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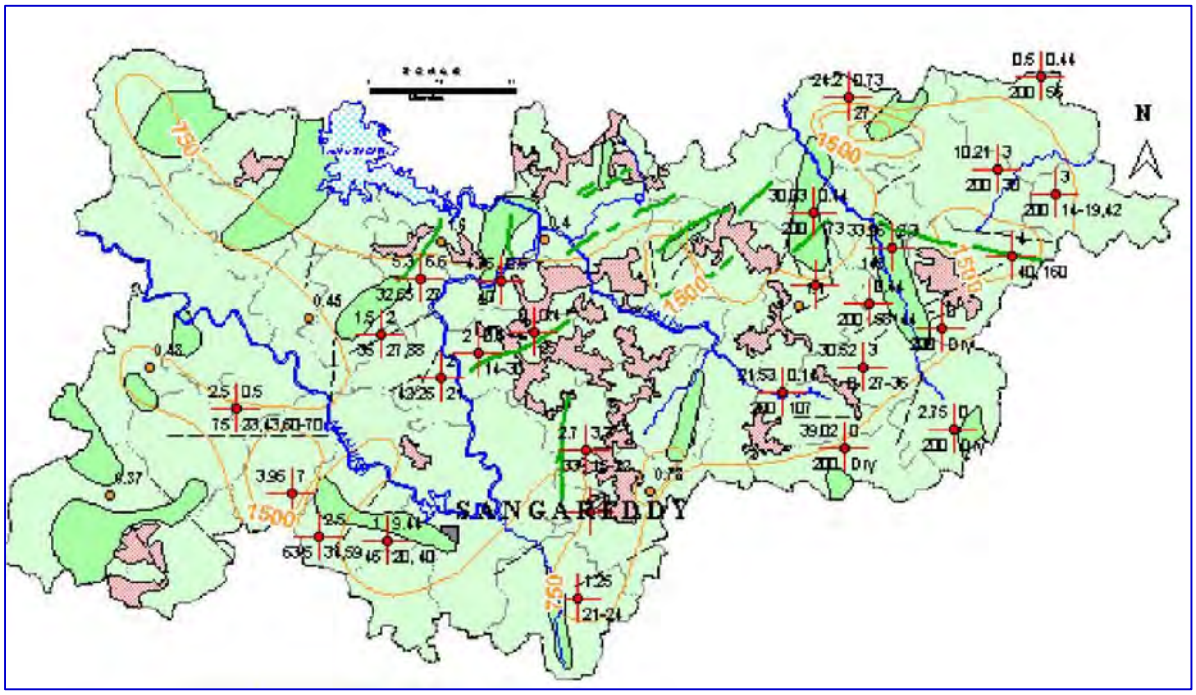
CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES
GOVERNMENT OF INDIA

GROUND WATER BROCHURE
MEDAK DISTRICT, ANDHRA PRADESH



SOUTHERN REGION
HYDERABAD
September 2013

CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES
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GROUND WATER BROCHURE
MEDAK DISTRICT, ANDHRA PRADESH
(AAP 2012-13)

BY

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GROUND WATER BROCHURE
MEDAK DISTRICT, ANDHRA PRADESH

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DISTRICT AT A GLANCE

1. GENERAL

Location	North Latitude	17^0 27'	18^0 19'
	East Longitude	77^0 28'	79^0 10'
Geographical area		9,699 sq.km	
Headquarters		Sangareddy	
No. of revenue mandals		46	
No. of revenue villages		1267	
No. of Gram panchayat villages		1065	
Population (2011 census)			
	Urban	7,28,121	
	Rural	23,03,756	
	Total	30,31,877	
	Population density	313sq.km	
Major rivers		Manjira, Haldi, Kundliar	
Geology		Archaeans, Deccan Traps and recent alluvium	
Soils		Red loamy, sandy and black cotton soils	
Agroclimatic zone		Southern plateau and hill zone-zone 10 Northern Telangana Zone Southern Telangana zone	

2. RAINFALL

Normal annual rainfall	868mm
Annual rainfall (2012)	843 mm

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

Forest	91,390
Barren and uncultivated	52,800
Cultivable waste	19,725
Current fallows	1,27,006
Net area sown	4,80,841

4. IRRIGATION (2012) (Area in ha.)

Source of irrigation

Canals	2,776

	Tanks	6,549
	Dug wells	7,154
	Bore / Tube wells	1,38,298
	Others	2,695
Net area irrigated		1,57,472
Gross area irrigated		2,40,139
Major irrigation projects		Nil

5. GEOLOGY

Major rock types — Archaeans, Basaltic flows and Alluvium

6. GROUND WATER

Exploration by CGWB			199
	No. of wells drilled		173
	Major aquifer zones		15m, 31m, 41m, 60m
Depth to water level (pre-monsoon-2012) min-max			3.85 -21.00m.bgl
Depth to water level (Post monsoon-2012) min-max			0.98 - 22.65 m bgl
Aquifer parametres			
	Transmissivity (sq.m/day)		
		Hard rock	19 to 290
		Soft rock	Nil
	Storage Co-efficient		
		Hard rock	0.001 to 0.04
		Soft rock	Nil
	Monitoring		
	No. of observation wells		47
	Dug wells		18
	Piezometers	Manual	29
		Digital recording	0
	Range of water levels (May 2010)		
	Minimum (m below ground level)		5.23
	Maximum (m bgl)		21.58
	General range (m bgl)		5 to 20

7. GROUND WATER RESOURCES (ha.m)

Net annual ground water availability	105038
Net annual draft	88700

Balance resource	15780
Stage of ground water development	84%

8. GROUND WATER DEVELOPMENT

CATEGORY No. of mandals categorised as

Safe (< 70 % of net available resource)	12
Semi Critical (70 - 90 %)	13
Critical (90 - 100 %)	9
Over exploited (> 100 %)	12
No. of villages notified for restricted development (by State Ground Water Authority)	Not Available

