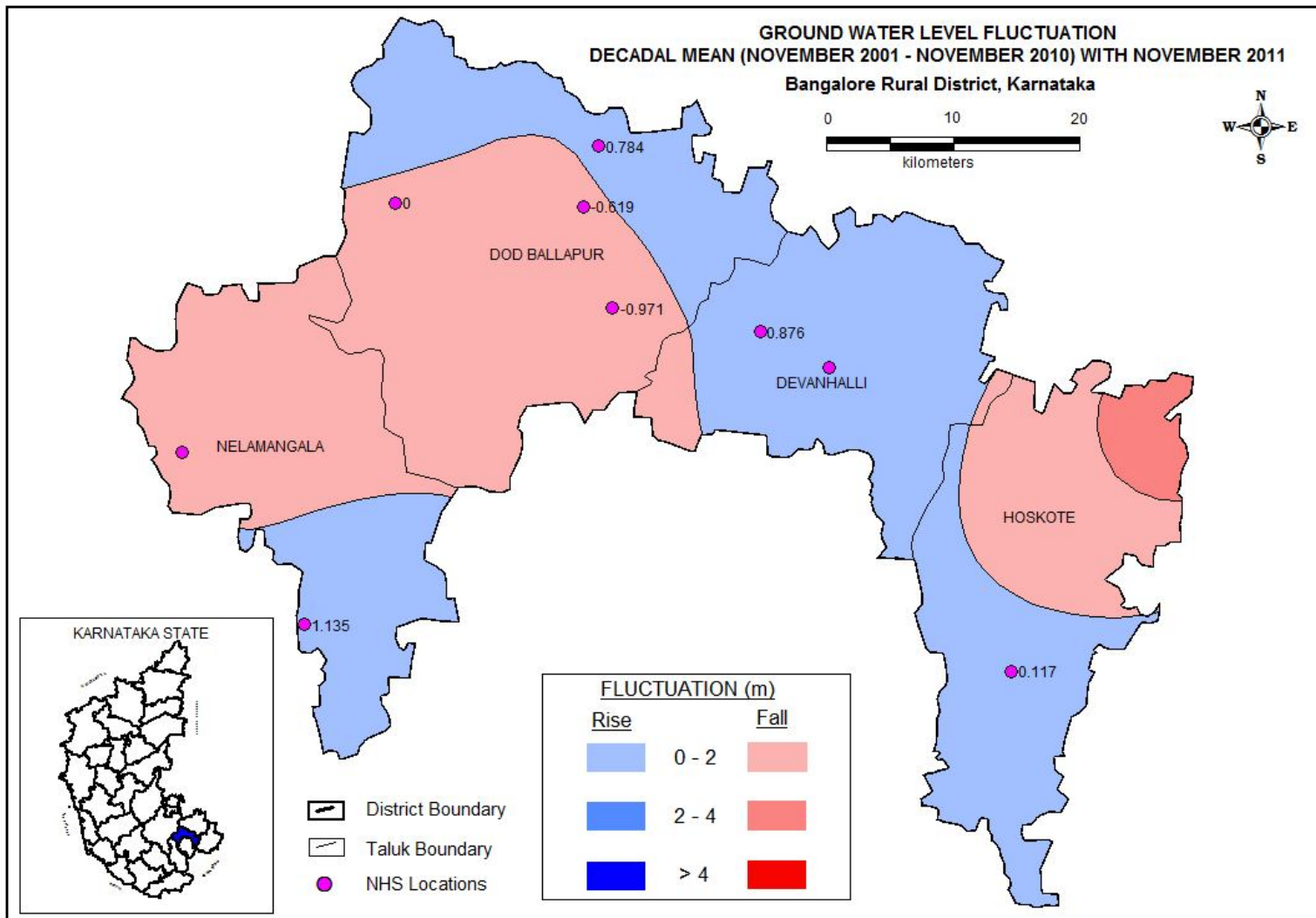


Fig.5 -Decadal Ground water level fluctuation (post-monsoon)

