



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
MANDYA DISTRICT, KARNATAKA



SOUTH WESTERN REGION
BANGALORE
JULY 2008

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 **Mandya** 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. A. Suresha, Assistant Hydrogeologist, 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

MANDYA DISTRICT AT A GLANCE

SI No	ITEMS	STATISTICS	
1	GENERAL INFORMATION		
	i) Geographical area (Sq Km)	4961	
	ii) Administrative Divisions	2	
	Number of tahasils	7	
	No. of Panchayat /Villages :	232/1479	
	iii) Population (As on 2001 Census)	17.64 lakhs	
	iv) Average annual rain fall	646 - 766 mm	
2	GEOMORPHOLOGY		
	Major Physiographic Units	Undulating topography	
	Major Drainages	Cauvery Hemavathi Lokapavani Shimsha Viravaishnavi	
3	LAND USE (Sq Km)		
	Forest area	167.65	
	Net area sown	2301.85	
	Cultivable area	3959.21	
	Area sown more than once (ha)	50892	
	Gross area under cultivation (ha)	230184	
	Net irrigated area (ha)	150475	
	Area irrigated by ground water (ha)	24506	
4	MAJOR SOIL TYPES	Red sandy loam soil, Red clay loam soil, Medium black soil, and Lateritic soil.	
5	AREA UNDER PRINCIPAL CROPS (2002-2003) in ha	Crop	Area
		Paddy	83772
		Ragi	79957
		Jowar	1674
		Maize	2599
		Pulses	29072
		Oil seeds	14296
		Sugar cane	34636
		Fruit	5002
		Vegetable	4340
		Cotton	5

6	IRRIGATION BY DIFFERENT SOURCES		Area (Ha)	Number
	Dug wells		12341	8334
	Borewells			
	Lift		12165	15905
	Tanks/ Ponds			
	Canals		529	33
	Other Sources			
	Net irrigated area		12790	
		111046		
		1604		
		150475		
7	NUMBER OF GROUND WATER MONITORING STATIONS OF CGWB (As on 31/03/2007)			
	Number Dug wells		41	
	Number of Piezometers.		8	
8	PREDOMINANT GEOLOGICAL FORMATIONS			
	Recent to sub recent		Alluvium	
	Algonkian?		Dolerite dyke, Pegmatite vein, Quartz vein	
		Dharwar super group	Schist, Phyllite, Ampibolite, Charnokite	
	Archaean	Peninsular gneissic complex	Granite gneiss, Granite Etc	
9	HYDROGEOLOGY			
	Major Water Bearing Formations -			
	Shallow aquifers of alluvium along the stream courses and weathered zones of schists, Granite gneiss, Granites etc occurring between the depths of 3 to 25 mbgl			
	Moderately deep aquifers of Weathered and fractured zones of schists, Granite gneiss, Granites etc occurring between the depths of 25 to 50 mbgl			
	Moderately deep aquifers of fractured and jointed zones of schists, Granite gneiss, Granites etc occurring between the depths of 50 to 200 mbgl			
	Premonsoon Water levels during 2006 (mbgl)		0.52 -21.28	
	Post monsoon Water levels during 2006 (mbgl)		0.63 -23.05	
	Long term water level trends (1997-2006) m/year			
	Rising trend		0.008 -0.73	
	Falling trend		0.033 -0.56	
10	GROUND WATER EXPLORATION BY C.G.W.B (As on 31/03/2007)		Phase I	Phase II
	No of wells drilled		26	26
	Depth range (m)		15.95 – 92.50	123.24-200
	Discharge (litres/second)		0.095 – 6.1	0.014-16.4
	Storativity (S)		N.A	N.A
	Transmissivity (m ² /day)		1- 125	0.276-291

11	GROUND WATER QUALITY	
	Presence of chemical constituent more than the permissible limit	Nitrate and Fluoride
	Type of water	Alkaline type
12	DYNAMIC GROUND WATER RESOURCES (2004) (HAM)	
	Net annual ground water availability	63881.64
	Existing gross ground water draft for all uses	23608.96
	Allocation for domestic and industrial use for next 25 years	5795.01
	Net ground water availability for future irrigation development	41002.24
	Balance ground water irrigation potential available	59966.59
	Stage of ground water development	37.93 %
13	AWARENESS AND TRAINING ACTIVITY	
	Mass awareness programmes arranged	
	Date Place	Nil
	No of participants	
	Water Management training programmes organized	26/07/2003 Mandya town 32 persons from different departments of GOK participated in the programme.
14	EFFORTS OF ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING	
	Projects completed by CGWB (No and amount spent)	Nil
	Projects under technical guidance of C.G.W.B (numbers)	Nil
15	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	1
	Number of critical blocks Number of blocks notified	1 Nil
16	MAJOR GROUND WATER PROBLEMS AND ISSUES	
	Note: Latest available data may be incorporated.	

MANDYA DISTRICT

1.0 Introduction

1.1 Location

The Mandya district lies between North latitude 12° 13" to 13° 04' and East longitudes 76° 19' to 77° 20' falling in the survey of India degree sheet Nos –57 H and 57D. The district is bounded on northwest by Hassan district, on the north and northeast by Tumkur district, on the east by Bangalore district and south by Mysore and Chamarajnar district.

1.2 Administrative Setup

Total geographical area of the district is 4961 sq.kms. The district is divided in to seven taluks coming under two sub divisions. The Mandya sub division comprises Mandya, Maddur and Malavalli taluks. The Pandavapura sub division comprises of Pandavapura, S.R.Patna, Nagamangala and K.R.Pet taluks.

The Administrative Setup is shown in fig- 1

1.3 Population

The total population in the district is around 17.64 lakhs (as per 2001 census) with a population density of 355 / sq km. The rural population constitutes 14.81 lakhs and urban population constitutes 2.83 lakhs. The schedule cast population constitutes 2.08 lakhs and the schedule tribe population constitutes 0.135 lakhs. The sex ratio in the district is 985 females for every 1000 males.

1.4 Drainage

The Cauvery river system drains the district towards the Bay of Bengal. The important rivers in the district are Cauvery, Hemanvathy, Shimsha, Lokapavani and Viravaishnavi all of which flow towards south and finally eastwards cutting through eastern range of hills. Apart from these rivers the district is endowed with number of streams, which along with the rivers form sub dendratic drainage pattern. The district is characterized by sub dendratic drainage probably dissected by numerous streams. The drainage density in the district ranges from 1.12 to 2.73 km sq km.

