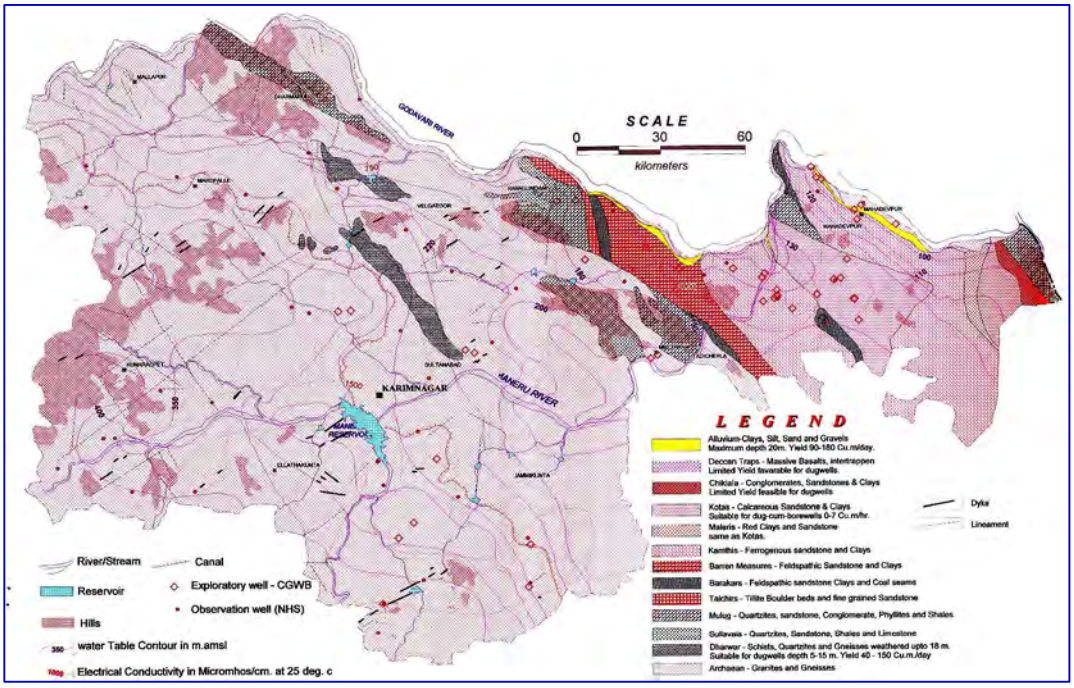
CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES
GOVERNMENT OF INDIA

GROUND WATER BROCHURE
KARIMNAGAR DISTRICT, ANDHRA PRADESH



SOUTHERN REGION
HYDERABAD
September 2013

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KARIMNAGAR DISTRICT, ANDHRA PRADESH
(AAP-2012-13)

BY

R.V.V. SAGAR
SCIENTIST-D

SOUTHERN REGION
GSI Post, Bandlaguda
Hyderabad-500068
Andhra Pradesh
Tel: 040-24225201
Gram: Antarjal

BHUJAL BHAWAN,
NH.IV, FARIDABAD -121001
HARYANA, INDIA
Tel: 0129-2418518
Gram: Bhumijal

GROUND WATER BROCHURE
KARIMNAGAR DISTRICT, ANDHRA PRADESH

CONTENTS

KARIMNAGAR DISTRICT AT A GLANCE

1. GENERAL FEATURES:

i. Location	:	North Latitude 18^0 00' and 19^0 00'
	:	East Longitude 78^0 40' and 80^0 00'
ii. Geographical area	:	11823 Sq kms
iii. Dist head quarters	:	Karimnagar
iv. No. of Revenue. Mandals	:	Fifty Seven (57)
v. No. of Revenue. villages	:	One thousand fifty eight (1058).
vi. Population (2011)	:	a) Total - 38, 11,738 b) Urban- 9,94, 231 c) Rural- 28,17,507
vii. Population density	:	322/ sq.km

2. RAINFALL(2012 in mm):

i. Normal Annual Rainfall	:	1521.0
Monsoon Rainfall	:	83%
Non-monsoon Rainfall	:	11%
ii. Cumulative departure for the last 5 yrs from normal	:	32% to 73%

3. LAND USE (2012) (Area in ha)

i. Forest	:	7,59,438
ii. Barren and uncultivable land	:	88,887
iii. Cultivable waste	:	14,570
iv. Current fallows	:	1,02,211
v. Net area sown	:	5,31,538

4. IRRIGATION (2012) (Area in ha)

i. Area irrigated under canals	:	78,571
ii. Area irrigated under tanks	:	26,697
iii. Area irrigated under dug wells	:	1,96,067
iv. Area irrigated under tube wells	:	52,898
v. Net area irrigated	:	3,54,343
vi. Gross area irrigated	:	5,85,992

5. GEOLOGY

Granites and Gneisses, Sandstone, Limestone, Shale, Quartzite's, Clays

6. GROUND WATER

Exploration by CGWB

a) Number of wells drilled	:	21 EW,5 OW,PZ-44

b) Aquifer Properties

i) Monitoring

Dug wells	:	24
Piezometers	:	51

Depth to water level

Pre-monsoon (min-max)	:	1.63 to 24.67 m.bgl
Post monsoon (min-max)	:	1.22 to 13.82 m bgl

7. GROUND WATER RESOURCES (MCM)

i. Net annual Ground water Resources	:	1458.75
ii. Net Annual Ground water Draft	:	696.20
iii. Balance Ground water resource	:	762.55
iv. Stage of Ground water Development	:	48%