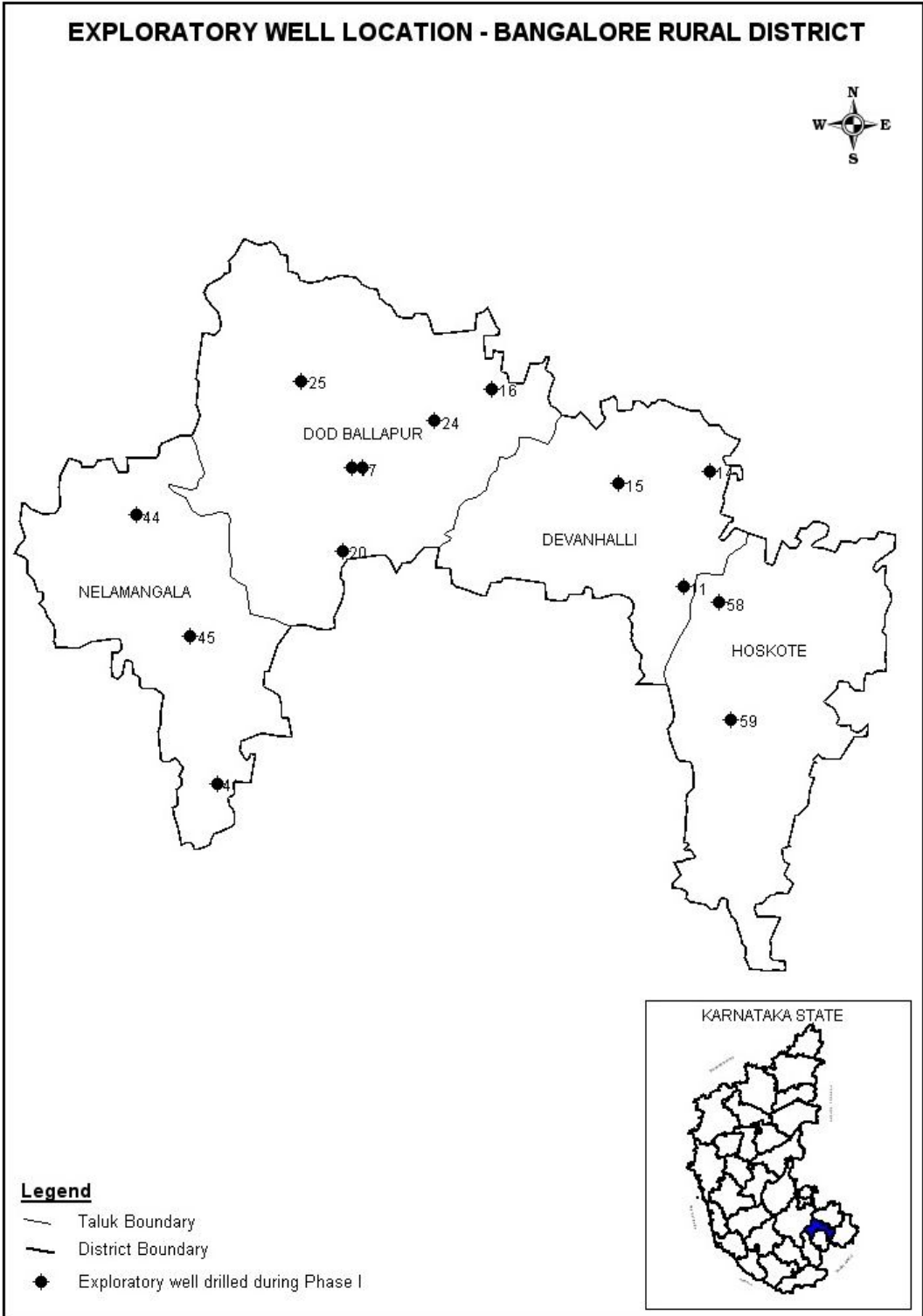


Fig.6 Exploratory borewell location

4.2 Ground water resources:

Ground water resource of the district has been assessed keeping in view, the sustainable and optimum development of the resource. The estimation has been done based Ground Water Estimation methodology (GEM)-1997. Assessment is done taking into consideration of various hydrologic units viz. command, non command hilly area with more than 20 % slope and poor quality area.