The drainage pattern is shown in fig- 2

1.5 Land use pattern

About 46.12% of the Geographical area of the district is under cultivation.65.37% of cultivated area is irrigated under tank, canal and wells etc. 73.80% of the area of

irrigation in Mandya district is under canal command. The district has 24765 ha. of forest area which constitute about 4.97 % of the total geographical area of the district. The fallow land in the district is about 76552 ha. Net area sown during the year 2005-06 was around 230185 ha, out of which, 50892 ha. of land was sown more than once.

Table –1 Land use pattern in the district

Sl.no	Particulars	Area (ha)	Percentage
1	Geographical area	498224	
2	Forest area	24765	4.97
3	Land not available for cultivation	83417	16.74
4	Other uncultivated land	83319	16.72
5	Fallow land	76552	15.36
6	Net area sown	230185	46.20
7	Area sown more than once	50892	10.21
8	Net irrigated area)	150475	30.20
9	Area irrigated by ground water	24506	4.92

Source: District at a glance- 2005-06

1.6 Crops

The main crops grown in the district are paddy, sugarcane, jowar, Maize, cotton, banana, Vegetable, mulberry, gram, Ragi, groundnut, horse gram, coconut etc.

Table –2 Cropping pattern in the district

Sl.no	Crop	Area
1	Paddy	83772
2	Ragi	79957
3	Jowar	1674
4	Maize	2599
5	Pulses	29072
6	Oil seeds	14296
7	Sugar cane	34636
8	Fruit	5002
9	Cotton	05

Source: District at a glance- 2005-06

1.7 Irrigation

Out of 230185 ha of cultivated land during 2003-04, 150475 ha was under irrigation by various sources. 111046 ha was irrigated under canals, 12790 ha was irrigated under tanks, 12341 ha was irrigated by dugwells, 12165 ha was irrigated by tube/bore wells, 529 ha was irrigated by lift and 1604 ha was irrigated by other sources.

Table –3 Irrigated areas under different sources

Sl.no	Source	Area (Ha)	Percentage
1	Dug wells	12341	8.2
2	Borewells	12165	8.08
3	Lift	529	0.35
4	Tanks/ Ponds	12790	8.5
5	Canals	111046	73.8
6	Other Sources	1604	1.07
7	Net irrigated area	150475	

Source: District at a glance- 2005-06

1.8 Industries

The sugar factory at Mandya, Pandavapura, K.M.doddi and Koppa. Chemical and Paper mill at Belagula near to Mandya town, Milk dairy at Gejjalagere are the important industries in the district.

1.9 Studies Carried out by CGWB

The central ground water board has carried out Systematic hydrogeological surveys and Ground water exploration in the district. The C.G.W.B has conducted exploratory drilling of 20 exploratory borewell and 6 observation wells in the first phase of exploration. In the second phase of exploration drilling 20 exploratory borewell and 6 observation wells were drilled.

The Systematic hydrogeological surveys were carried out by Shri. N.R.Bhagat, Shri. T.M.Hunse, Shri. K.R.Sooryanarayana and Shri.V.Saivasan.

The Reappraisal hydrogeological surveys were carried out by Shri. A.Suresha and Shri N.Jyoti kumar.

The C.G.W.B. and Department of mines and geology Govt. Karnataka has carried out ground water resource evaluation of all taluks.

2.0 Rainfalls and Climate.

The district enjoys sub-tropical climate with temperatures ranging between 16^o and 35^o C. April is the hottest month and with the on set of southwest monsoon in June, the temperature drops considerably. December is the coldest month.

The rainfall is generally uniform in the district except in the western sector where it is slightly higher. The normal rainfall of the district is 623mm. The highest rainfall recorded in the district was 1321 mm at Maddur, whereas lowest rainfall was at S.R.Patna, which was 861 mm during 2005. During the year 2005 the rainfall at all the taluks is above normal. About 50% of the rainfall is received during southwest monsoon, 20% during northeast monsoon period and 30% during the summer period. The average number of rainy days is about 43 spread over a period of 7 months from April to October.

Table- 4 Talukwise rainfall data

sl. no	Taluk	No.of Raingauge stations	Normal rainfall mm (1901-70)	Actual rainfall mm 2005	Rainy days	
					Normal (1901-70)	Actual (2005)
1	K.R.Pet	5	735.2	1042.3	48.0	61
2	Maddur	5	706.1	1320.7	43.5	57
3	Malavalli	2	703.8	1125.8	43.9	62
4	Mandya	7	765.7	1171.1	42.8	61
5	Nagamangala	5	686.5	1235.4	40.4	54
6	Pandavapura	3	645.9	1232.2	39.7	64
7	Srirangapatna	5	655.8	861.3	41.7	57
Total/Average		32	623.19	1141.3	42.9	59

Source: District at a glance- 2005-06

3.0 Geomorphology and Soil types

3.1 Geomorphology

The district is located in the southern maidan region of the state. The surface topography is in the form of undulating plain situated at an average elevation of 750-900m amsl. There are few sporadic out crops of rocks as hills and few fertile shallow valleys. In the southeastern part of the district the Biligirirangana bett ranges extending

from Mysore District tapers off here. In this portion Cauvery river breaks through the hill ranges and forms the famous Gaganachukki and Barachukki water falls. The Melukote range of hills form a broken series of conspicuous peaks, which reach the altitude of 1159m amsl, 1064m amsl, 1050m amsl and 1046m amsl. The Hulikere-Kartigatta hill range near S.R.Patna and bold rugged low peaks near Sindhugatta are also conspicuous. The general slope in the district is in southeast direction.

The Cauvery river system drains the district towards Bay of Bengal.

3.2 Soil types

The soil of Mandya district is derived from granites and gneisses interpreted with occasional patches of schist in SR Patna, Mandya and Pandavapura taluks. The soils range from red sandy loams to red clay loam very thin in ridges and higher elevations and comparatively thick in valley portions. The soils in Mandya, Malavalli, Maddur and Nagamangala taluks are thin gravelly and underlain with a murrum zone containing weathered rock. The soils are highly leached and poor in bases. The water holding capacity is low. On the other hand the soil under the old channel areas of Malavalli, Pandavapura and S.R. Patna are high in clay. The infiltration rates of red loamy and red soils are 2 to 12 cm/ hr and 1 to 3 cm/ hr.