8. GROUND WATER DEVELOPMENT CATEGORY

i. Safe (<70%)	:	All mandals

9. CHEMICAL QUALITY

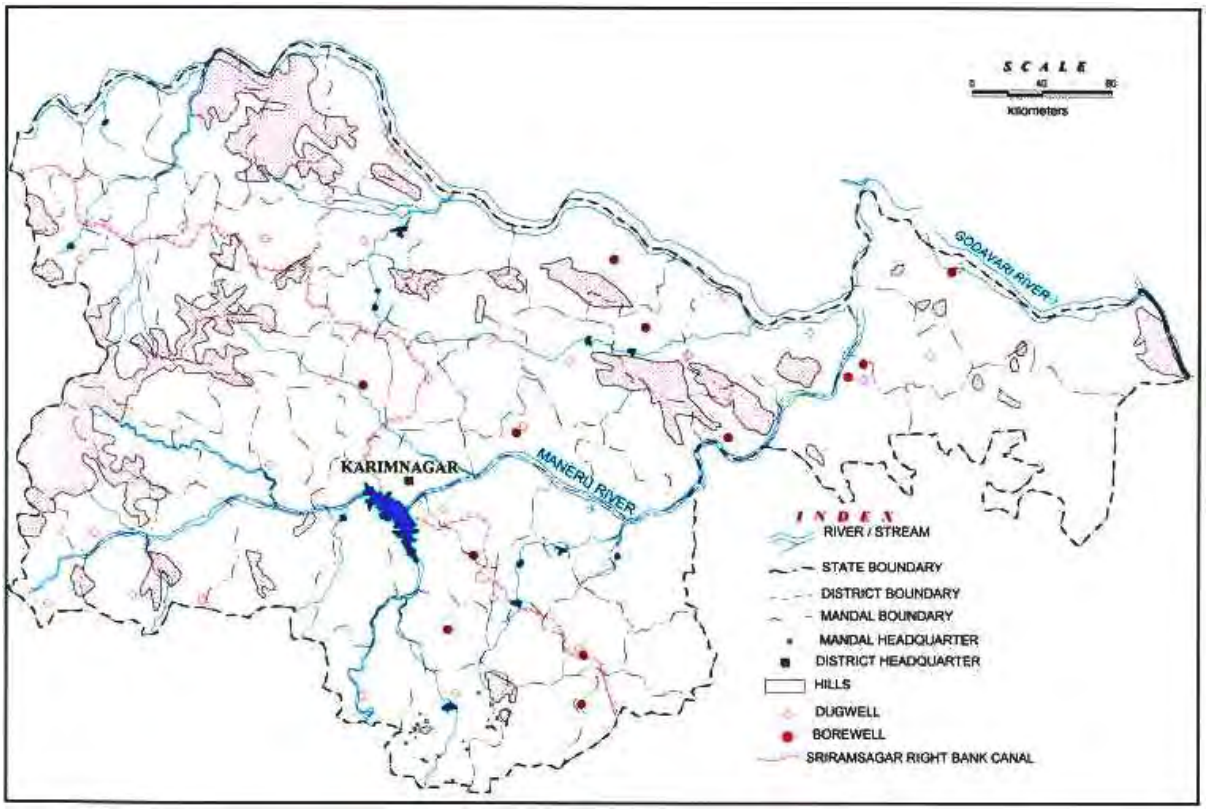
i. Electrical Conductivity (Micro Siemens/cm at 25^0 C)	:	1020 to 1900
ii. Chloride (mg/l)	:	48 to 241
iii. Fluoride (mg/l)	:	0.52 to 0.55
iv. Nitrate (mg/l)	:	20 to140

GROUND WATER BROCHURE
KARIMNAGAR DISTRICT, ANDHRA PRADESH

1.0 INTRODUCTION

Karimnagar district with a total geographical area of 11,823 sq km is one of the ten Telangana districts of Andhra Pradesh. The district is mainly agrarian and agriculture is the main stay of the population. Population density, which was 64 persons per sq km during 1901, has risen to 295 people per sq km as per 2001 census. This has led to stress on available land and the size of landholdings has decreased considerably. The district forms part of the Godavari river basin. The river Godavari, the largest river in the peninsular India enters the district at Kandukurthi village runs for a distance of 283 km forming the northern and eastern boundary of the district and leaves the district at Muknur village (Fig 1). The entire district is mainly drained by Maneru river, a tributary of river Godavari. The district is divided into 85 minor basins.

Fig. 1: Administrative Divisions of Karimnagar District, A.P

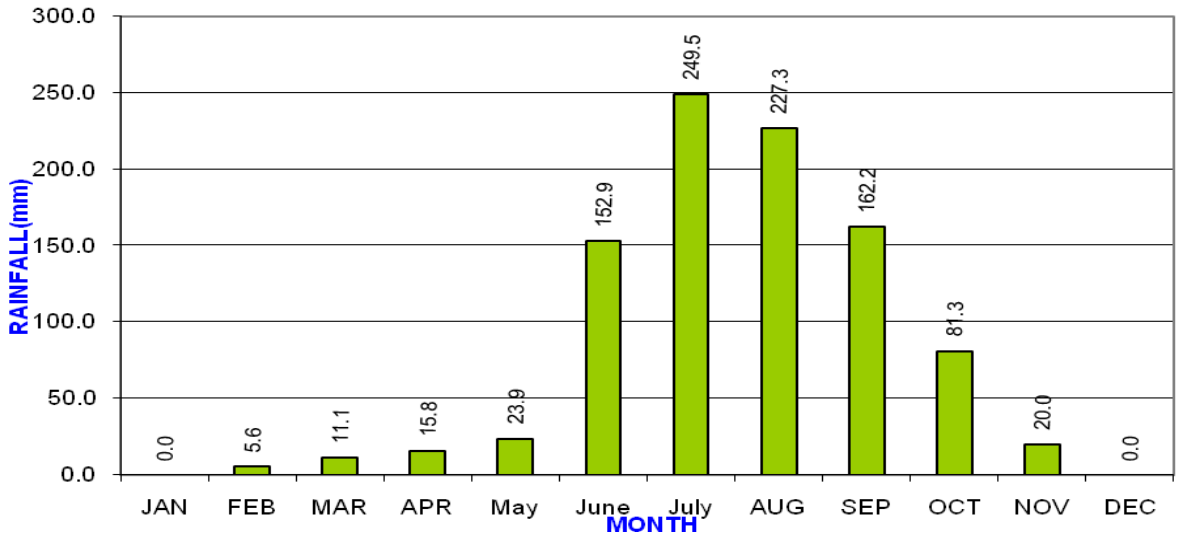


The total cropped area of 533604 ha an area of 356418 ha is having irrigation facilities. 25.17% of the irrigated area is covered by surface water sources, 64.75% of the area is irrigated through ground water sources and the remaining by other sources. The main crops raised are Rice, maize, green gram, chillies, turmeric, cotton and ground nut. Central Ground Water Board has covered the entire district through systematic hydrogeological surveys by 1990.

2.0 RAINFALL

The average annual rainfall of the district is 950 mm, which ranges from nil rainfall in December to January to 250 mm in July. July and august are the wettest months of the year. The mean seasonal rainfall distribution is 792 mm in southwest monsoon (June-September), 101 mm in northeast monsoon (Oct-Dec), nil rainfall in winter (Jan-Feb) and 43mm in summer (March–May). The percentage distribution of rainfall, season-wise, is 83% in southwest monsoon, 11 % in northeast monsoon, 0.6 % in winter and 5.4 % in summer. The mean monthly rainfall distribution is given in Fig.2.

Fig.2 Mean monthly rainfall distribution in Karimnagar district



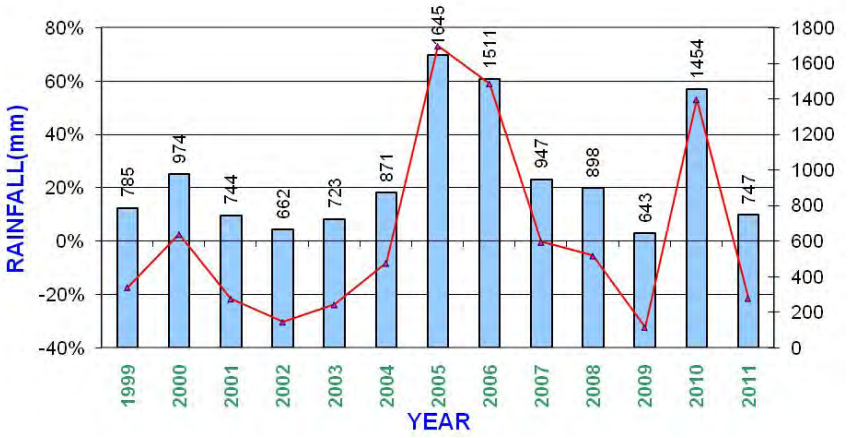
The annual and seasonal rainfall distribution with its departure from mean along with percentage distribution year-wise is given in Table 1. The data is presented in Figure 3. The annual rainfall ranges from 643 mm in 2009 to 1645 mm in 2005. The annual rainfall departure ranges from -32 % in 2009 and to 73 % in 2005. The southwest monsoon rainfall contributes about 83 % of annual rainfall. It ranges from 486 mm in 2009 to 1223 mm in 2010. The year 2002 and 2009 experienced drought conditions in the district as the annual rainfall recorded in these two years is 30% and 32% less than the long period average (LPA) respectively. The cumulative departure of annual rainfall from LPA is presented in Figure 2. It indicates that, the rainfall departure, as on 2011 is positive i.e. 27%, showing rainfall excess.