Net annual groundwater availability of the district is 19,394 ham, total ground water draft for irrigation is 23,202 ham, and total ground water draft for domestic and industrial uses is 2,450 ham and existing gross ground water draft for all uses is 25,653 ham. Thus, draft exceeding the total available ground water resources leaving almost nil ground water resources for future use. The stage of ground water development in all the four taluks of the district is above 100% and are in the **over exploited** category. Therefore, bothe Central Ground Water Authority and Karnataka Ground Water Authority have notified these taluks for regulation and development of ground water resources. Talukwise resources as on March 2009 and categorization is given in table 1 and is shown in Fig-7.

Table-2. Talukwise resources and categorization as on March 2009.

Taluk	Net Ground water Availability	Irrigation draft	Domestic and industrial draft	Total annual ground water draft for all uses	Projected domestic and industrial draft 2025	Ground water availability for future irrigation	Stage of development	Stage of Development as on March 2009			
								Safe area (%)	Semi-critical area (%)	Critical area (%)	OE area (%)
	HAM						(%)				
Devenhalli	4101	5554	499	6053	499	0	148	---	---	---	100
Dodaballapur	4973	5838	662	6500	662	0	131	---	---	---	100
Hoskote	4340	5745	507	6252	507	0	144	---	---	---	100
Nelamangala	5980	6065	782	6848	795	22	115	10	---	---	90
Total	19394	23202	2450	25653	2463	22					

5. GROUND WATER MANAGEMENT STRATEGY

A well-planned groundwater resource management strategy is essential to make economical, efficient and judicious use of ground water, to make the availability of ground water, sustainable. In view of the ever-growing population and increasing demand for groundwater for various developmental activities, it is suggested to adopt methods to artificially recharge the ground water in the water level depleting areas, in order to increase the ground water availability. The ground water management will also help in environmental

**STATUS OF GROUNDWATER UTILISATION
BANGALORE RURAL DISTRICT**

(As on March 2009)