4.0 Ground Water scenario

4.1.1 Occurrence of Ground Water

Mandya district is covered by the geological formations ranging in age from Archaean, Granitic gneiss, Dharwar etc to recent alluvium. Various intrusive later traverse these formations. Based on the hydrogeological conditions in different rock types occurring in the district the entire district comes under hard rock area except for areas adjacent to the major streams and rivers where alluvium occurs as local pockets. The ground water occurs in the secondary porosity of weathered formations like granitic gneiss, granite and schists etc under water table conditions at shallow depth up to 25 m and generally under semi-confined to confined conditions in the jointed and fractured portions of the above rocks down to the depth of 200 m bgl. The ground water also occurs in the inter-granular spaces in the alluvial patches along the stream courses under water table conditions at shallow depth.

Hydrogeological features are shown in fig -3

The regional ground water flow systems of Mandya districts described under three zones as shallow, moderately deep, and deep zone.

a) Shallow zone: The aquifers occurring within the depth of 25 m below ground level are constituted of weathered and fractured granite gneisses, granites and schist. Ground water occurs in the open spaces of weathered and fractured formations under water table conditions. Ground water of this zone is utilised through structures like dug wells, dug cum borewells and shallow borewells. In the 12% of the areas of the district the weathered zone thickness is less than 5 mts falling in parts of northeastern K.R.Pet, southwestern Nagamangala and north and western parts of Pandavapura taluks. In 64% areas of the district the weathered thickness is in the range of 5 to 10 mts. In the remaining 24% areas of the district falling in parts of southern K.R.Pet, eastern Maddur, eastern Malavalli, small portion in eastern part of Nagamangala, southern part of Pandavapur and major part of S.R.Patna taluk the weathered thickness is more than 10m.

b) Moderately deep zone: The aquifers occurring within the depth of 50 m below ground levels are grouped in this category. The aquifers of this category constituted of weathered and fractured granite gneisses, granites and schist. Ground water occurs in the open spaces of weathered and fractured formations under semi-confined conditions.

c) Deep zone: The aquifers occurring within the depth of 200 m below ground levels are grouped in this category. The aquifers of this category constituted of fractured and jointed granite gneisses, granites and schist. Ground water occurs in the open spaces of fractured and jointed formations under semi-confined to confined conditions.

4.1.2 Depth to water levels

Out of 41 national hydrograph stations in Mandya district, during May 2006, 2 stations were dry and during November 2006, 3 stations were dry. The depth to water levels in the national hydrograph stations (dug wells) recorded during May-2006 was in the range of 0.53 to 21.28 mbgl. The depth to water levels in the national hydrograph stations (dug wells) recorded during November –2006 were in the range of 0.63 to 23.05 mbgl. The water levels in the 8-piezometer national hydrograph stations ranges from 1.23 to 13.85 m.bgl during May 2006 and from 1.49 to 17.77 mbgl during November 2006.

Depth to water levels of May and November 2006 are shown in fig- 4 and 5 respectively.

4.1.3 Seasonal water level fluctuation

The seasonal water level fluctuation for the year 2006 was in the range of 0.01 to 4.43m for water level raise category and was in the range of -3.44 to -0.10m for water level fall category. The seasonal water level fluctuation for the year 2006 is available for piezometer hydrograph network stations in the range between 0.025 to 2.45 m.

4.1.4 Long-term water level trends (from year 1997 to 2006)

Out of 26 premonsoon Long term water level trend data for the period from year 1997 to 2006 available for national hydrograph network stations, 13 are showing rising trends in the range of 0.0081m/year to 0.7298m/year and remaining 13 are showing falling trends in the range of 0.0331m/year to 0.5613m/year. Out of 38 post monsoon long term water level trend data for the period from year 1997 to 2006 available for national hydrograph network stations, 10 are showing rising trends in the range of 0.0021m/year to 0.263m/year and the remaining 28 are showing falling trends in the range of 0.0069m/year to 1.9793 m/year. The annual Long-term water level trend data for the period from year 1997 to 2006 available for 32 national hydrograph network stations. Out of the above 16 are showing rising trends in the range of 0.0158m/year to 0.3516m/year and remaining 16 are showing falling trends in the range of 0.018m/year to 0.883m/year.

4.1.5 Results of Ground water exploration

On the basis of the hydrogeological surveys followed by resistivity surveys total of 26 sites were recommended for the drilling of exploratory wells to a depth of 100m bgl in the first phase of ground water exploration in Mandya district. The depth of the wells ranged from 15.95 to 92.50 mbgl. The discharge during PYT ranged from 0.095 to 6.1 lps The transmissivity during PYT ranged from 1.2 to 126m²/day. The drilling results indicated that 35% of the wells, discharge during PYT was >3 lps. In the second phase of ground water exploration in Mandya district total of 26 exploratory wells were drilled to a depth maximum of 200m bgl. The depth of the wells ranged from 123.24 to 200.00 mbgl. The drilling discharge ranged from 0.014 to 16.4 lps The discharge during PYT ranged from 55.2 to 438 lpm. The transmissivity ranged from 0.276 to 291m²/day. The drilling results indicated that 65% of the wells, the drilling discharge was >3 lps. The deep fractures were encountered at a depth 150 to 200 mbgl.

4.2 Ground Water Resources

The ground water resource estimation shows that, total annual ground water recharge is 65064.75 HAM and net annual ground water availability is 63881.64 HAM as on year 2004. Annual ground water draft for domestic and industrial uses is 4017.97 HAM and for irrigation purposes the draft computed is 19591.01HAM. Total draft during the year 2004 was 39608.96 HAM. The net ground water availability for future irrigation development is 41002.24 HAM, after allocating 5795.01 HAM of ground water for domestic and industrial uses for the next 25 years. The stage of development for the whole district was computed as 37.93 %. About 27.14 % area of the district is over exploited, 11.43% area of the district is critical and 62 % of the area is safe. Talukwise resources and categorization are shown in fig- 6.