Table -1 MONTHLY RAINFALL DISTRIBUTION (1999-2011)

Sl No	YEAR	ANNUAL	SWM	NEM	WINTER	SUMMER	SWM(%)	NEM(%)	WINTER (%)	SUMMER (%)	DEP FROM LPA (%)
1	1999	785.0	712.0	30.0	5.0	38.0	90.70%	3.82%	0.64%	4.84%	-17%
2	2000	974.0	922.0	5.0	9.0	38.0	94.66%	0.51%	0.92%	3.90%	3%
3	2001	743.9	585.0	105.9	5.0	48.0	78.64%	14.24%	0.67%	6.45%	-22%
4	2002	661.7	547.7	45.0	38.0	31.0	82.77%	6.80%	5.74%	4.69%	-30%
5	2003	723.4	590.5	109.0	3.0	20.9	81.63%	15.07%	0.41%	2.89%	-24%
6	2004	871.3	574.7	87.8	114.4	94.4	65.96%	10.08%	13.13%	10.83%	-8%
7	2005	1644.6	1215.0	216.5	89.4	123.7	73.88%	13.16%	5.44%	7.52%	73%
8	2006	1511.0	1230.7	108.7	0.0	171.6	81.45%	7.19%	0.00%	11.36%	59%
9	2007	946.5	850.2	48.6	2.0	45.7	89.83%	5.13%	0.21%	4.83%	0%
10	2008	897.6	769.1	15.1	1.2	112.2	85.68%	1.68%	0.13%	12.50%	-6%
11	2009	642.6	486.1	122.9	0.0	33.6	75.65%	19.13%	0.00%	5.23%	-32%
12	2010	1454.4	1222.5	196.1	18.3	17.5	84.06%	13.48%	1.26%	1.20%	53%
13	2011	746.9	674.4	6.9	22.4	43.2	90.29%	0.92%	3.00%	5.78%	-21%
	Long Period Average	**949.5**	**791.9**	**101.3**	**5.6**	**50.7**	**83.40 %**	**10.66 %**	**0.59%**	**5.34%**	

SOURCE: INIDIA METEOROLOGICAL DEPARTMENT AND DIRECTORATE OF ECONOMICS AND STATISTICS

Fig.3 Rainfall distribution and departure from mean

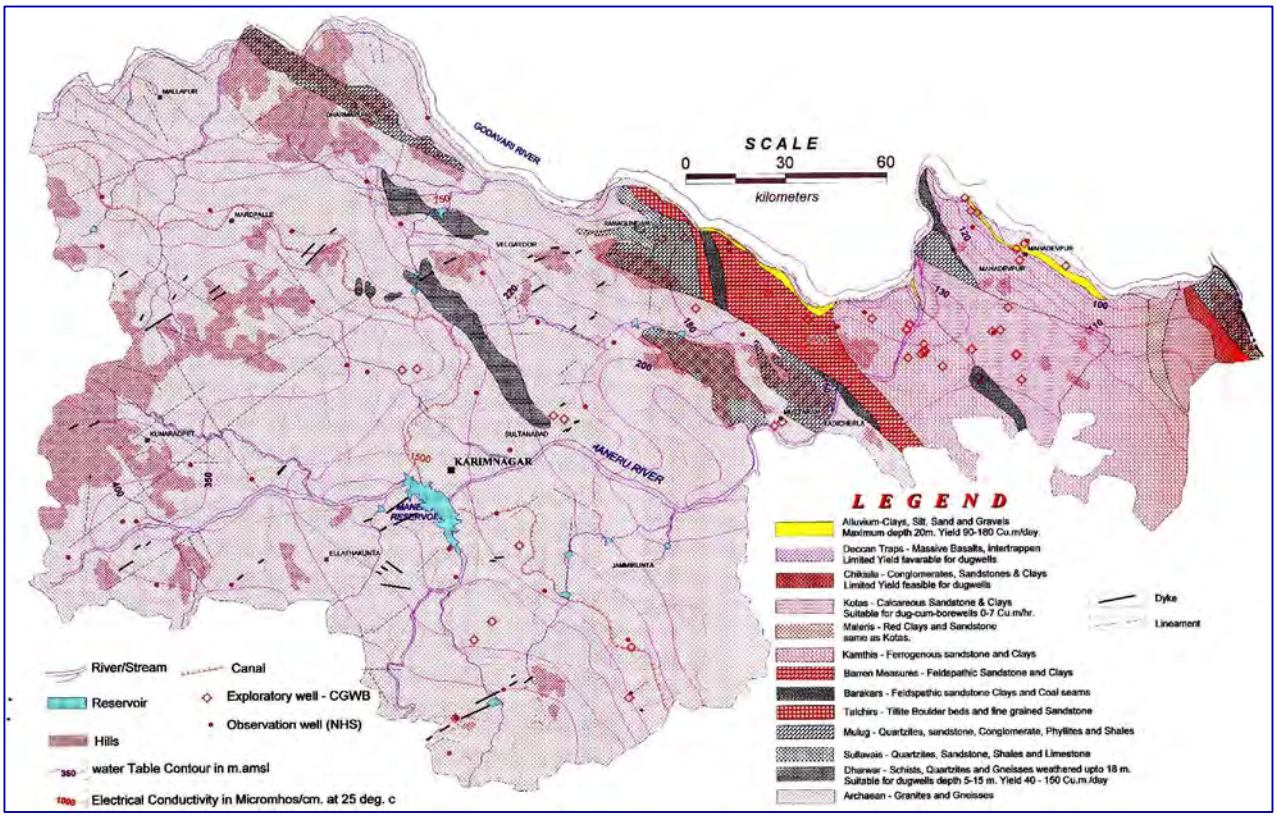


3.0 GROUND WATER SCENARIO

3.10 Hydrogeology

Ground water occurs in all the geological formations in the district. The major rock types occurring in the district are granites, gneisses, sandstone, limestone, shale, quartzite's etc. The occurrence and movement of the ground water is a consequence of a finite combination of topographical, climatological, hydrological, geological, and structural and pedagogical factors, which together form integrated dynamic system. Hydrogeological conditions of the district are shown on Fig 4.

FIG.4 Hydrogeology - Karimnagar district



3.2 Archaean and Dharwar Group of Rocks

These rock types occupy about two thirds area of the district. The Ground water occurs under unconfined conditions in weathered zone and under semi confined conditions in the fractures and fissures. The shallow aquifers tapping the weathered zone have very limited yields in the non-command areas and limited to moderate yields in the command areas. The yield ranges from 40 to 150 m3/day, storage coefficient varies from 0.001 to 0.019 and specific capacity ranges from 0,106 to 0.159 m3/min/m dd. The deeper fractured aquifer is developed through bore wells. The fractured aquifers are potential up to 100 m depth in general, beyond 100 m the occurrence of fractures decreases drastically; potential fractures are encountered only along the lineaments and

at other favourable location. The discharge of the successful bore wells range from 0.5 lps to 3 lps. The transmissivity values range from 3.65 to 48 m2/day.