9. CHEMICAL QUALITY

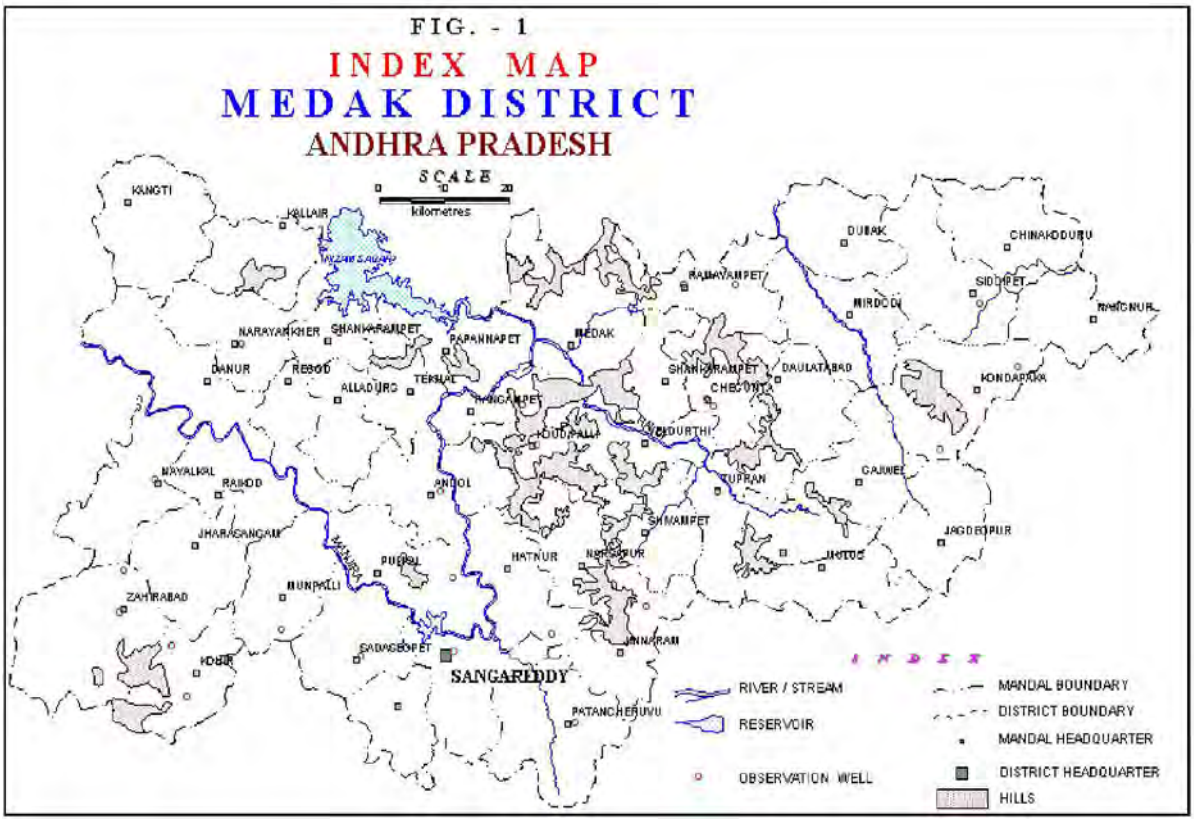
Electrical Conductivity (micro Siemens / cm at 25 deg. C)	733 to 5266
Chloride	78 to 1007
Fluoride	<2.0
Nitrate	20 to 270

GROUND WATER BROCHURE
MEDAK DISTRICT, ANDHRA PRADESH

1.0 INTRODUCTION

Medak was originally known as "Methukudurgam" which subsequently changed into Methukur due to growth of fine and coarse variety of rice in this area. It is one of the ten districts of Telangana Region of Andhra Pradesh with a geographical area of 9,699 km^2. It forms a part of Deccan Plateau under Godavari basin and lies between North Latitudes 17^0 27' and 18^0 18' and East longitudes 77^0 28' and $79^0$10' falling in topographical sheet nos. 56 F, G, J and K of Survey of India. The district is divided into 46 revenue mandals, with its Headquarters at Sangareddy. The district has a population of 3031877 (as per 2011 census). The population density is 313 persons per sq.km. The forest cover is 91,390 hectares and the net area sown is 4,80,841 ha.

Fig.1: Administrative Divisions of Medak District



Though the Manjira River is a perennial river, a major project Singoor which is dedicated to drinking water supply. There are no major irrigation projects in the District. An area of 9325 ha is being irrigated by surface water sources and an area of 1,45,452 ha is being irrigated by ground water, which indicates that ground water plays a major roles when compared to surface water. The various crops raised are rice, jowar, bajra, sugarcane, black gram, red gram, bengal gram, cotton, groundnut. Borewell irrigation is increased to 55% whereas canal irrigation is decreased to 25% as well as 117% decreased in tanks irrigation.

2.0 RAINFALL

The average annual rainfall of the district is 910 mm, which ranges from nil rainfall in December, January and February to 229 mm in July. July is the wettest months of the year. The mean seasonal rainfall distribution is 745 mm in southwest monsoon (June-September), 109 mm in northeast monsoon (Oct-Dec), 0.0 mm rainfall in Winter (Jan-Feb) and 55 mm in summer (March – May). The percentage distribution of rainfall, season-wise, is 82% in southwest monsoon, 12 % in northeast monsoon, 0.0% percentage in winter and 6 % in summer. The annual and seasonal rainfall distribution with its departure from mean along with percentage distribution year-wise is given in Table.1 The mean monthly and seasonal rainfall distribution are presented in Fig.1& 2 respectively. The annual rainfall during 2012 is 843 mm.

Table.1 Season wise rainfall distribution (1999-2011)

Sl No	YEAR	ANNUAL	SWM	NEM	WINTER	SUMMER	SWM(%)	NEM(%)	WINTER (%)	SUMMER (%)	DEP FROM LPA(%)
1	1999	657.0	574.0	20.0	0.0	63.0	87.37%	3.04%	0.00%	9.59%	-28%
2	2000	868.0	763.0	17.0	15.0	73.0	87.90%	1.96%	1.73%	8.41%	-5%
3	2001	691.5	496.0	154.5	7.0	34.0	71.73%	22.34%	1.01%	4.92%	-24%
4	2002	559.1	431.1	88.0	16.0	24.0	77.10%	15.74%	2.86%	4.29%	-39%
5	2003	759.0	664.6	73.0	2.0	19.4	87.56%	9.62%	0.26%	2.56%	-17%
6	2004	654.8	533.1	51.7	2.2	67.8	81.41%	7.90%	0.34%	10.35%	-28%
7	2005	1188.7	880.6	172.3	87.5	48.3	74.08%	14.49%	7.36%	4.06%	31%
8	2006	961.2	721.6	41.5	0.0	198.1	75.07%	4.32%	0.00%	20.61%	6%
9	2007	745.8	692.5	27.6	0.0	25.7	92.85%	3.70%	0.00%	3.45%	-18%
10	2008	969.3	695.0	25.3	58.7	190.3	71.70%	2.61%	6.06%	19.63%	7%
11	2009	504.1	416.9	59.6	0.0	27.6	82.70%	11.82%	0.00%	5.48%	-45%
12	2010	1038.4	890.3	114.1	23.2	10.8	85.74%	10.99%	2.23%	1.04%	14%
13	2011	694.8	642.8	16.6	0.0	35.4	92.52%	2.39%	0.00%	5.09%	-24%
Long Period Average		909.5	745.4	108.8	0.0	55.3	81.96%	11.96%	0.00%	6.09%	

Source: Inidia Meteorological Department and Directorate Of Economics And Statistics