Table- 5: Ground water resources of Mandya district, Karnataka state as on March 2004

Taluk	Net annual ground water availability	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	Balance ground water irrigation potential available	Stage of ground water development	Taluk wise Categorisation of areas as on March 2004			
							Safe area	Semi Critical area	Critical area	O.E. area
	HAM	HAM	HAM	HAM	HAM	(%)	(%)	(%)	(%)	(%)
K.R.Pet	11920.20	9089.43	455.11	4812.30	5384.24	76.25	3			97
Maddur	6962.10	1778.22	976.49	4968.37	8093.26	25.54	69		2	29
Malavalli	5852.31	4089.54	705.61	1589.34	1771.36	69.88	1		77	22
Mandya	10367.12	1250.79	1511.57	8628.24	13440.64	12.06	99			1
Nagamangala	13267.46	2843.73	1141.47	10129.74	19035.73	21.43	98			2
Pandavapura	10303.26	2858.00	500.41	7497.06	8453.06	27.74	85			15
S.R.patna	5209.19	1699.25	504.35	3377.19	3788.30	32.62	75		1	24
Total	63881.64	23608.96	5795.01	41002.24	59966.59	37.93	61.43		11.43	27.14

4.3 Ground water Quality

Water samples are collected from selected dug wells (National Hydrograph monitoring Stations) annually for chemical analysis. The analysis result indicates that in general the quality of ground water is potable for drinking and suitable for irrigation purposes. However high concentration of fluoride (>1.5 mg/lit) is observed around Nagamangala and Maddur as small patches. High concentration of nitrates (>45 mg/lit) is observed in major parts of all taluks except Malavalli taluk where it is seen as small patches in the southern part. This may be attributed to more use of fertilizers and canal irrigation. High chloride concentrations are observed in eastern part of Mandya and around Maddur. Electrical conductivity is in permissible range in general. In the western part of the district the Electrical conductivity values are less than 1000 micro mhos, whereas In southeastern part the electrical conductivity values varies from 1000 to 3000 micromhos, especially in canal command areas of the district the EC values are more than 2000 micromhos /cm.

Ground water quality map of the district is shown in fig -7.

4.4 Status of Ground Water Development

The farmers with small acreage of land depend mainly on the rainwater and water available in the shallow wells. The abstraction structures, dug-wells and bore wells constructed/existing are mainly tapping the aquifers within depth range 8.00 to 12.00mbgl and 150 to 200mbgl respectively.

As per the record as on 31.3. 2006 the domestic water requirement supplied through 1132 numbers of Mini-water supply schemes, 932 numbers of piped water supply schemes through borewells along with 9902 number of bore wells installed with hand pumps. The ground water is a major source for drinking purpose.

Irrigation from ground water is through dugwells, dug-cum-borewells and borewells with 16.29 % of the total irrigation in the district. Wells are the major source of irrigation in the district. There are 8501 dug wells and 15905 bore wells in the district as per third MI census.167 dug wells and 520 bore wells are not in use due to various reasons including drying up of the wells. Talukwise breakup of the wells is given in table- 6.

Table- 6: Distribution of wells according to status as per MI Census 2000-01

SI No	Taluk	Wells in Use		Wells not in use	
		Dug Wells	Shallow BW	Dug Wells	BW
1	K.R.Pet	1312	4409	22	309
2	Maddur	1205	2202	27	63
3	Malavalli	1477	3266	40	74
4	Mandya	1892	1259	16	1
5	Nagamangala	977	2554	20	25
6	Pandavapura	816	909	29	28
7	S.R.patna	655	782	13	20
Total		8334	15381	167	520

4.4.1 Water Lifting devices

Water lifting devices used in the district are Electric motor, Diesel Pump, Wind Mill and manual. 97% of the water lifting devices is electric pump. Distribution of water lifting devices is given in table -7.

Table- 7: Distribution of wells according to water lifting device as per MI Census 2000-01

Lifting device	Dug well	Bore well	Total
Electric Pump	7885	15695	23580
Diesel	428	11	439
Wind Mill	92	85	177
Solar	2	0	2
Manual	8	14	22
Others	86	96	182
Total	8501	15901	24402

4.4.2 Distribution of wells according to Horse Power

Capacity of pumps used in the area to draw ground water ranges from less than 2HP to >10HP. About 75 percentages of the wells are fitted with 4 to 6 HP motor. The Distribution of wells according to Horse Power is given in table- 8.

Table- 8: Distribution of wells according to Horse Power

Horse Power							
Type of well	0-2	2--4	4--6	6--8	8--10	>10	Not Specified
Dug Well	104	1551	5827	439	382	10	188
Bore Well	182	2705	12290	377	142	10	195
Total	286	4256	18117	816	524	20	383
Percentage	1.17	17.44	74.49	3.34	2.15	0.82	1.57

4.4.3 Drinking water Wells

As per the record as on 31.3. 2006 the domestic water requirement supplied through 1132 numbers of Mini-water supply schemes, 932 numbers of piped water supply schemes through borewells along with 9902 number of bore wells installed with hand pumps. The ground water is a major source for drinking purpose.

5. Ground Water Management Strategy.

5.1 Ground water development

A hydrogeological map showing water-bearing formations, tiled potential, decadal mean water level and isohyets is shown in fig 7. Sustainability of ground water resource and its judicious use should be given prime importance while making development strategy. In critical and over exploited areas, artificial recharge and rainwater harvesting measures are recommended to augment to ground water system. About 41002.24 ham of ground water resource is available in the district for further development. The development is recommended only in area catagorised as safe and semi critical (Fig- 5). In such areas, potential aquifers can be located by hydrogeological surveys aided by geophysical methods. Dug wells and filter points are recommended only in river and valley banks where sufficient thickness of valley fill is available which gets saturated during rainy seasons. The ground water development in other feasible areas should be done by bore wells. Spacing norm of 200 m may be strictly adhered to avoid interference. Aquifer should be pumped as per crop water requirement.

In areas, which are categorized as critical and over exploited, growing crops like paddy, sugarcane etc, having high water requirement may be avoided. Advance irrigation methods like drip and sprinkler irrigation may be practiced.

In the command areas conjunctive use of surface and ground water may be practiced to avoid long-term hazards like water logging and ground water as well as soil salinity problems.

5.2 Water conservation and Artificial Recharge

More than 97% of the areas of K.R.Pet taluk in the district is over exploited and Malavalli taluk has more than 77% area in critical category. Water level in these is taluks showing downward trend. In such a situation there is a need to augment ground water recharge by artificial recharge structures and rainwater harvesting structures to harvest noncommittal surface runoff.