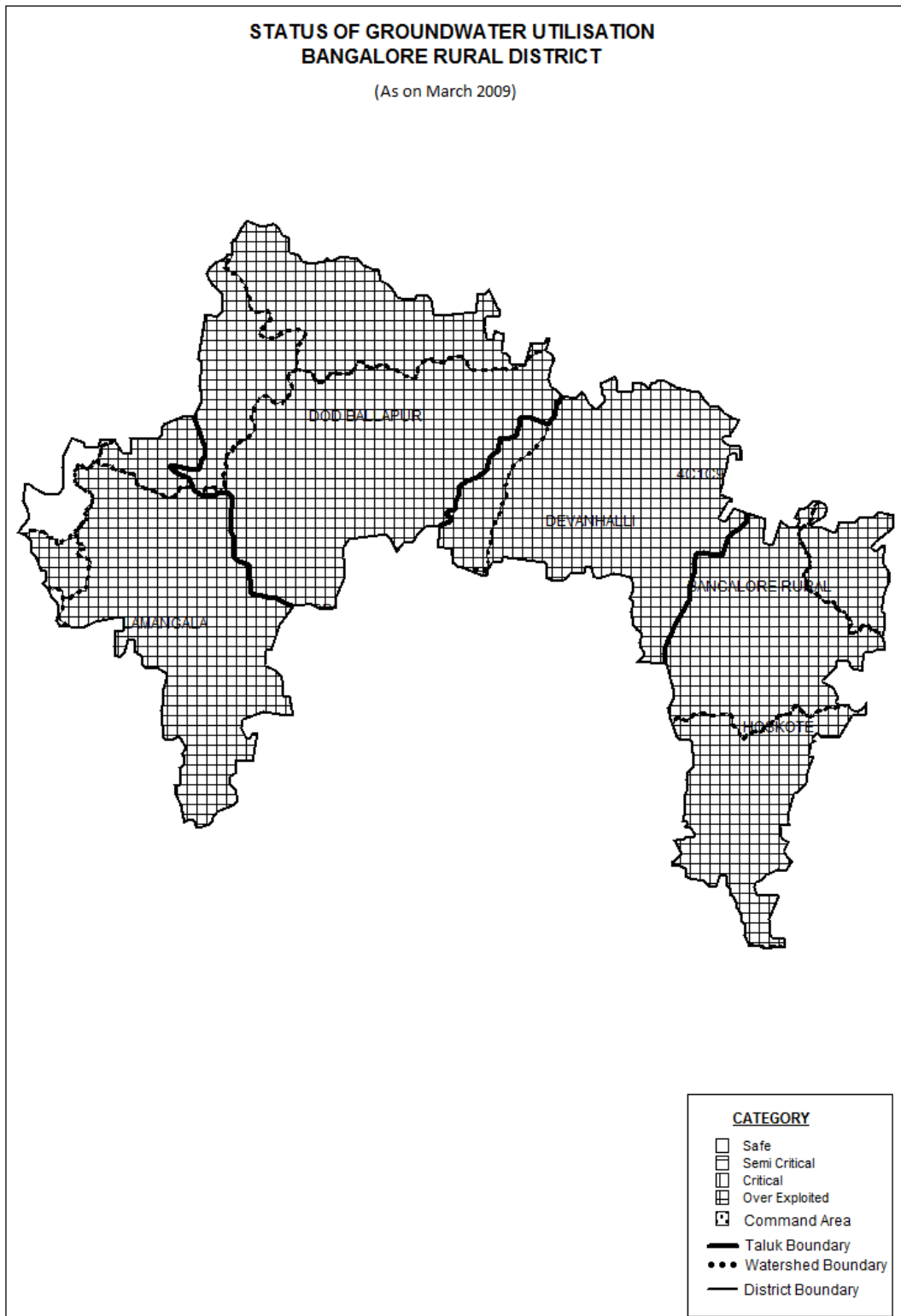


Fig.7 Status of Ground water Utilisation

management and ecological stability in the area. The development of water management model should be resource based and the whole problem should be tackled in its totality, vis-a-vis surface and subsurface resources.

Water use efficiency in irrigations and domestic sectors needs emphasis. Farmers should be encouraged to grow crops that require less water for its production and should be discouraged from growing water intensive crops like sugarcane and paddy, especially in the areas where water levels are falling. Use of tertiary treated water for non potable use is another viable option to minimize the dependability of fresh water for such uses.

4.3. Ground water quality.

The Electrical conductivity values in the major part of the district are in the range between 750 to 1000 micro mhos. In Nelamangala taluk, the EC varies from 500 to 750 micromhos. In northern part of Devenahalli taluk, EC values of more than 2000 micromhos /cm are observed. Flouride content more than the permissible limit is observed in Nelamangala, Doddaballapura and Devenahalli taluks.

Chloride problem in the district (Chloride content more than 250 to 1000mg/L) are observed in Nelamangala, Doddaballapur, Devenahalli and in Hoskote taluks.

5.1 Ground water development

All the taluks in Bangalore Rural district are categorized as **over exploited**. Hence, water crops like paddy, sugarcane etc having high water requirement from ground water irrigation may be avoided. Advance irrigation methods like drip and micro irrigation may be practiced.

5.2 Water conservation and Artificial Recharge

All the taluks in the district namely Nelamangala, Doddaballapur, Devenahalli and Hoskote are suitable for implementing artificial recharge structures. The artificial recharge plan for the district is shown in **Fig.8**

5.3 Unit area annual groundwater recharge

Sustainability of groundwater resource depends mainly on two factors viz. Annual groundwater recharge and annual groundwater draft. The annual groundwater recharge depends on the quantity and intensity of rain fall, the infiltration characteristics of the soil, the depth to groundwater level, the slope of the area and the geomorphology. The groundwater recharge is assessed separately for the monsoon and non monsoon period due to rainfall as well as due to other sources. The annual groundwater recharge includes all the above.