Fig.1 Mean monthly rainfall distribution in Medak district

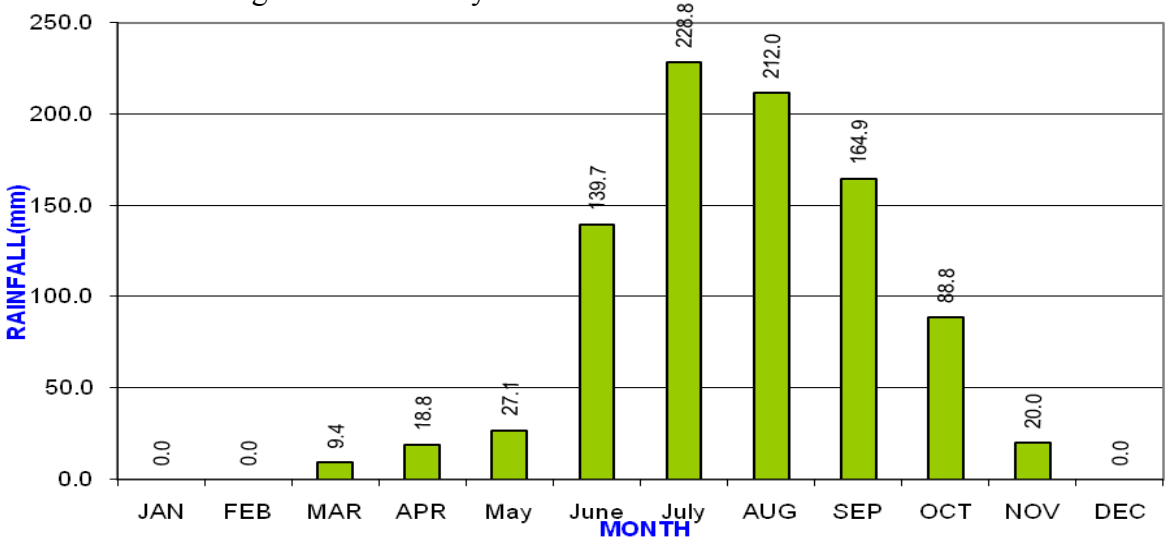


Fig.2

MONTHLY RAINFALL DISTRIBUTION OF LONG PERIOD AVERAGE

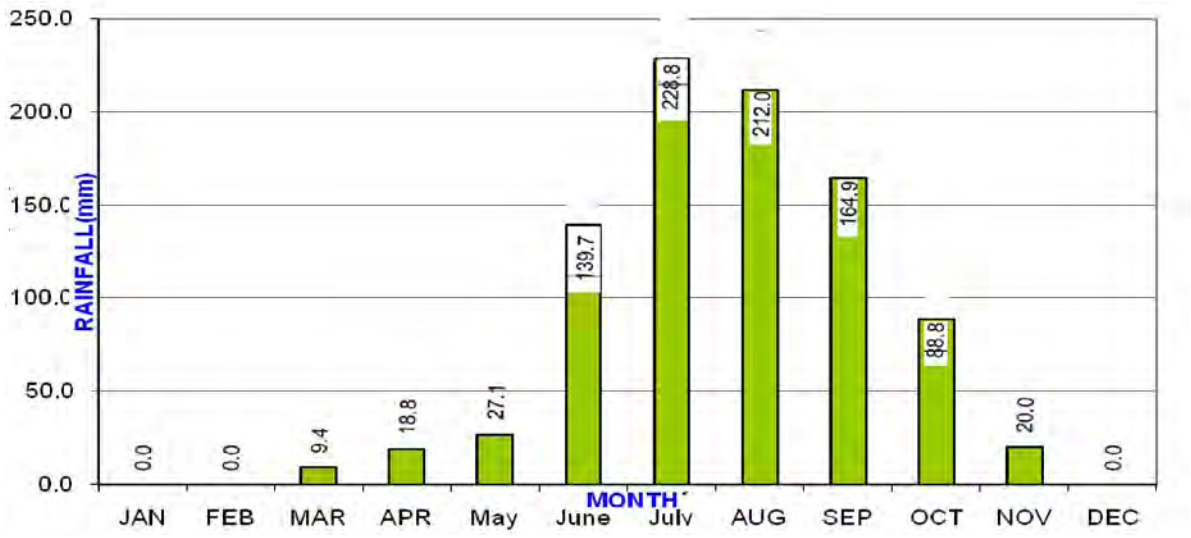
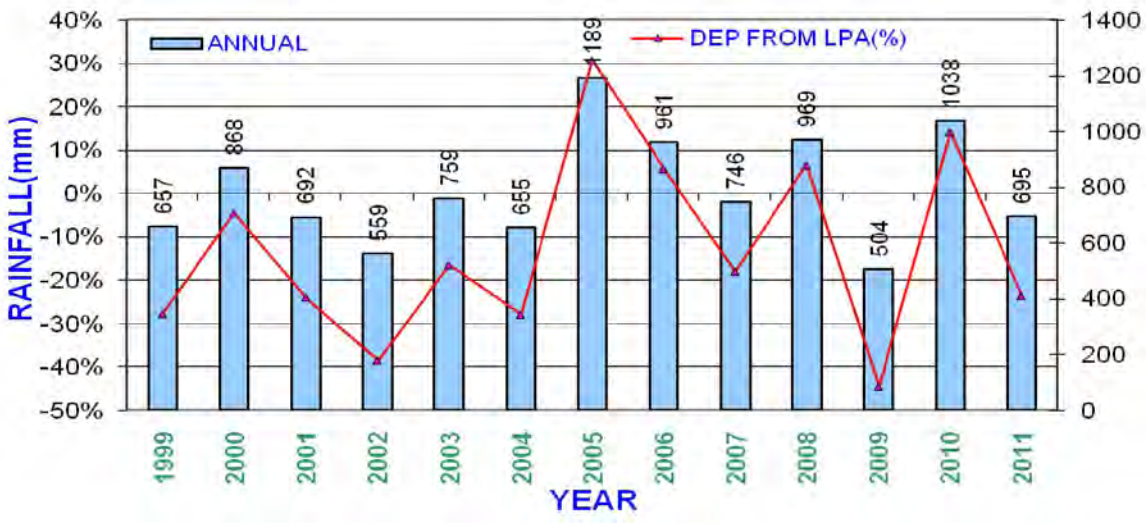


Fig.3 Annual Rainfall and departure from LPA



The annual rainfall ranges from 504 mm in 2009 to 1189 mm in 2005. The annual rainfall departure ranges from -45 % in 2009 to 31 % in 2005.. The southwest monsoon rainfall contributes about 82 % of annual rainfall. It ranges from 417 mm in 2009 to 890 mm in 2010. The year 1999, 2002, 2004 and 2009 experienced drought conditions in the district as the annual rainfall recorded in these four years is less than 75% of long period average (LPA) respectively. The annual rainfall and departure from LPA in shown in the Fig.3. It indicates that, the rainfall departure as on 2011 is negative i.e. -169%, showing rainfall deficit.

3.0 GROUND WATER SCENARIO

3.1 HYDROGEOLOGY

The entire district is covered by hard rock except for 0.2% of the alluvium area. Ground water occurs under unconfined to confined conditions in hard rock (Archaean and Deccan traps ages) and recent alluvial formations. The common ground water abstraction structures are dug wells, dug-cum-bore wells and bore wells and their yields mainly depending on the recharge conditions in the area. Yield potential of the aquifers in the consolidated rocks varies widely from 3 to 7 lps (Fig.4). Due to indiscriminate drilling of bore wells, the yields have fallen drastically, lack of recharge to fracture confined aquifer and existing borewells becoming to defunct and even leading to failure.