In the western part of the district where the topography is hilly and rugged artificial recharge structures like nalla and gully plugs contour bunds and contour trenches and nallabunds may be constructed and in comparatively plain areas percolation tanks and point recharge structures like recharge shafts recharge pits and recharging through existing dug/bore wells may be practiced. In semi-urban areas in the district, lot of roof area is available for rooftop rainwater harvesting. So in these semi-urban areas rooftop rainwater harvesting practices may be encouraged. This will help in reducing the load on urban water supply systems.

6.0 Ground water related Issues & Problems

There is over exploitation of ground water resource in 97% area of K.R.Pet taluk, and there is critical area of 77% area of Malavalli taluk. This has resulted in the decline of water level. Therefore, immediate artificial recharge measures are required to be taken up in these taluks.

Fluoride concentration of more than permissible limit exists as small pockets in parts of Maddur and Nagamangala taluks of the district. Ground water in younger granites has more fluoride content than the gneisses. The fluoride content increases with depth in same aquifer. The shallow aquifers are having comparatively low concentration of fluoride. In order to reduce or control the problem, it is recommended to recharge ground water by way of artificial recharge structures like percolation tank, desilting of silted tanks, check dams, nalla bunds, farm ponds and subsurface dykes. Nitrate concentration of more than permissible limit exists all over the district. This may be due to indiscriminate use of fertilizer and biological contamination from decaying vegetation. Judicious use of fertilizer and proper care in disposing the biological waste can reduce the problem.

7. Awareness and Training Activity

7.1 Water Management Programmes (Wmtp)

Training program on Ground water management was organized for TOT at Cauvery Auditorium, ZP Office, Mandya during 26.7.2003 to 28.7.2003. Sri.S.S.Chauhan Chairman, CGWB presided over the function. Sri B.P.Kaniram, IAS, DC, Mandya District inaugurated on 26.7.03. Sri K.H.Ashwathnarayana Gowda, IAS, CEO, ZP, Mandya participated as Guest of Honour. Sri C.S.Ramasesha R.D, CGWB, SWR, welcomed the gathering and Sri.K.Keerthiseelan, Suptdng Hydrogeologist gave vote of thanks. 32 trainees from various State Government Departments, NGOs, and Educational Institutions from Mandya district participated in the training programme. Officers of CGWB presented seven lecture topics on the theme. One-day field visit was arranged to Bangalore University and trainees were apprised of the artificial recharge scheme implemented in the university campus. Valedictory function was held on 28.7.03 and certificates with course material were distributed to the trainees.

7.2 Participation in Exhibition, Mela, fair etc

No exhibition was conducted in the district

8.0 Areas Notified by CGWA/SGWA

No area in the district is notified so far

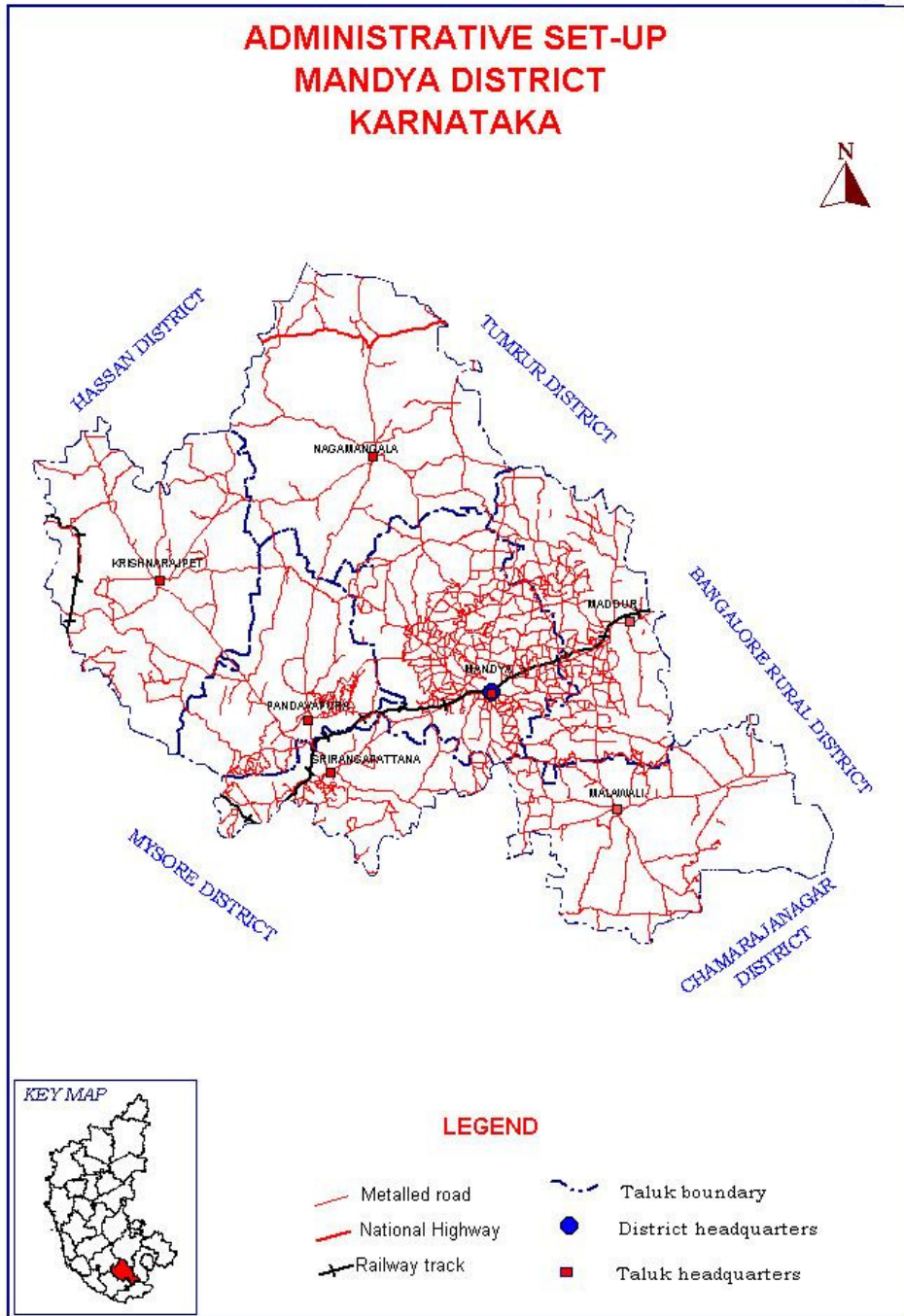
9. Recommendations

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.