3.3 Ground Water in Pakhals and Sullavais:

The Pakhals and Sullavais are the oldest sedimentary rocks known as Purana formations occur in the northern part of the district. They comprise mainly quartzites, sandstones and limestones. They are hard, compact and possess limited primary porosity. However, subsequent fracturing and fissuring followed by weathering enabled them to form aquifers locally. The yields in the limestone are about 45 m3/day and in sand stone it from 50 to 75 m3/day. In general they form poor aquifers.

3.4 Ground Water in Gondwanas:

They are the youngest sedimentary rocks and occupy 18 percent of the district area in the northwestern part. The Gondwanas are represented by Talchir boulder bed, shale and sand stone, Barakar sand stones, sand stones and clays of Barren measures, Ferruginous sand stones and clays of Kamthi series, gritty sand stones and clays of Maleri series, Kota formation comprising of shales with intercalated shale's, fine to medium grained sand stone and lime stone and Chikiala formations represented by ferruginous sand stone and conglomerates associated with clay and shale bands.

3.5 Shallow Phereatic Aquifers

The Talchir boulder bed is favourable for sinking open wells and the yields range from 15 to 25 m3/day. The yields of the dug wells in Barakars and Barren measures vary from 40 to 90 m^3/day. The shallow bore wells tapping Kamthi sand stones have yields of 10m^3/day and the transmissivity is about 70 m^2/day. The shallow bore wells tapping the Kota sand stones have discharge of 5 to 7 m^3/Hr for draw down of 10 m and the transmissivity varies from 25 to 30 m^2/day.

3.6 Deeper Confined Gondwana Aquifers

Central Ground Water Baord has proved the existence of deeper aquifers in the Gondwana formations by constructing test wells. Deeper aquifers are not encountered in Barakar sand stones. Barren measures have deeper aquifer with discharge ranging from 7.9 to 50 m3/day. Potential zones in these formations at places may be due to encountering of fracture planes. Kamthi sand stones have potential aquifers at deeper depths upto 300 m. the discharge vary from 1638 m3/day to 4 197 m3/day. The transmissivity values are ranging from 49.9 to 668 m2/day. Deeper aquifers in the Kota formation are of poor or limited yields varying upto 26 m3/day. Deeper aquifers in the Maleri formation occur upto a depth of 206 m with discharges varying from 1143 to 1259 m3 /day and the transmissivity values range from 28 to 50 m2/day.

3.7 Ground Water in Alluvium

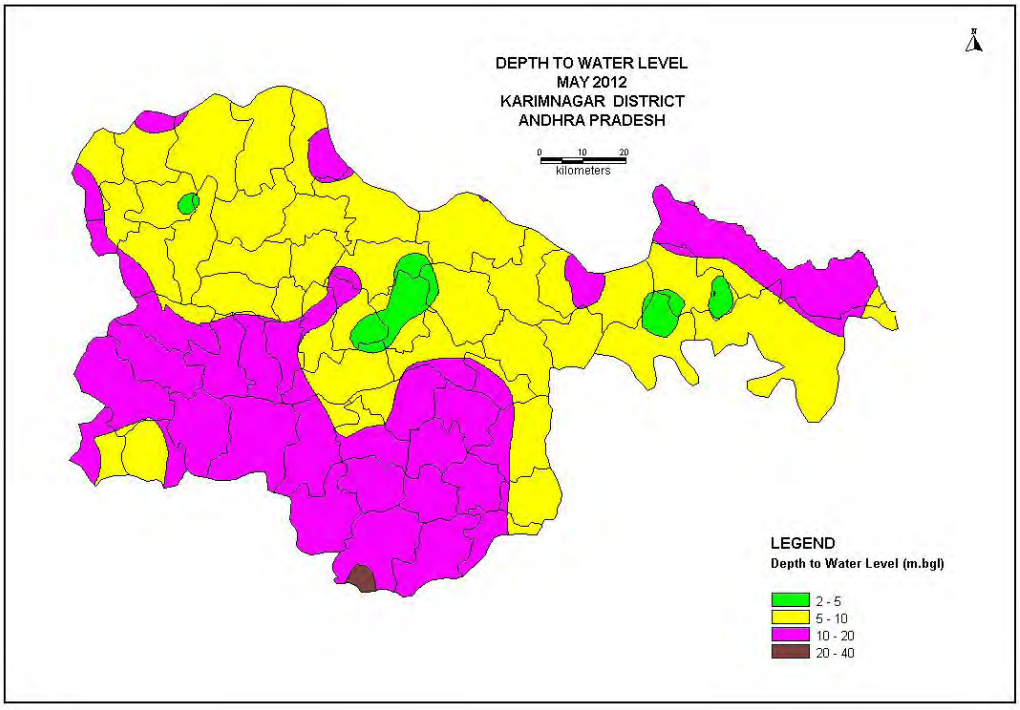
Alluvium comprising sand, silt and clay occurs along the banks of the river Godavari down to a maximum depth of 20 m bgl near Mahadevpur. The depth of filter points varies from 10 to 20 m bgl and sustains continuous pumping. The sandy aquifer extending down to a depth of 10 to 13 m bgl on either side of Maneru River at few places have yields ranging from 90 to 180 m3/day.

4.0 WATER LEVEL

4.1 Pre-monsoon:

The depth to water levels during pre-monsoon range from 1.63 to 24.67 m.bgl. The shallow water level of <2 m is observed as isolated patches in the central and eastern part of the district. The depth to water is shallow in the canal command area, varying from 5 to 10 m bgl in NE and SE part of the district and deeper water levels of more than 10 m bgl are observed in extreme eastern and south western part of the district where the level of ground water development is more and natural recharge is less (Fig 4).

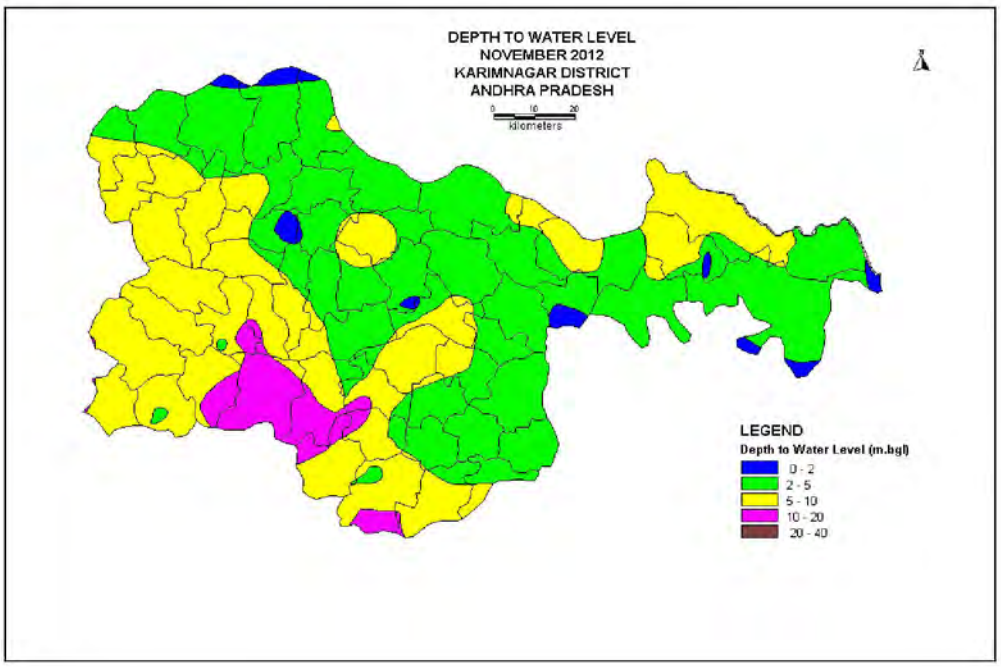
Fig.4 Depth to water level during pre-monsoon 2012 in Karimnagar district