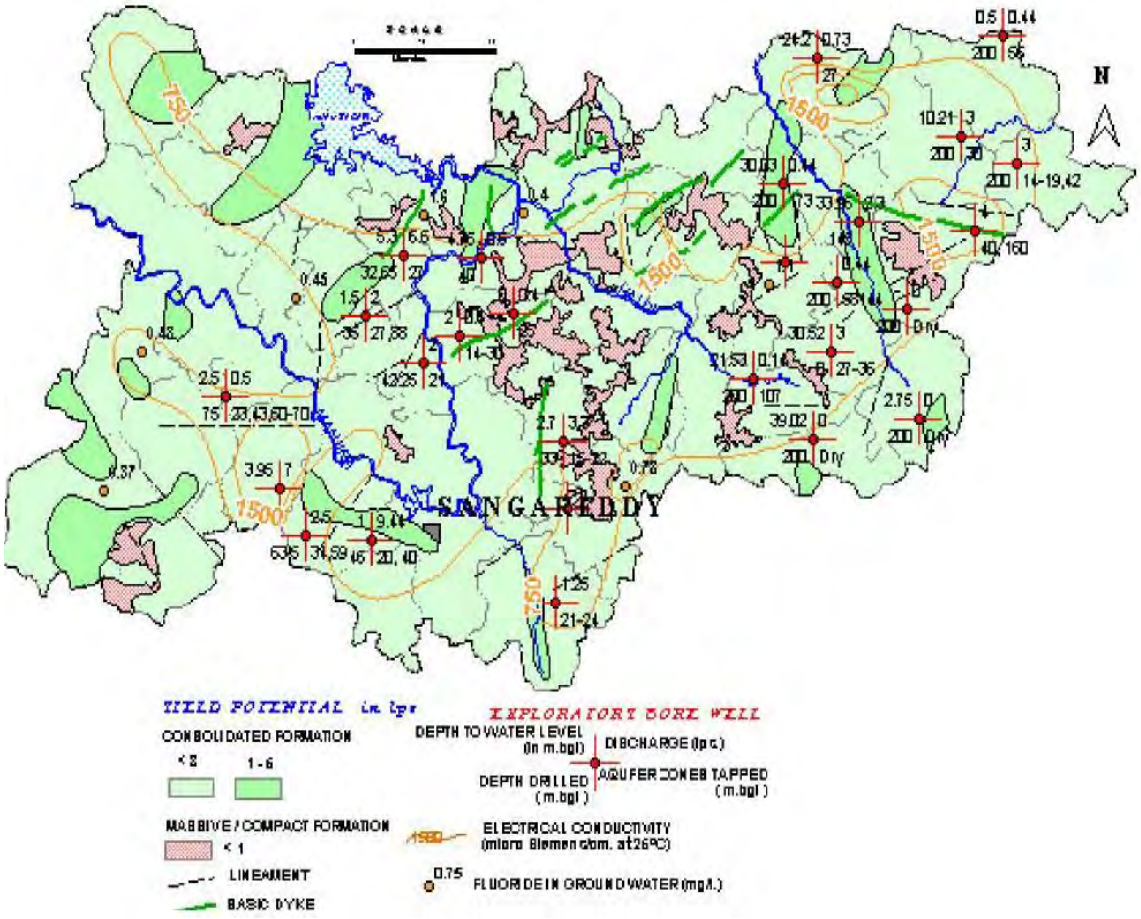
3.1.1 ARCHAEAN CRYSTALLINE FORMATIONS

Ground water is one of the important sources both for domestic and irrigation purposes in the District and is being exploited through large diameter dug wells, dug-cum bore wells and bore wells. In the Archaeans, ground water occurs under phreatic conditions, but it is desaturated and under semi- confined conditions in the fractured zones. The depth of weathering varies between 5.5 and 15 m bgl. The yield of Extension bores down to a depth of 20 to 30 m in the dug wells, ranges from 0.17 to 0.3 litres per second (lps). The yields of irrigation dug wells range between 40 and 135 cu.m/day sustaining 1 to 5 hrs of pumping in a day. The depth of irrigation bore wells ranges between 20 to 45m yielding 1.5 to 75 cu.m/day. In weathered granite (mostly dry) and alluvium, the transmissivity values ranges from 100 to 150 sq.m/day and the specific capacity ranges from 0.005 to 0.16 cu.m/m per unit cross-section.

3.1.2 Deccan Traps (Basalt & Laterite rocks)

Basalts and laterites occupy about 20% of the area and ground water occurs under water table and semi-confined conditions in joints, fractures. The density/intensity of fractures and joints play a major role in movement and occurrence of ground water. The depth of open wells tapping laterites and weathered basalts varies from 20 to 30m with yields varying from 5 to 20 cu.m/day.

Fig.3 Hydrogeology – Medak District



The wells are capable of sustaining 2 to 5hrs of pumping with an average discharge of 14400 lph. The yield of bore wells constructed down to the depth of 50 to 100 m vary from 400 to 10,800 lph. Higher yields of more than 20,000 lph was reported from bore wells located in laterites of Zahirabad and Narayankhed areas. Further, the wells tapping the inter-trappean and intra-trappens beds are also yielding higher discharges. The transmissivity values of these formations range between 10 and 100 m^2/day.

The depth of wells, constructed by CGWB under Canadian Assisted Ground Water Project, ranges from 48.50 to 193.0 m and the discharge varies from meager to 50.0 lps. The fracture zones are mostly confined upto 75 to 100 m bgl. Occasional occurrence of deeper fractures of more than 100 m rare and noticed at places (Bibipet and Ramreddypet villages). The yield of the bore wells ranges from meager to 9 lps (Bibipet). The transmissivity of these wells varies from 15 to 68 sq.m/day.

3.1.3 Alluvium

Alluvial aquifers are very limited in extent and occur on either side of the Haldi, Nakkavagu and Mantru streams along a narrow strip. The development of ground water in these alluvial tracts is through shallow dug wells and filter points with depth ranges from

3.5 to 10 m. The yield of these wells ranges from 5000 to 15,000 lph. The transmissiivty values ranges from 80 to 110 sq.m/day.