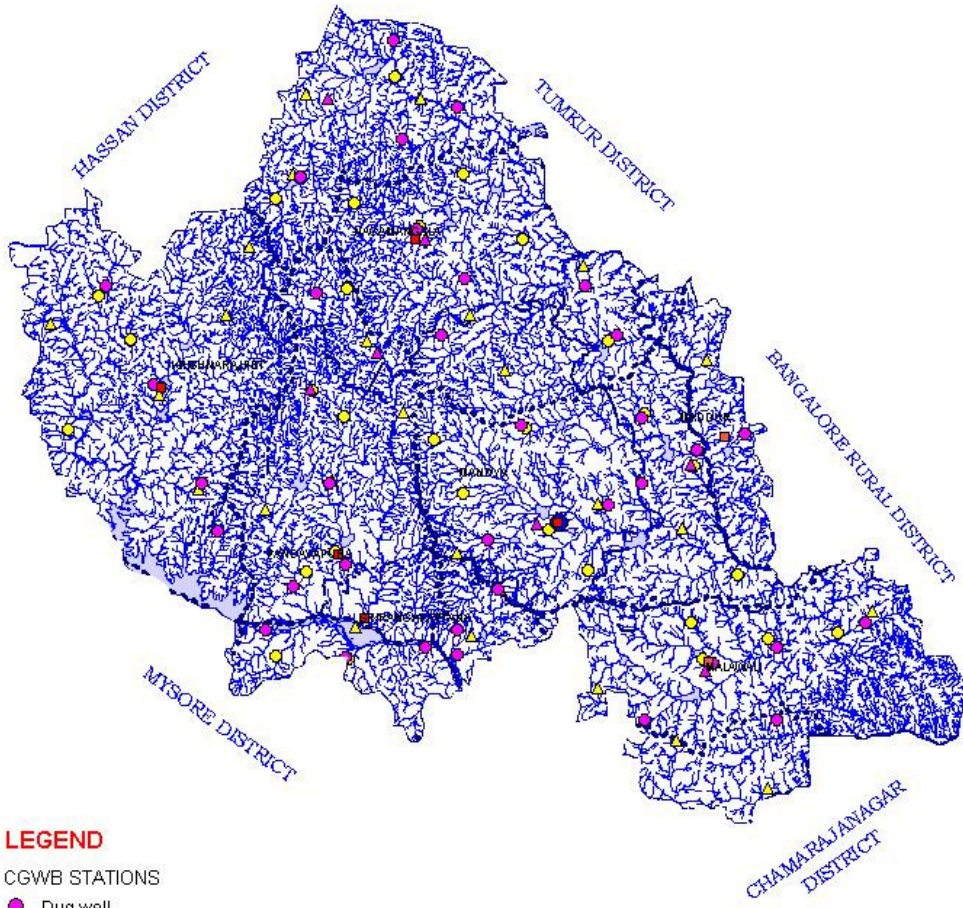
- 1) The dugwells, which penetrate partially the weathered, fractured zones of the aquifers, may be deepened further for the better productivity.
- 2) Construction of check dams and sub surface dykes at appropriate places across the nallahs and streams in the water table depleting areas of K.R.Pet, Nagamangala and Malavalli taluks.
- 3) 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.

- 4) The ground water worthy areas such as topographic lows, valley portions low water level fluctuations zones should be developed with an adequate soil conservation measures to prevent the soil erosions.
- 5) Constant monitoring of ground water quality should be carried out in the Cauvery and Hemavathi canal command areas to prevent the pollution and related problems. The determination of trace elements and organic compound is done to help in categorizing the quality of water.
- 6) The ground water in canal command area is found under-developed therefore, it is strongly recommended to prepare an action plan to bring more area under conjunctive use of ground water and surface water irrigation.
- 7) An additional number of 13667 dug wells and 26092 borewells/dug-cum-borewells, constructed would help in tapping the unutilized ground water, an annual average draft of 0.9 ham and 1.1ham can be exploited respectively through dug wells and borewells and keep the area under safer category.
- 8) Conjunctive use of both Surface and Ground water practiced in the canal command area would improve the quality of ground water, prevent the water logging conditions and availability of canal water to the tail end areas.
- 9) The ground water development should be allowed only areas, which are categorised as safe and semi critical with caution.
- 10) Mass awareness programmes should be conducted for public awareness about the limited availability of ground water resource.
- 11) Farmers should be educated to grow less water intensive crops and adopt micro irrigation system. Government should provide subsidy such irrigation systems.
- 12) Artificial recharge structures should be constructed in feasible areas for augmenting ground water resource and to improve ground water quality especially in areas of K.R.Pet, Nagamangala and Malavalli taluks where fluoride problem exists to a limited extent.
- 13) Sites for bore wells and dug wells should selected with the technical advice from technical qualified persons.