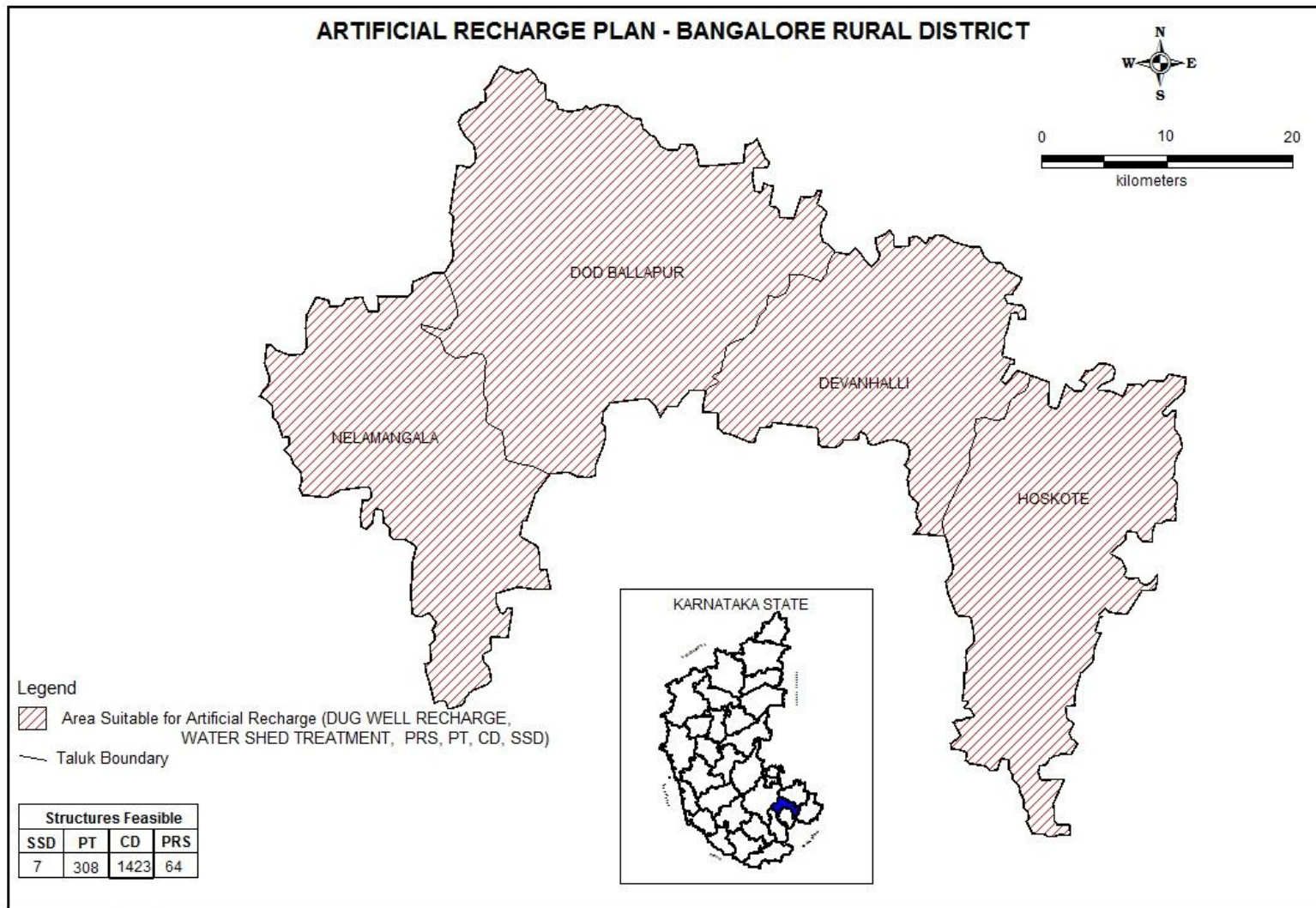


Fig.8 Artificial Recharge Plan

The recharge from other sources includes return seepage from irrigated area, seepage from canals, seepage from water bodies, seepage from influent rivers etc. The recharge can be expressed in metres. In the state of Karnataka, the unit area recharge is grouped into four categories viz. 0.025-0.10m, 0.10-0.15m, 0.15-0.25m and 0.25-0.50m. In Bangalore Rural district the unit area annual recharge is in the range of 0.025 to 0.15. (Fig.9)

In the district where the topography is comparatively rugged, water conservation structures like gully plugs, contour bunds and contour trenches are recommended. In comparatively plain areas, check dams/percolation tanks and point recharge structures are suggested. Recharging through existing dug/bore wells may also be practiced wherever feasible.