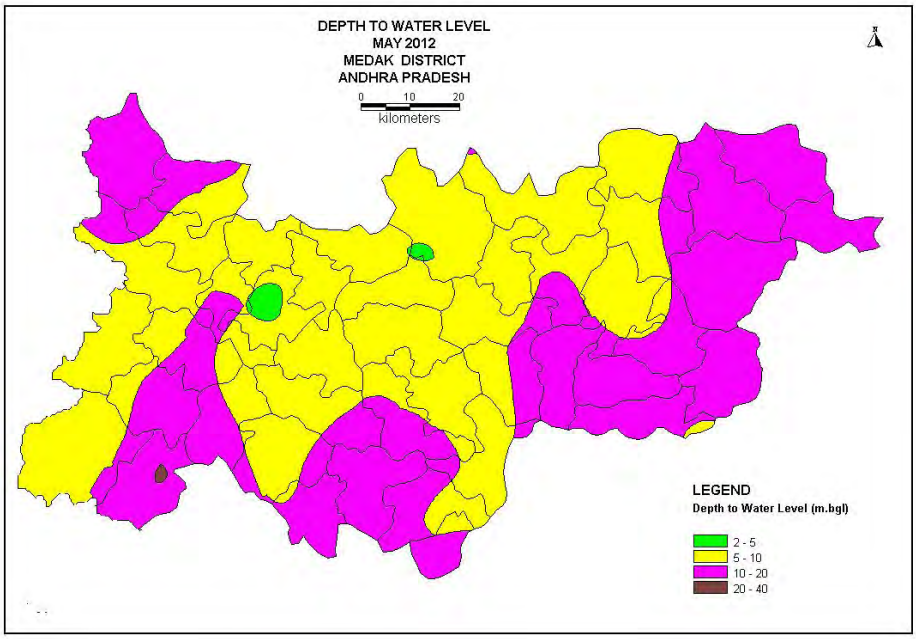
3.1.4 Depth to Water Level

In order to monitor the changes in ground water scenario Central Ground Water board established a network of observations wells and collects water level data 4 times a year.

3.1.4.1 Pre-monsoon

The depth to water level varies from a minimum of 3.85 m.bgl (Medikonda) to a maximum of 21.00m.bgl (Kohir). Most of the area is having water levels below 5 mbgl. Water levels ranges from 5-10m and above 10m water levels in Zahirabad, Kohir, Sangareddy and Kondapuram(Fig-4).

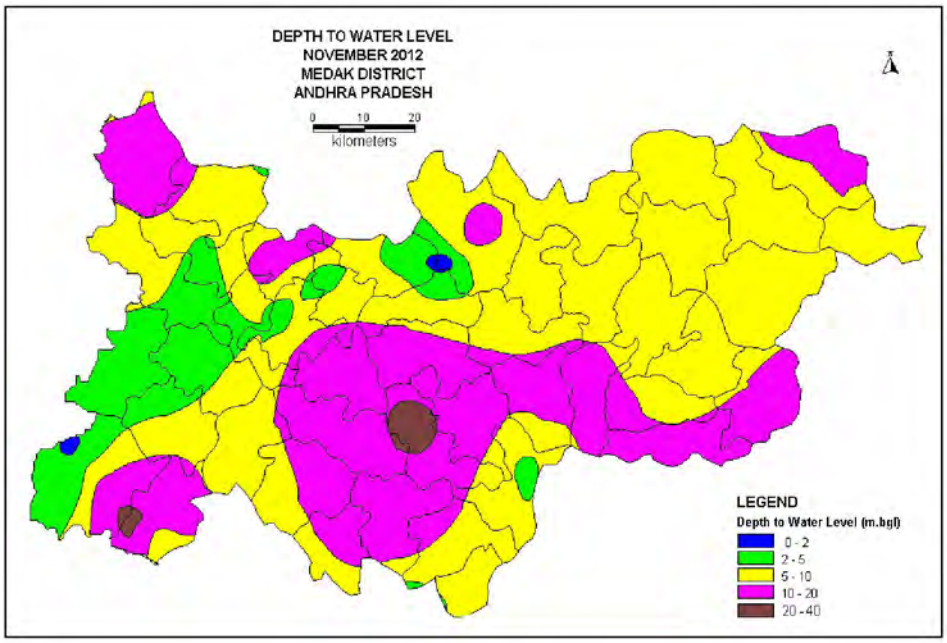
Fig.4 Depth to water level – Pre-monsoon (2012)



3.1.4.2 Post-monsoon

The depth to water level during post-monsoon ranges from a minimum of 0.98 m.bgl (Peroor) to maximum of 22.65 m bgl (Melchelma). Water levels of less than 2m were recorded at North-western parts of the district. The water levels of less than 10 m bgl cover the maximum area of the district. (Fig-5).

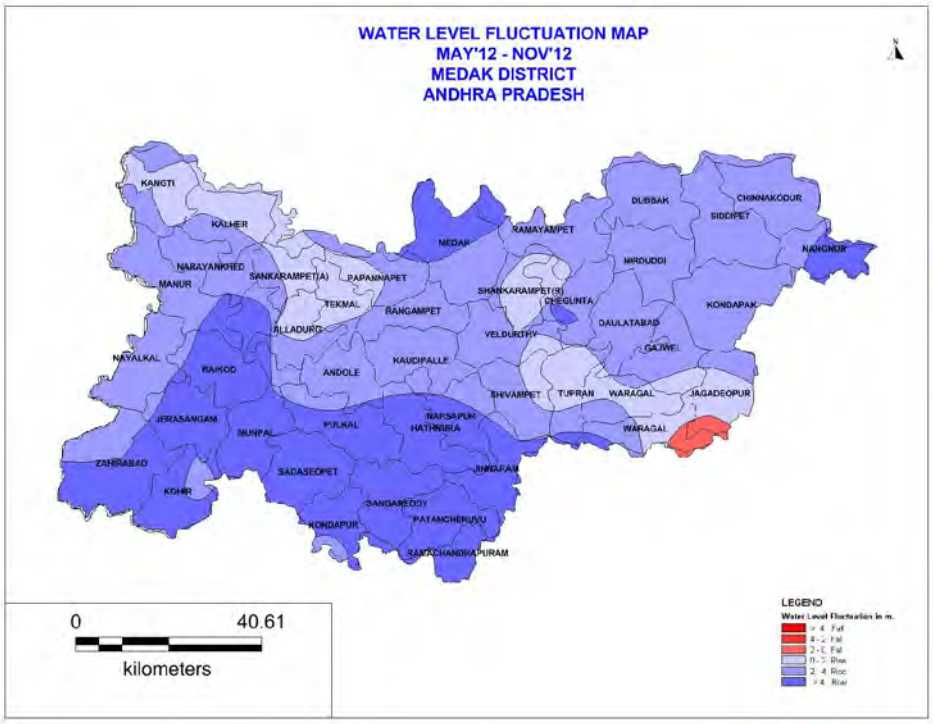
Fig.5 Depth to water level – Post-monsoon (2012)



3.1.4.3 Water Level Fluctuation

The water level fluctuation between pre-monsoon and post-monsoon ranges between 0.00 to 7.88m. The majority of the area shows rise in the range of 2-4m (Fig.6).