Fig- 1



DRAINAGE & HYDROGRAPH MONITORING STATIONS MANDYA DISTRICT, KARNATAKA



LEGEND

CGWB STATIONS

● Dug well

▲ Piezometer

DMG STATIONS

● Dug well

▲ Piezometer

☪ Surface waterbody

☪ Drainage

⋯ Watershed Boundary

Fig-3

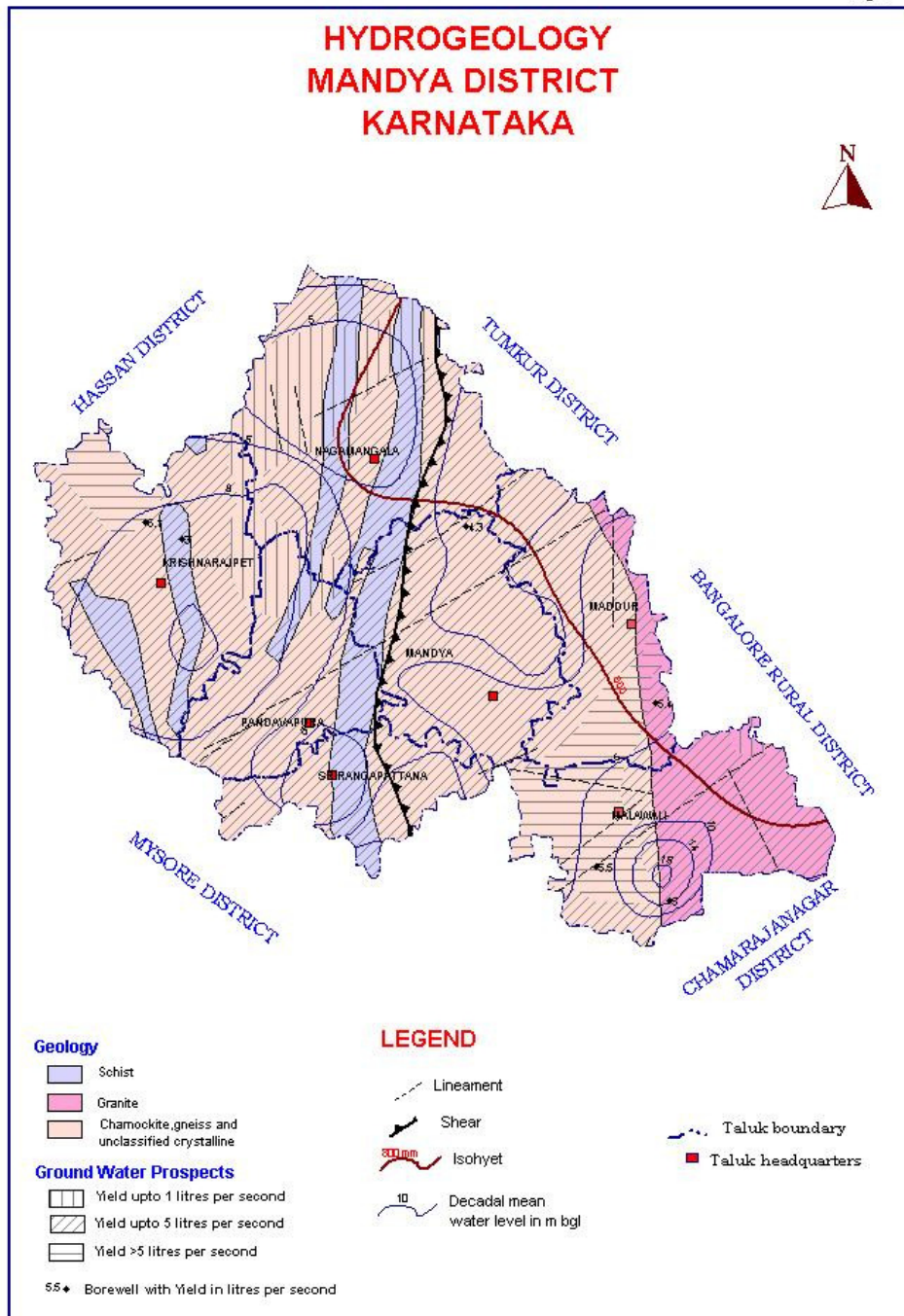
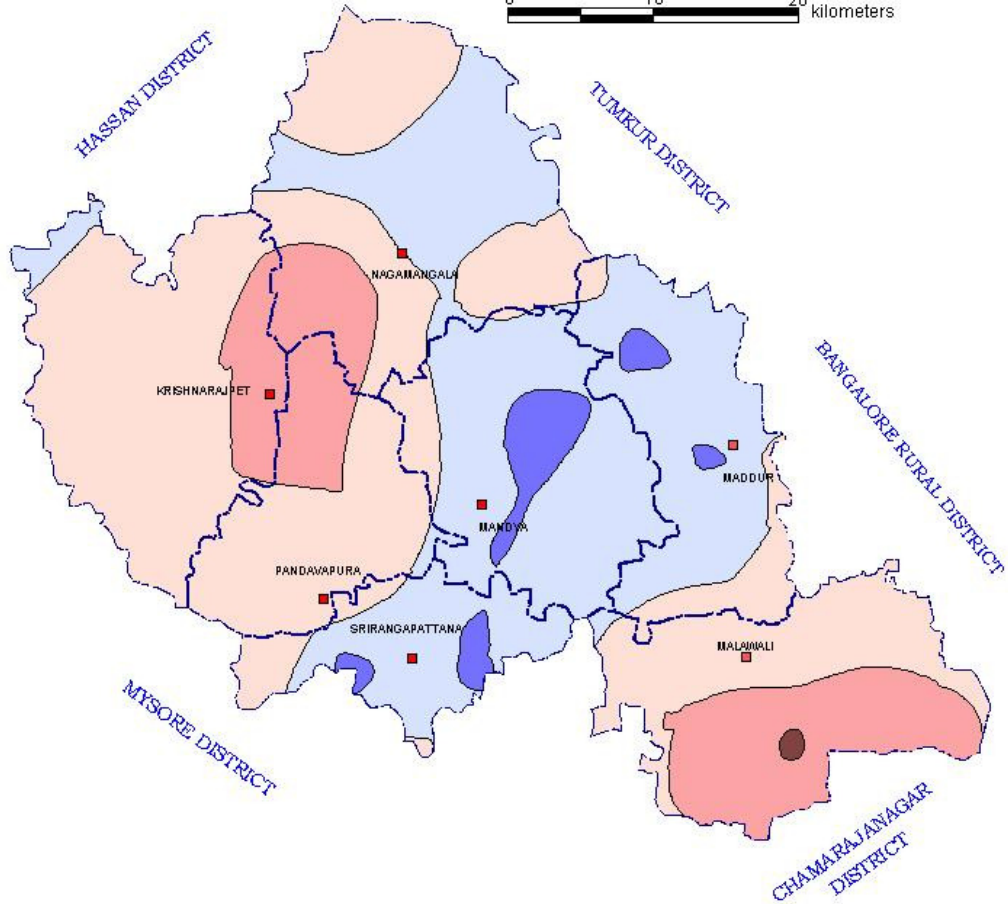


Fig-4

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



0 10 20 kilometers



LEGEND

Depth to Water
Level (m bgl)