4.2 Post monsoon

The depth to water level during post-monsoon 2012 ranges from 1.22 to 13.82 m bgl (Fig 5). The area under < 2 m bgl occurs in central, eastern and western part as isolated patches. The areas having water levels of 5 to 10 m bgl during pre-monsoon have come up to 2-5 m bgl with monsoon recharge.

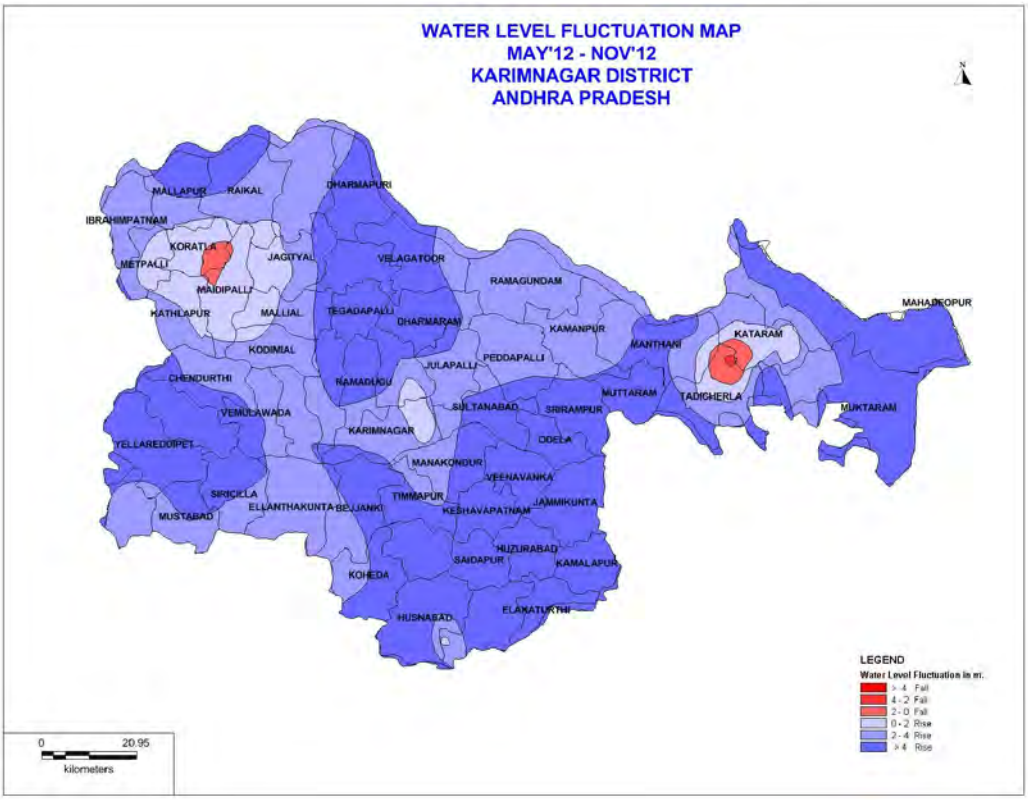
Fig.5 Depth to water level during post-monsoon 2012 in Karimnagar district



4.3 Water Level Fluctuation

The rise in water level between pre and post monsoon period of 2012 is more than 4 m in majority area of the district. Rise in water level between 2-4 m in observed in central and western parts of the district (Fig 6). Fall in water level between 2-4 and more than 4 are seen as isolated patches in the eastern and western parts of the district.

Fig.6 water level Fluctuation during 2011 in Karimnagar district



4.4 Long Term Water Levels:

Water level data of observation wells for period1993 to 2012, has been considered for long term water level trend analysis. The detailed trend analysis is given in the Table-2.

Table-2- Long term Water Level Trend (1992-2011)

			PreMonsoon			PostMonsoon			Annual	
S NO	location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
1	2	3	4	5	6	7	8	9	10	11
2	Metpalli2	7			5			52		0.5723
3	Katlapur	9			7			67		0.4548
4	Chepyal	7			5			52		0.946
5	Racherla boppapur	9			8			80		3.177
6	Vadloor begampet	9			8			75		1.857
7	Kothapet1	8			4			54		0.9067
8	Desaipet	8			7			64		1.4239
9	Veenavanka	8			7			65		0.6587
10	Vangara	8			7			78		1.3876
11	Karimnagar1	9			8			96		0.294
12	Peddapalli1	5			6			62		0.5534
13	Mahadevpur 124	5			6			61		0.4411
14	Shankarpally - 47	6			6			60		0.8458
15	Shankarpally- 125	5			6			61		0.4824
16	Rudrangi	8			7			77		1.275
17	Siricilla	9			8			99		1.2943
18	Mahadevpur-70	7			6			71		0.6618
19	Jagtial	9			6			90		0.2866
20	Huzurabad1	9			7			87		0.4947
21	Kothapalli-1	19	0.3478		19	0.0665		164	0.8069	
22	Dharmapuri-new	24		0.0494	28	0.0375		128	0.0168	
23	Kataram -PZ 3	11			13	0.0759		45		
24	Kataram -PZ 2	12		0.2097	14		0.0965	49		0.2127
25	Kataram-PZ1	10			12	0.0341		46		
26	Manthani -PZ3	12		0.352	10			47		
27	Manthani -PZ 2	13		0.1328	11			47		
28	Manthini -PZ 1	13		0.2831	11			48		0.2203
29	Kaleswaram-PZ 1	12		0.1747	12	0.367		44		
30	Vallamkuntla -PZ3	12		0.2107	12		0.0956	46		
31	Vallamkuntla -PZ 2	11			12		0.9198	44		
32	Sulthanabad -PZ	12	0.2168		12	0.3947		42		
33	Ramagundam - PZ	12		0.1689	12		0.1679	44		
34	Muktharam-PZ	13	0.0384		13	0.3974		51	0.1302	
35	Kamanpur	4			3			12		
36	Ramadugu -PZ	13	0.0255		14	0.1976		53	0.1223	
37	Chigurumamidi-PZ	11			12	0.196		44		
38	Yelakaturthy -PZ	11			12	0.3224		44		
39	Mahadevpur1	17		0.0662	15		2.0387	66		0.6059
40	Kalwacherla	16		0.0627	20		0.0832	70		0.0893
41	Kothapally	16		0.105	19		0.0747	69		0.043
42	Manukonduru	17	0.0363		22		0.1463	78		0.0686
43	Mustafabad	31	0.0781		41	0.0723		272	0.0972	
44	Gangadhara	7			9			34		
45	Mustafanagar	18	0.0439		22		0.115	75	0.0173	
46	Gollapalli1	22		0.039	28	0.0075		139	0.0298	
47	Husnabad	13		0.0735	14		0.2932	51		0.1133
48	Buswapuram1	11			13	0.8074		44		
49	Venkatapur	44		0.0271	43		0.0397	374		0.0701
50	Chillapalli	16		0.0017	32		0.0768	161		0.0569
51	Mohanraopet1	19	0.0243		22		0.0423	80		0.0014
52	Yelakaturti-new	9			12		0.4504	43		
53	Huzurabad	14		0.1121	15		0.3426	56		0.252
54	Tadikal	20	0.2093		20	0.1742		79	0.2118	
55	Yellareddypet	6			12		0.2332	41		
56	Karimnagar	19		0.1199	20		0.3042	75		0.2077
57	Aruna konda-new	28	0.0368		29	0.0275		186	0.0277	
58	Aruna konda-old	0			0			0		
59	Kudurupaka-alt	18	0.1346		20	0.1706		75	0.1659	
60	Garepalli	19	0.0535		25		0.0951	95		0.0364
61	Koyyuru2	19	0.1423		20		0.0032	77	0.0156	
62	Osmannagar	12		0.0638	18	0.0571		83	0.0861	
63	Mahadevpur	19		0.261	20		0.1442	77		0.1882
64	Peddapalli	26		0.14	32	0.1309		213	0.0043	
65	Kothapet	18	0.0697		20		0.147	77		0.069
66	Yerraguntapalli	14		0.0818	15		0.015	58		0.0476
67	Jagityal-new	20		0.0042	21		0.0034	81	0.0106	
68	Kolleda	18		0.0401	20		0.0492	78		0.0293
69	Metpalli1	11			13	0.0459		49	0.0496	