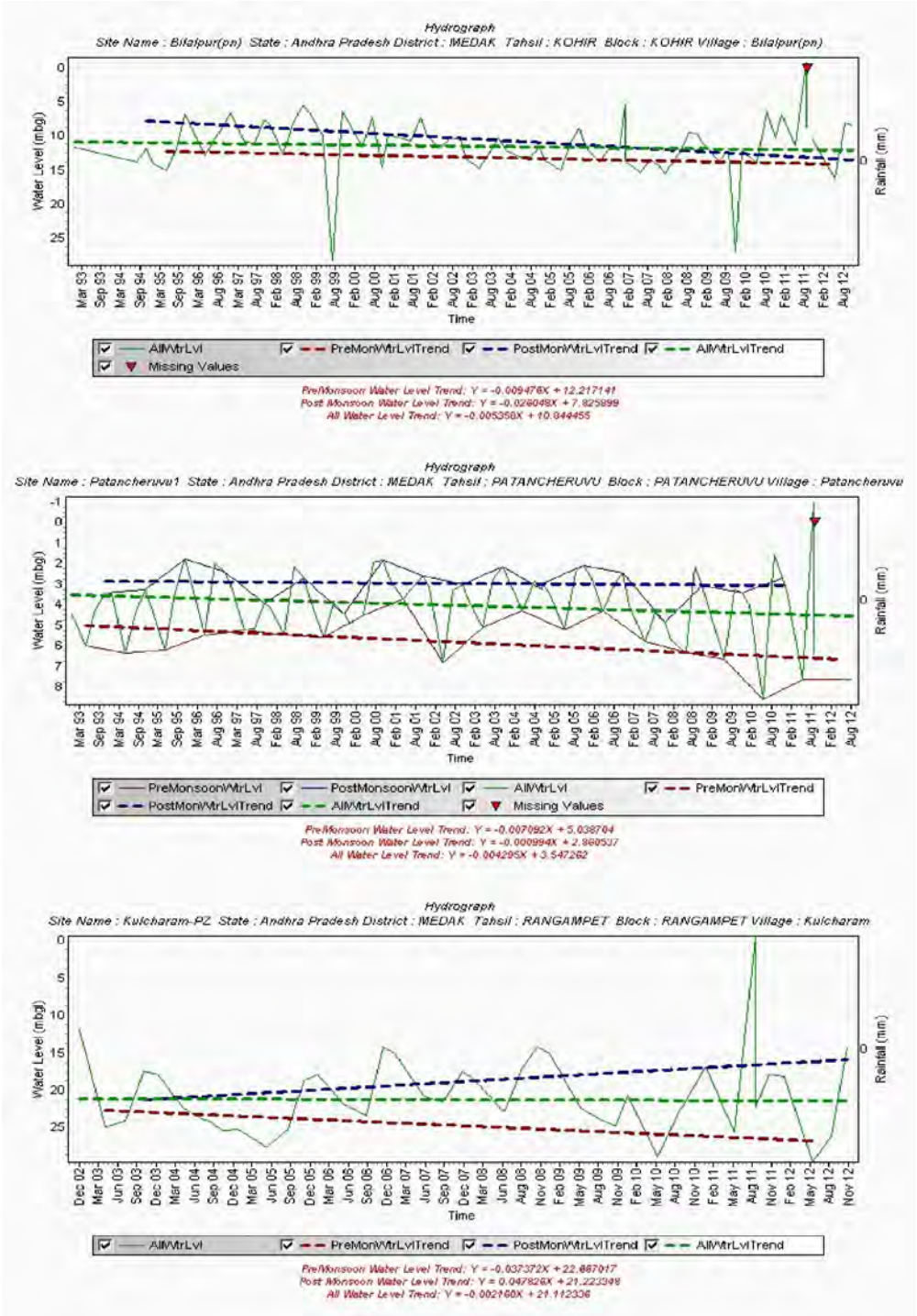
Fig .6 Water level Fluctuation (2012)



3.1.4.4 Long Term Water Levels

Decline in water levels during pre-monsoon is noticed in 75% of the wells while 25% of wells show rise in water levels during the last decade (1996- 2005) (Fig.7). The decline in water levels varies between 1.06 to 5.19 metres. Rise in water levels occurred in the eastern part of the district.

Fig.7 Trend of water levels during Pre- & post- monsoon (1996-2005) – Medak district

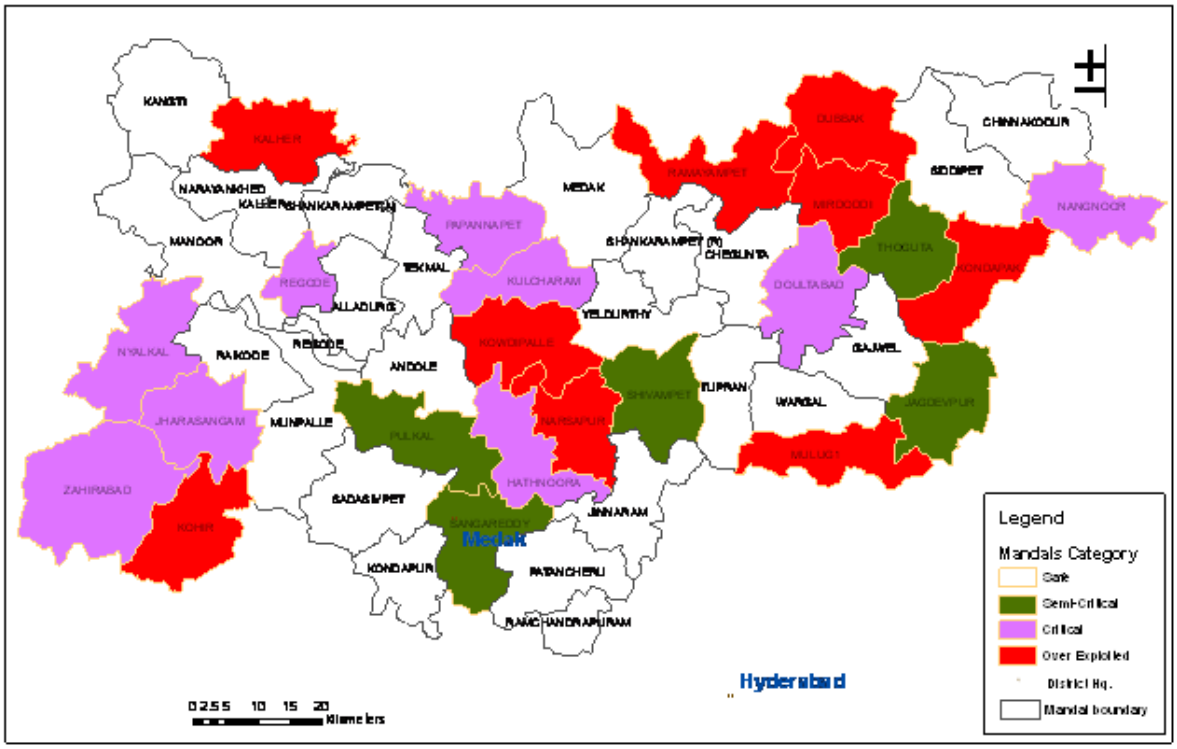


The analysis of post-monsoon water levels (1996-2005) shows that there is a decline in 77% of the wells while 23% show rise in water levels. The water level decline varies from 0.19 to 6.62 m.

4.0 GROUND WATER RESOURCES

Based on the Ground Water Estimation Committee (GEC-97) norms, ground water assessment was done in 2008/09. The mandal wise details of ground water resources are presented in the Table 2 & 3. The Ground water resources available in the district is 1,05,038 ha.m and the utilisation is 88,700 ha.m and projection for dosmestic and industrial requirement for (2025) is 7,793 ha.m. and the ground water balance is 15,780 ha.m for future development. Based on Stage of development of ground water, 23 mandals are classified as safe, 9 are semi critical and another 9 mandals are over-exploited(Fig.8). The minimum stage of development is 33% in Kangti mandal and the maximum stage of development of 188 % is in Mirdoddi mandal.