In semi-urban areas in the district/taluk Head quarters like Doddaballapur, Nelamangala, Devanahalli and Hoskote, rooftop rain water harvesting is ideal for direct rainwater harvesting and hence needs to be encouraged. This will help in reducing the stress on urban water supply systems.

6. Awareness and Training Activity :

Awareness on water conservation and training on water management with special thrust on ground water management are required to built-up capacity building in effective use of ground water resource in the area.

7. Ground Water vulnerability:

Groundwater being a dynamic resource, getting recharged annually, primarily from the rainfall, is vulnerable to various developmental activities and is prone to deterioration in quality and quantity. The vulnerability is high in certain areas while in other areas it is comparatively stable. Based on it's susceptibility to various stress factors the district wise vulnerability map is prepared on a regional scale considering the following factors viz.

i). Area under high stage of ground water development falling in over exploited (generally with stage of development more than 100%) and critical (generally stage of development within 85-100%) category as on March 2009.

ii). Area having intensive cultivation/ area falling under canal command, thus prone to pollution from fertilisers/ insecticides or water logging.

iii) Area having fluoride above maximum permissible limit of 1.5ppm

iv). Area having nitrate above maximum permissible limit of 45ppm. (Even though nitrate is point source pollution due to anthropogenic activity and as such area cannot be demarcated, for the convenience of the user group, area having high incidence of pollution is marked. Within the marked area there may be points devoid of high nitrate and vice-versa.)

v). Industrial cluster as identified by Central Pollution Control Board, prone for pollution from industries.

In some of the districts parts of the area groundwater is vulnerable due to more than one of the above parameters, while in some others the entire district is free from vulnerability.

In Bangalore rural district, ground water vulnerability is observed due to over-exploitation and fluoride concentration in ground water. The details are shown in **Fig.10**

7. 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 check dams and sub surface dykes at appropriate places across the nallahs and streams in the water table depleting areas, over exploited, critical and areas of the district 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 the rain water through roof top, check dams, surface tanks, bunds and subsurface dykes to use the resources directly from the structures, 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. In semi-urban areas in the district like Doddaballapur, Nelamangala, Devanahalli and Hoskote towns, rooftop rain water harvesting needs to be encouraged.