5.0 GROUND WATER RESOURCES

Based on the Ground Water Estimation Committee (GEC-97) norms ground water assessment was done in 2009. The mandala wise details are present in Table 3. Ground water resource available is 1458.95 MCM in command area and non-command area of the district. Ground water draft is 696.20 MCM in command and non-command areas respectively. The ground water balance is 762.55 MCM in command and non-command areas respectively. Based on the stage of ground water development and water level trend the villages and ground water assessment units are categorized as described below. Overall, the district falls under Safe category with a stage of development at 48%.

Table- 3: Assessment of Mandal Wise Dynamic Groundwater Resources of Karimnagar District, Andhra Pradesh [2008-2009] [in ha.m.]

Sl. No	Mandal	C/ NC/ T	Net annual ground water availability	Existing gross ground water draft for irrigation	Existing gross GW draft for domestic and industrial water supply	Existing gross ground water draft for all uses [11+12]	Provision for domestic and industrial require-ment supply to 2025	Net GW availability for future irrigation development [10-11-14]	Stage of ground water development {(13/10*100)} [%]
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Bejjanki	C	0	0	0	0	0	0	0
		NC	2782	1777	60	1837	257	748	66
		T	2782	1777	60	1837	257	748	66
2	Bheemadevarapally	C	0	0	0	0	0	0	0
		NC	1647	1171	60	1231	251	225	75
		T	1647	1171	60	1231	251	225	75
3	Boinapalli	C	0	0	0	0	0	0	0
		NC	1365	1018	96	1114	191	156	82
		T	1365	1018	96	1114	191	156	82
4	Chandurthy	C	0	0	0	0	0	0	0
		NC	2642	1485	91	1576	169	988	60
		T	2642	1485	91	1576	169	988	60
5	Chigurumamidi	C	0	0	0	0	0	0	0
		NC	3032	1367	70	1437	201	1464	47
		T	3032	1367	70	1437	201	1464	47
6	Choppadandi	C	1061	556	22	578	123	382	54
		NC	883	529	33	562	163	191	64
		T	1944	1085	55	1140	286	573	59
7	Dharmapuri	C	2930	556	86	642	173	2201	22
		NC	172	423	23	446	23	0	259
		T	3102	979	109	1088	196	2201	35
8	Dharmaram	C	2821	948	21	969	135	1738	34
		NC	504	220	7	227	24	260	45
		T	3325	1168	28	1196	159	1998	36
9	Eligedu	C	721	315	45	360	55	351	50
		NC	94	82	4	86	14	-2	91
		T	815	397	49	446	69	349	55
10	Elkathurthy	C	428	175	8	183	43	210	43
		NC	751	474	47	521	154	123	69
		T	1179	649	55	704	197	333	60
	Gambhiraopet	C	0	0	0	0	0	0	0

11		NC	1715	961	186	1147	203	551	67
		T	1715	961	186	1147	203	551	67
12	Gangadhara	C	248	142	1	143	26	80	58
		NC	1752	1202	54	1256	154	396	72
		T	2000	1344	55	1399	180	476	70
13	Gollapally	C	2174	835	67	902	125	1214	41
		NC	76	26	5	31	5	45	41
		T	2250	861	72	933	130	1259	41
14	Husnabad	C	0	0	0	0	0	0	0
		NC	3335	1909	109	2018	347	1079	61
		T	3335	1909	109	2018	347	1079	61
15	Huzurabad	C	1942	1231	36	1267	116	595	65
		NC	252	208	19	227	35	9	90
		T	2194	1439	55	1494	151	604	68
16	Ibrahimpatnam	C	1960	671	30	701	118	1171	36
		NC	287	131	14	145	36	120	51
		T	2247	802	44	846	154	1291	38
17	Illanthakunta	C	0	0	0	0	0	0	0
		NC	2540	1426	78	1504	281	833	59
		T	2540	1426	78	1504	281	833	59
18	Jagityal	C	2802	1187	125	1312	411	1204	47
		NC	56	18	4	22	4	34	39
		T	2858	1205	129	1334	415	1238	47
19	Jammikunta	C	3573	1985	36	2021	346	1242	57
		NC	0	0	0	0	0	0	0
		T	3573	1985	36	2021	346	1242	57
20	Julapalli	C	890	385	25	410	96	409	46
		NC	218	58	8	66	15	145	30
		T	1108	443	33	476	111	554	43
21	Kamalapur	C	1713	570	42	612	250	893	36
		NC	298	159	13	172	35	104	58
		T	2011	729	55	784	285	997	39
22	Kamanpur	C	3345	296	979	1275	979	2070	38
		NC	1476	274	42	316	47	1155	21
		T	4821	570	1021	1591	1026	3225	33
23	Karimnagar	C	1021	521	33	554	145	355	54
		NC	1760	773	87	860	765	222	49
		T	2781	1294	120	1414	910	577	51
24	Kataram	C	0	0	0	0	0	0	0
		NC	1642	212	74	286	96	1334	17
		T	1642	212	74	286	96	1334	17
25	Kathalapur	C	0	0	0	0	0	0	0
		NC	2759	1437	66	1503	137	1185	54
		T	2759	1437	66	1503	137	1185	54
26	Keshavapatnam	C	2185	1650	41	1691	148	387	77
		NC	839	483	25	508	57	299	61
		T	3024	2133	66	2199	205	686	73
27	Kodimyal	C	0	0	0	0	0	0	0
		NC	1308	911	43	954	156	241	73
		T	1308	911	43	954	156	241	73
28	Koheda	C	0	0	0	0	0	0	0
		NC	1961	1167	64	1231	232	562	63
		T	1961	1167	64	1231	232	562	63
29	Konaraopet	C	0	0	0	0	0	0	0
		NC	2266	1114	56	1170	153	999	52
		T	2266	1114	56	1170	153	999	52
30	Korutla	C	4075	684	23	707	202	3189	17
		NC	465	198	12	210	25	242	45