Fig.8 Categorization of Mandals in Medak District (2008-09) in respect of ground water development



5.0 GROUND WATER QUALITY

The ground water in the district is in general suitable for both domestic and irrigation purposes. The electrical conductivity ranges from 733 to 5266 micro Siemens/cm at 25^0C. Nitrate values in ranges from 20 to 270 mg/l, however 60% of area is reported >45 mg/l of nitrate and fluoride values are within the permissible limits of 1.5 mg/ only at papannapet (2.00mg/l). High fluoride concentration in ground water is observed in Siddipet, innakodur, Nangunur, Dubbak, and Narayankhed mandals.

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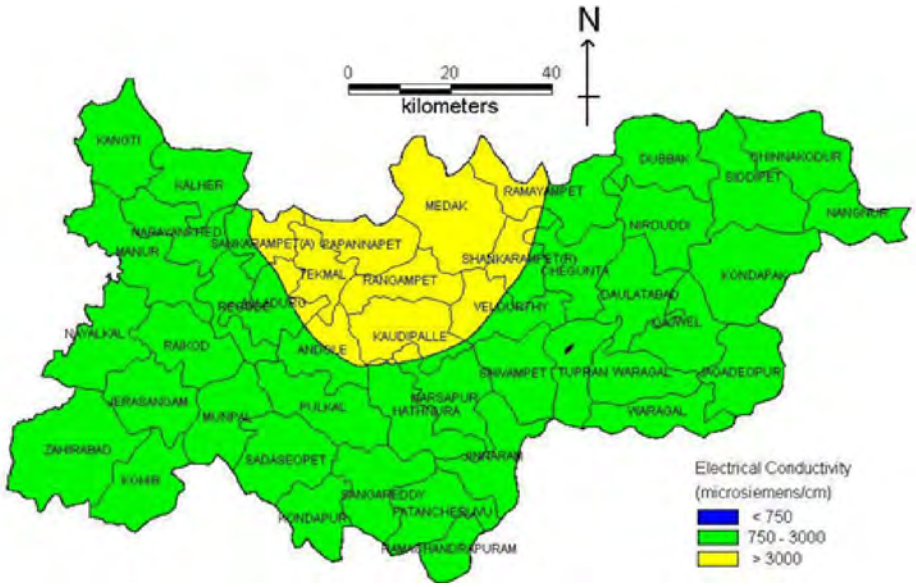
Table.2 Assessment Ground Water Resources – Medak District [2009]

Sl. No	Mandal	C/ NC / T	Recharge from rainfall during monsoon season	Recharge from other sources during monsoon season	Recharge from rainfall during non-monsoon season	Recharge from other sources during non-monsoon season	Total annual ground water recharge [4+5+ 6+7]	Provision for natural discharge	Net annual ground water availability
1	Alladurg	NC	1009	179	199	304	1691	169	1522
2	Andole	NC	1883	195	232	313	2623	262	2361
3	Chegunta	NC	1497	415	539	533	2984	265	2719
4	Chinnakodur	NC	2100	513	516	763	3892	389	3503
5	Doulthabad	NC	1628	437	724	588	3377	338	3039
6	Dubbak	NC	1673	544	494	781	3492	349	3143
7	Gajwel	NC	1577	254	450	361	2642	264	2378
8	Hathnura	NC	1869	352	227	492	2940	294	2646
9	Jagdevpur	NC	1546	323	454	432	2755	275	2480
10	Jharasangam	NC	959	111	246	136	1452	145	1307
11	Jinnaram	NC	1488	317	307	430	2542	171	2371
12	Kalher	NC	1415	134	305	242	2096	210	1886
13	Kangti	NC	1405	107	405	155	2072	207	1865
14	Koheer	NC	1285	204	325	278	2092	209	1883
15	Kondapak	NC	1614	474	716	647	3451	345	3106
16	Kondapur	NC	1141	148	368	187	1844	184	1660
17	Kowdipally	NC	1504	367	210	607	2688	269	2419
18	Kulcharam	NC	1086	266	141	427	1920	192	1728
19	Manoor	NC	1567	187	372	303	2429	243	2186
20	Medak	NC	2796	542	537	799	4674	395	4279
21	Mirdoddi	NC	1029	444	688	559	2720	272	2448
22	Mulugu	NC	960	193	231	260	1644	162	1482
23	Munipally	NC	1189	125	307	148	1769	177	1592
24	Nanganur	NC	1235	332	278	463	2308	231	2077
25	Narayankhed	NC	1402	160	192	253	2007	201	1806
26	Narsapur	NC	1410	270	226	460	2366	237	2129
27	Nyalkal	NC	1272	200	222	263	1957	196	1761
28	Papannapet	NC	1493	393	292	534	2712	271	2441
29	Patancheru	NC	1880	232	417	321	2850	276	2574
30	Pulkal	NC	2211	339	113	572	3235	324	2911
31	Raikode	NC	1198	109	256	144	1707	171	1536
32	Ramayampet	NC	1260	653	995	692	3600	318	3282
33	RC Puram	NC	584	63	143	82	872	87	785
34	Regode	NC	986	123	132	183	1424	142	1282
35	Sadasivpet	NC	1770	217	451	280	2718	272	2446
36	Sangareddy	NC	1758	178	489	237	2662	197	2465
37	Shankarampet-A	NC	1183	139	0	193	1515	152	1363
38	Shankarampet-R	NC	1319	354	303	420	2396	141	2255
39	Shivampet	NC	1613	406	283	696	2998	300	2698
40	Siddipet	NC	2061	506	458	790	3815	382	3433
41	Tekmal	NC	1222	229	208	381	2040	204	1836
42	Thoguta	NC	1126	233	233	320	1912	191	1721
43	Toopran	NC	1462	420	399	597	2878	288	2590
44	Wargal	NC	859	235	245	330	1669	167	1502
45	Yeldurthy	NC	1774	368	345	679	3166	311	2855
46	Zaheerabad	NC	2278	339	575	460	3652	365	3287
Total			67576	13329	16248	19095	116248	11210	105038

Table.3 Assessment Of Administrative Unit (Mandal) Wise Categorisation [2009]