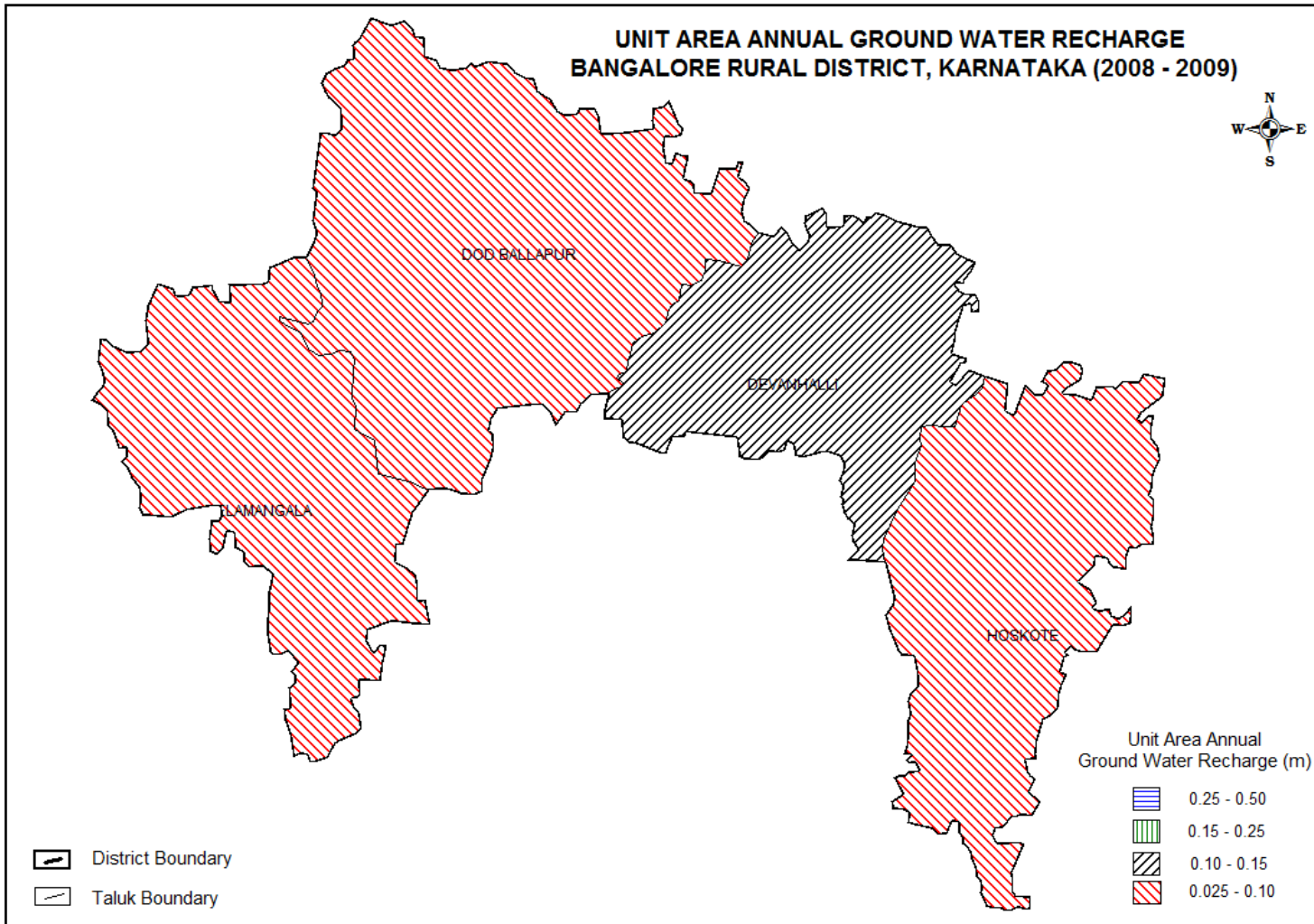


Fig.9 Unit Area Annual Ground water Recharge

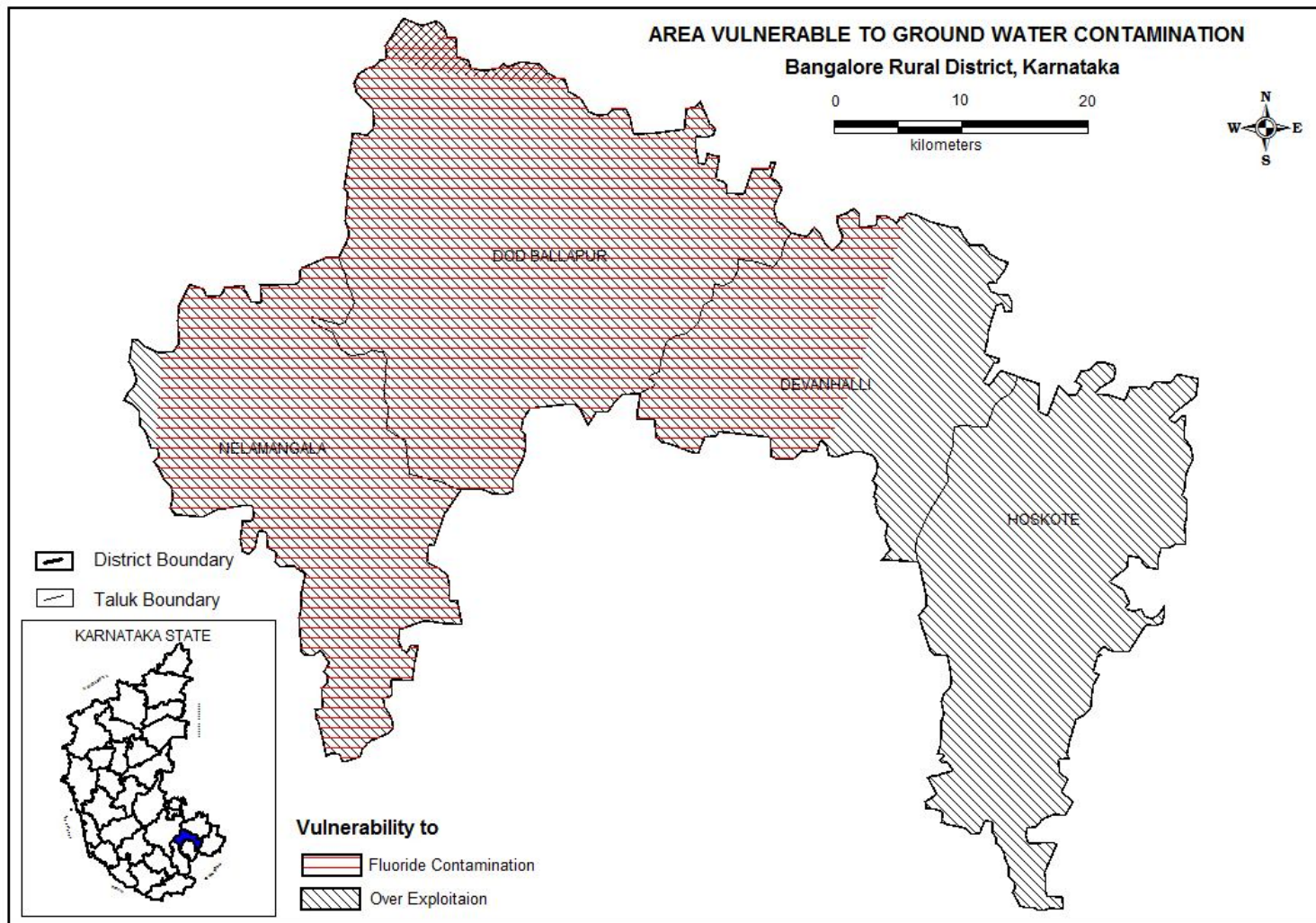


Fig.10 Area vulnerable to ground water contamination

TALUK WISE GROUND WATER RESOURCES AND CATAGORISATION OF BANGALORE RURAL DISTRICT AS ON 31st MARCH 2004

Sl No	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 IN %	CATEGORISATION				
		HAM	HAM	HAM	HAM	HAM	HAM	HAM	(m)				SAFE AREA (%)	SEMI-CRITICAL AREA (%)	CRITICAL AREA (%)	OE AREA (%)
	CHANNAPATNA	2950.48	2802.96	2923.86	136.93	3060.79	196.08	11.69	0.82	14.30	109.20	3				97
	DEVANHALLI	6496.65	6171.82	13935.36	358.95	14294.31	509.74	0	0.89	0	231.61					OE
	DOD BALLAPUR	5465.07	5191.81	9486.29	447.28	9933.57	627.89	0	0.89	0	191.33					OE
	HOSKOTE	6081.62	5777.54	12521.32	390.98	12912.31	554.16	0	0.89	0	223.49					OE
	KANAKAPURA	9383.61	8914.43	14469.58	890.79	15360.37	1240.30	116.88	0.82	142.97	172.31			11		91
	MAGADI	7376.98	7172.66	6547.20	466.00	7013.20	655.76	1707.26	0.47	3653.20	97.78	38				62
	NELAMANGALA	3992.15	3801.01	6057.25	339.91	6397.16	473.60	207.15	0.89	233.84	168.30	8				92
	RAMANAGARAM	4260.84	4047.80	6070.47	266.15	6336.62	371.43	0	0.89	0	156.54					OE
	TOTAL	46007.40	43880.03	72011.33	3297.00	75308.33	4628.96	2042.98	0.82	4044.31	171.62					