		T	4540	882	35	917	227	3431	20
31	Mahadevpur	C	0	0	0	0	0	0	0
		NC	3658	406	94	500	125	3127	14
		T	3658	406	94	500	125	3127	14
32	Mahamutharam	C	0	0	0	0	0	0	0
		NC	1274	133	56	189	85	1056	15
		T	1274	133	56	189	85	1056	15
33	MallaharRao	C	0	0	0	0	0	0	0
		NC	2692	684	64	748	138	1870	28
		T	2692	684	64	748	138	1870	28
34	Mallapur	C	2602	787	42	829	141	1674	32
		NC	175	161	0	161	14	0	92
		T	2777	948	42	990	155	1674	36
35	Mallial	C	747	416	31	447	40	291	60
		NC	1089	685	21	706	42	362	65
		T	1836	1101	52	1153	82	653	63
36	Manakondur	C	3016	1490	25	1515	173	1353	50
		NC	1097	907	28	935	145	45	85
		T	4113	2397	53	2450	318	1398	60
37	Manthani	C	1498	214	82	296	131	1153	20
		NC	893	238	62	300	62	593	34
		T	2391	452	144	596	193	1746	25
38	Medipally	C	1899	692	7	699	37	1170	37
		NC	2191	750	52	802	64	1377	37
		T	4090	1442	59	1501	101	2547	37
39	Metpalli	C	1344	276	28	304	119	949	23
		NC	747	340	29	369	46	361	49
		T	2091	616	57	673	165	1310	32
40	Mustabad	C	0	0	0	0	0	0	0
		NC	1440	963	61	1024	191	286	71
		T	1440	963	61	1024	191	286	71
41	Mutharam (Manthani)	C	224	97	17	114	39	88	51
		NC	1116	301	49	350	94	721	31
		T	1340	398	66	464	133	809	35
42	Odela	C	1277	864	32	896	113	300	70
		NC	651	368	9	377	67	216	58
		T	1928	1232	41	1273	180	516	66
43	Peddapally	C	2967	1530	152	1682	345	1092	57
		NC	417	103	2	105	34	280	25
		T	3384	1633	154	1787	379	1372	53
44	Pegadapally	C	2093	878	25	903	145	1070	43
		NC	0	0	0	0	0	0	0
		T	2093	878	25	903	145	1070	43
45	Raikal	C	5508	2349	81	2430	173	2986	44
		NC	0	0	0	0	0	0	0
		T	5508	2349	81	2430	173	2986	44
46	Ramadugu	C	0	0	0	0	0	0	0
		NC	2067	1163	65	1228	199	705	59
		T	2067	1163	65	1228	199	705	59
47	Ramagundam	C	2116	352	29	381	121	1643	18
		NC	2437	379	127	506	192	1866	21
		T	4553	731	156	887	313	3509	19
48	Saidapur	C	0	0	0	0	0	0	0
		NC	2025	1304	58	1362	183	538	67
		T	2025	1304	58	1362	183	538	67
49	Sarangapur	C	3128	742	56	798	124	2262	26
		NC	0	0	0	0	0	0	0
		T	3128	742	56	798	124	2262	26

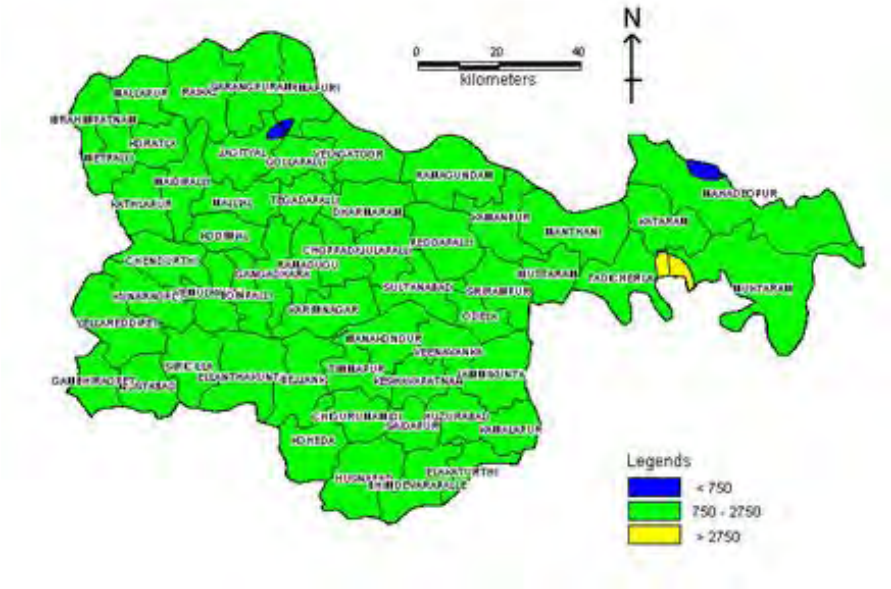
50	Siricilla	C	0	0	0	0	0	0	0
		NC	2484	1485	81	1566	446	553	63
		T	2484	1485	81	1566	446	553	63
51	Srirampur	C	1435	527	38	565	114	794	39
		NC	762	212	20	232	41	509	30
		T	2197	739	58	797	155	1303	36
52	Sulthanabad	C	1431	995	45	1040	176	260	73
		NC	621	401	31	432	46	174	70
		T	2052	1396	76	1472	222	434	72
53	Thimmapur	C	0	0	0	0	0	0	0
		NC	2113	1500	84	1584	230	383	75
		T	2113	1500	84	1584	230	383	75
54	Veenavanka	C	2914	1364	46	1410	185	1365	48
		NC	299	246	11	257	28	25	86
		T	3213	1610	57	1667	213	1390	52
55	Velagatur	C	2879	1190	30	1220	130	1559	42
		NC	0	0	0	0	0	0	0
		T	2879	1190	30	1220	130	1559	42
56	Vemulawada	C	0	0	0	0	0	0	0
		NC	2475	1417	130	1547	261	797	63
		T	2475	1417	130	1547	261	797	63
57	Yellareddypet	C	0	0	0	0	0	0	0
		NC	3308	1706	115	1821	195	1407	55
		T	3308	1706	115	1821	195	1407	55
District Total		C	70967	27470	2386	29856	5797	37700	42
		NC	74908	37065	2699	39764	7158	30959	53
		T	145875	64535	5085	69620	12955	68659	48

C-Command; NC-Non-command; T-Total

6.0 GROUND WATER QUALITY

The ground water in the district in general is suitable for both domestic and irrigation purpose. The totals of 23 ground water samples of shallow aquifer were analysed. In 22% of samples Total Hardness values are beyond permissible limits. 26% of samples are beyond permissible limits with respect to Bicarbonate, whereas about 78% samples falls beyond the permissible limits, in case of Nitrates. This may be attributed to anthropogenic activities going on thought the district. Fluoride is excess as per the BIS permissible limits at two places Viz., Peddapalli, Gollapalli areas. The distribution of Electrical Conductivity is shown as Fig.7.