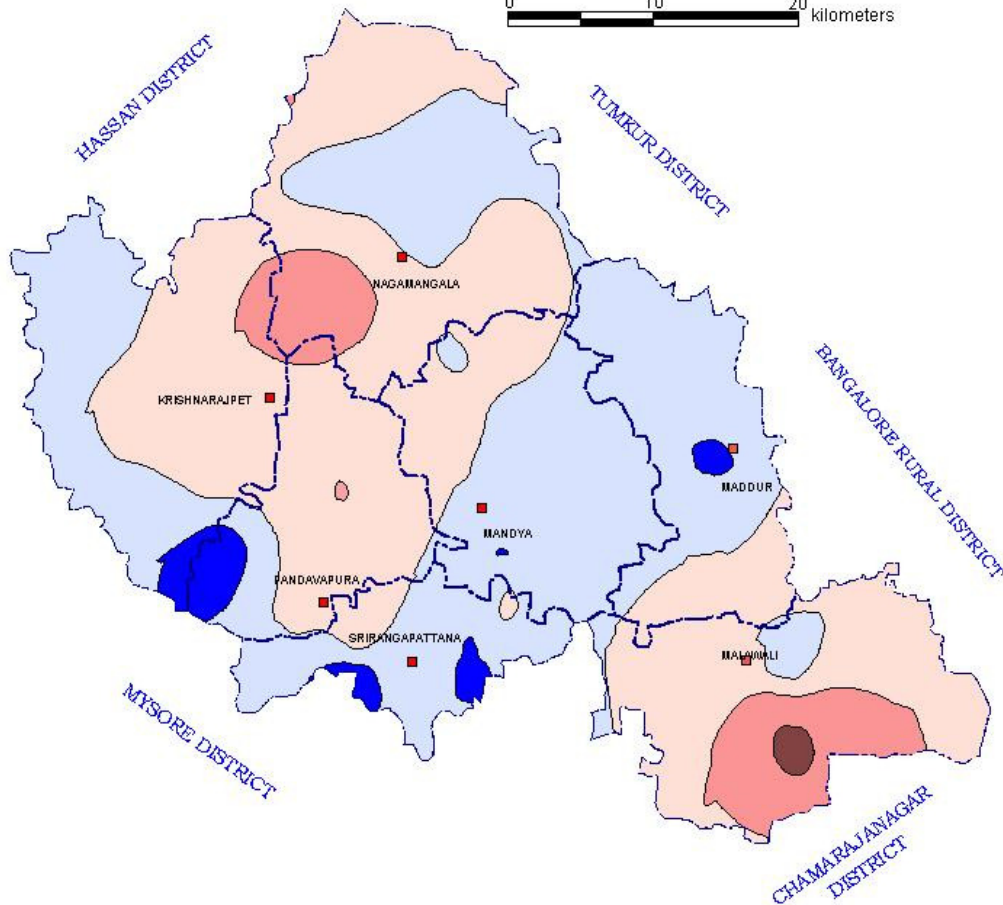
-  < 2
-  2 - 5
-  5 - 10
-  10 - 20
-  > 20

Fig-5

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



0 10 20 kilometers



LEGEND

Depth to Water

Level (m bgl)



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

Fig- 6

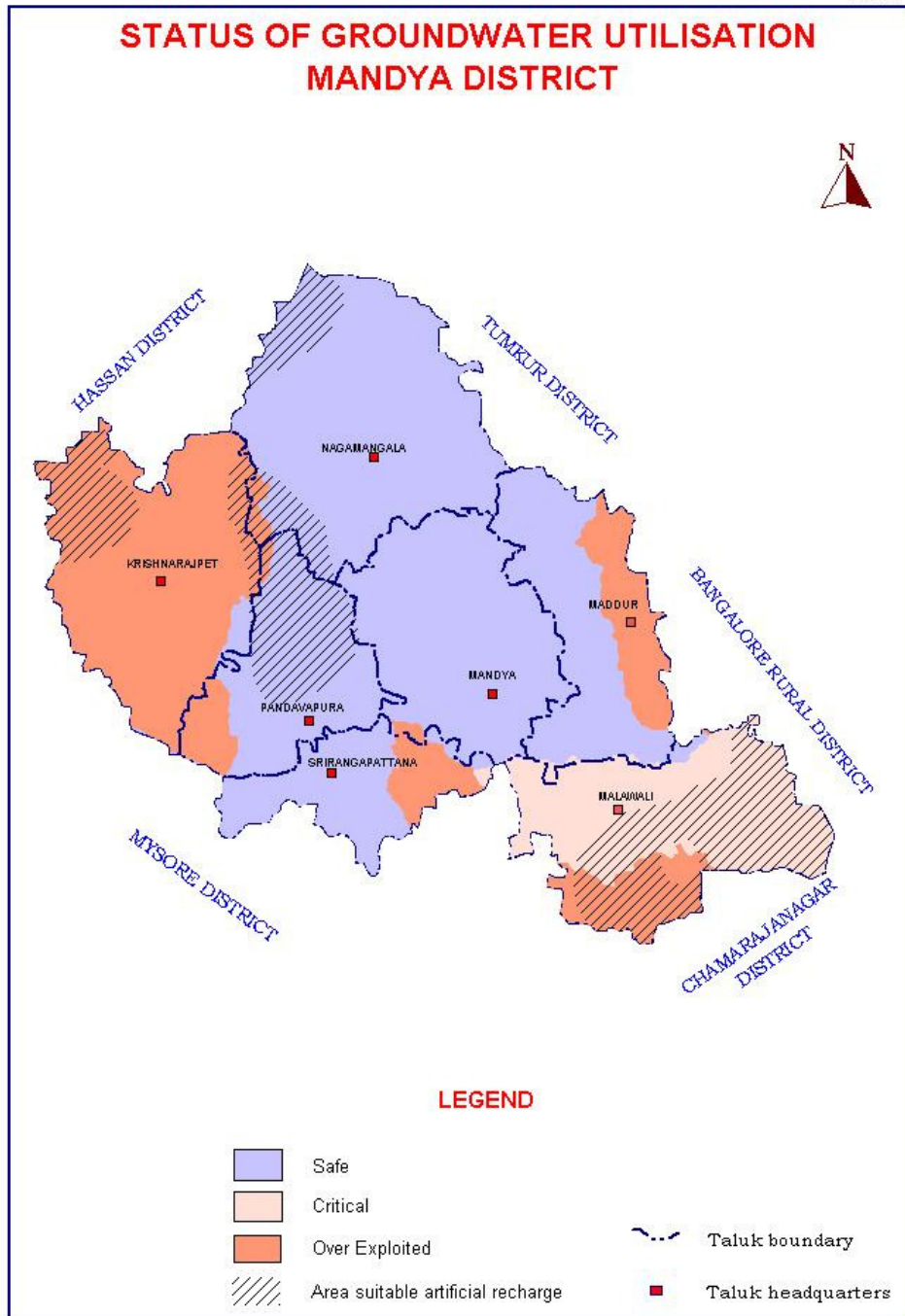


Fig-7