Fig. 7: Distribution of Electrical Conductivity in Ground water- Karimnagar District



7.0 STATUS OF GROUND WATER DEVELOPMENT

Ground water development in the district is through bore well of 60 to 100 m depth in the non-command areas and through dug wells and shallow bore wells in the command area. In the sedimentary terrain ground water development is through deep tube wells tapping the Gondwana sandstones. Alluvial aquifers are developed through filter point well of 10 to 20 depth. The district is mainly dependant on ground water for its irrigation and domestic needs. Large diameter dug wells piercing the weathered rock are existing in the area for irrigation purpose, they are either in rectangular or circular shape. The sides of the rectangular wells are usually between 4 to 10 m, similarly the diameter of the circular wells is between 6 to 10 m. The depth of the dug wells varies from 6 to 15 m bgl in non-command areas and is less than 9 m in command area. Most of the wells in the non-command dry up in summer. The wells have 1-2 m of water column and sustain pumping by 5 HP motors for 2 to 5 hrs in two spells in a day. The yields of the wells vary from 40 to 150 m3/day during post monsoon period. The fractured aquifers are tapped by bore wells of 100 to 159 mm dia with a depth range of 60 to 100 m bgl in general. The discharge of the bore wells varies from 1 to 18 m3/hr for draw down of 4 to 10 m.

8.0 GROUND WATER MANAGEMENT STRATEGY

The ground water management strategy should be such that there is optimal utilisation of ground water resource and it should also take into consideration the well spacing norms. Based on the well spacing of 250 m on an average for shallow bore wells in hard rocks and sedimentary

rocks, the optimal well density per sq.km comes to 16, whereas presently the well density in the district is 20 per sq. km leaving little scope for further development of the ground water (Table 5). A perusal of the table shows that the well density is lowest in Mutharam and Elgaid mandals 1 well/sq. km, and is highest in Husnabad mandal 59 wells/sq. km. Based on the above norm ground water development is only possible in 17 mandals of the district out of which 15 mandals are falling in sedimentary terrain or command area and two mandals Yellareddipet and Ghambhiraopet are already categorised as critical mandals hence no further development is possible.

The district is having considerable command area spread over 33 mandals and the entire command area is falling under safe category. Ground water development is the command area through construction of dug wells/bore wells may be taken up for utilisation of ground water resource available and use it in conjunction with surface water to increase the irrigation potential. In the non-command area particularly in hard rock areas it is necessary to augment the ground water resource by taking up artificial recharge to ground water on a large scale to sustain the existing ground water extraction structures. Further construction of bore wells needs to be stopped.

9.0 GROUND WATER DEVELOPMENT

Ground water development should be restricted to the command area and sedimentary terrain. In command area dug wells of 10 to 15 m depth having a radius of 5 m may be constructed in areas having water levels below 5 m bgl or shallow bore wells of 165 mm dia up to a depth of 40 m may be constructed. The selection of bore well sites should be done based on the geophysical and hydrogeological studies. The unit cost of each dug well will be around Rs 44,500 and that of bore well Rs 12,500 to 15000 (Source NABARD). Deeper aquifer in the Gondwana formations has good potential, which can be developed by deep tube wells up to a depth of 200 to 300 m bgl. Tube wells with 254 mm housing, 152 mm casing with slotted pipes again the productive aquifer zones may be constructed. The selection of bore well sites should be done based on the geophysical and hydrogeological studies. The tube well construction and maintenance may be taken up by Government agencies and irrigation may be taken up on co-operative basis. The approximate cost of each tube well will be between 2 to 2.5 lakhs as per market rate.

10.0 WATER CONSERVATION & ARTIFICIAL RECHARGE

Ground water conservation and artificial recharge works have been taken up on a large scale in the district., Water shed, RIDF and other programmes. So far 257 numbers of structures have been constructed. The structures constructed under these schemes are percolation tanks, check dams and farm ponds. Apart from these structures, contour trenching has been done by the Forest department in number of places. Artificial recharge works in the district should be taken up in non-command hard rock area to get the maximum benefit (Fig-9). Artificial recharge works should be avoided in command area and sedimentary terrain. The most ideally suited artificial recharge structure in the area is the percolation tank. Apart from this check dams/gully plugs may be taken up where the slope is considerable. All the works have to be taken up on water shed basis

and after careful assessment of the available surface run off and after meeting the needs of the existing structures. Rooftop harvesting both in urban and rural areas should be made mandatory to enhance the ground water recharge.

11.0 RECOMMENDATIONS

1. The distress deaths by farmers are spread uniformly in the entire district both in command and non-command areas and irrespective of stage of ground water development. The reasons for farmers suicide are many, the first is related to crop failure due to high input costs, wrong selection of crops, spurious seeds, market rate fluctuation for farm produce etc leading to crop failure and accumulated loans. The problem needs to be addressed by Governmental interference by way of subsidies, market regulation, timely advise regarding suitable cropping pattern taking in to consideration the soil suitability, water availability and anticipated market demand. Awareness has to develop regarding the need for adopting less water intensive and less cost intensive cropping pattern even if the profits are not high but assured.

2. The second is related to socio-medical reason particularly in families having migratory labourers. In such cases proper awareness has to be created regarding use of protective methods while having relationship with unknown partners and the others way of transmission of the decease. This problem is reported to be frequent in some parts of the district as the migratory population is quite high.

3. The third is failure of bore wells due to the vagaries of monsoon and scanty rainfall and over development leading to deepening of water levels and further investments in new bores where the rate of failure of wells is high. Further construction of very deep bores beyond 80-100 m in hard rocks where the success rate is very limited leads to high cost investments and loan burdens.

4. The strategies for ground water management have to be different for different areas in the district. In Command area conjunctive use practice has to be adopted by developing ground water through dug wells/shallow bore wells and using it in conjunction with surface water to increase the irrigation potential with in the command area. In sedimentary terrain, the tube wells of 200 – 300 m depth are constructed to tap the potential Gondwana sandstone. As the cost of the tube wells is quite high the development has to be undertaken by Government agencies and co-operative farming adopted by involving the stakeholders. In non-command and over exploited areas large scale artificial recharge needs to be encouraged on watershed basis. Care has to be taken in assessing the source water availability and the needs of the existing structures. Site selection need to be done on scientific lines. Annual maintenance of the artificial recharge structure is very essential for its effective functioning. A corpus fund has to be created for the maintenance of the structure at the time of construction from the cost of the structure or contribution from the beneficiaries. Involvement of the stakeholders in the maintenance of the structure has to be made mandatory.

5. Exploring the possibility of diversion of surface water for filling up of existing tanks particularly in the over exploited mandals and non-command area may be taken up as rainfall alone may not be sufficient to fulfil the needs of artificial recharge and to mitigate the problem of drying of wells.