Sl.No.	Mandal	C/ NC/ T	Stage of ground water development[%]	Pre-monsoon		Post monsoon		Category [safe/ semicritical/ Critical/ Over exploited]
				Water level trend cm/yr	Is there a significant decline [Yes/No]	Water level trend cm/yr	Is there a significant decline [Yes/No]	
1	Alladurg	NC	60	-6.21	No	-56.33	No	Safe
2	Andole	NC	39	-104.28	No	-48.63	No	Safe
3	Chegunta	NC	90	-52	No	-102.2	No	Safe
4	Chinnakodur	NC	77	-107.48	No	-150.27	No	Safe
5	Doulthabad	NC	100	267.58	Yes	145.84	Yes	Critical
6	Dubbak	NC	117	220.14	Yes	146.02	Yes	O. E.
7	Gajwel	NC	76	-85.6	No	-66.13	No	Safe
8	Hathnura	NC	99	43.2	Yes	43.63	Yes	Critical
9	Jagdevpur	NC	73	50.62	Yes	3	No	Semi-cri
10	Jharasangam	NC	98	14.82	Yes	17.18	Yes	Critical
11	Jinnaram	NC	60	-238.92	No	-181.72	No	Safe
12	Kalher	NC	113	102.4	Yes	80	Yes	O. E.
13	Kangti	NC	33	-27.36	No	-67.37	No	Safe
14	Koheer	NC	101	37.04	Yes	5.65	No	O. E.
15	Kondapak	NC	127	18.65	Yes	11.85	Yes	O. E.
16	Kondapur	NC	62	-83.05	No	-84.75	No	Safe
17	Kowdipally	NC	117	43.2	Yes	43.63	Yes	O. E.
18	Kulcharam	NC	96	43.2	Yes	43.63	Yes	Critical
19	Manoor	NC	50	-43.41	No	-15.15	No	Safe
20	Medak	NC	65	-126.63	No	-247.8	No	Safe
21	Mirdoddi	NC	188	267.58	Yes	145.84	Yes	O. E.
22	Mulugu	NC	112	29.1	Yes	28.1	Yes	O. E.
23	Munipally	NC	45	-12.21	No	-56.5	No	Safe
24	Nanganur	NC	96	18.65	Yes	11.85	Yes	Critical
25	Narayankhed	NC	71	-69.64	No	4.66	No	Safe
26	Narsapur	NC	114	43.2	Yes	43.63	Yes	O. E.
27	Nyalkal	NC	98	25.93	Yes	11.42	Yes	Critical
28	Papannapet	NC	95	43.2	Yes	43.63	Yes	Critical
29	Patancheru	NC	69	-23.5	No	-46.58	No	Safe
30	Pulkal	NC	79	-9.68	No	35.13	Yes	Semi-cri
31	Raikode	NC	47	-52	No	-102.2	No	Safe
32	Ramayampet	NC	107	17	Yes	-19.17	No	O. E.
33	RC Puram	NC	65	-82.52	No	-68.85	No	Safe
34	Regode	NC	92	102.4	Yes	80	Yes	Critical
35	Sadasivpet	NC	57	-12.21	No	-56.5	No	Safe
36	Sangareddy	NC	78	-9.68	No	35.13	Yes	Semi-cri
37	Shankarampet-A	NC	90	-69.64	No	-4.66	No	Safe
38	Shankarampet-R	NC	57	-52	No	-102.2	No	Safe
39	Shivampet	NC	88	11.95	Yes	-12.44	No	Semi-cri
40	Siddipet	NC	74	-29.49	No	-112.26	No	Safe
41	Tekmal	NC	66	-211.9	No	-178.1	No	Safe
42	Thoguta	NC	87	18.65	Yes	-11.85	No	Semi-cri
43	Toopran	NC	74	11.95	No	-12.44	No	Safe
44	Wargal	NC	70	-85.6	No	-66.13	No	Safe
45	Yeldurthy	NC	66	-126.63	No	-247.8	No	Safe
46	Zaheerabad	NC	92	25.93	Yes	11.42	Yes	Critical

Fig.9 Distribution of Electrical Conductivity in Ground Water



6.0 STATUS OF GROUND WATER DEVELOPMENT

The district is mainly dependant on ground water for its irrigation due to scanty rainfall. About 1,65,930 abstraction structures viz., dug wells, bore wells and deep bore wells exist in the district. Ground water development is through deep bore wells in the non-command areas and through dug wells and shallow bores in under of ponds, tanks and reservoirs areas. Alluvial aquifers are developed through filter point wells. In Non-command areas, the stage of ground water development is 84 per cent.

7.0 GROUND WATER MANAGEMENT STRATEGY

The ground water management strategy should be adopted such that optimal utilization of ground water resource and well spacing norms(Table.4). Based on the well spacing norms at a distance of 250 to 300 m. for shallow bore wells in hard rocks and the optimal density per sq.km comes to 9, whereas presently the well density in the district is 6 per sq.km and there is no scope for further development of ground water. In practice, large diameter wells are constructed to store large quantity of water on investing huge amount of money. The excess expenditure could be avoided by proper designing, based on local hydrogeological conditions, water requirement and the cropping pattern should be adopt practice. It is, thus necessary that the wells be designed in such a way that the dimensions are optimum. The optimum design of a well depends on the quantum of water to be discharge and the cropping pattern.

To avoid mutual interference between two adjacent wells, they have to be properly spaced. Liberal institutional financing has accelerated the ground water development and accordingly spacing has been made mandatory by the Government of India, so that the wells are economically viable. In order to work out spacing, pumping test for a minimum of 6 to 8 hrs duration would be necessary and the spacing between two adjacent wells has to be twice the radius of influence. Based on the present irrigation practice, the economic viability of various types of ground water abstraction structures with the required spacing is presented in the following table.

Table.4 Spacing Norms of wells

Sl No	Situation	Spacing between any two wells (m)	
		Dug wells	Tube wells or borewells
1	Non-Ayacut	160	250-300
2	Ayacut	100	200-250
3	Near perennial source like river of tank within 200 m	100	200-250
4	Non-perennial streams within 100 m	150	200-300

8.0 GROUND WATER DEVELOPMENT

The easy availability of ground water at the place of requirement and liberalization of credit facilities by the financial institutions and free power (Electricity) coupled with modern drilling techniques have opened the flood gates for exploitation of the available ground water resources. The entire district's drinking water demand, with a few exceptions, and about 97% of the irrigational requirements, is met from the ground water resources. The water requirement of some of the industries is also met by the ground water. Ground water forms the main source for drinking water schemes in both rural and urban areas in the district. Under Pancahayth Raj Department, Rural Water Supply Department, Government of Andhra Pradesh maintains the protected water supply schemes and de-fluoridation plants in the district. These schemes include lift irrigation schemes, bore wells and large diameter dug wells, dug cum bore wells and shallow bore wells fitted with hand pumps etc.

9.0 GROUND WATER RELATED ISSUES AND PROBLEMS

9.1 Water Logged areas

The water logging conditions with water levels less than 2 m bgl and prone to water logging conditions with water levels varying between 2-3 m bgl occur in minor portion on the northern part of the district in both during pre and post monsoon periods.

9.2 Polluted areas

Ground water pollution in the district is mainly by agricultural and human activities. About 66% of the samples show Nitrates beyond permissible limits in shallow ground water as well as, while it is about 20% in deeper ground water. A total of 69 Fluoride affected villages are observed..

9.3 Water Table Depleted areas

No significant fall of water table is noticed in the district. Long term water level trends of last two decades (1993-2012) shows that, depleting areas are limited in nature however, 40% of wells shows rising tread varies from 0.01 to 0.16 m/year. The range of fall (decline) trend of water levels varies from 0.0259 to 0.2 m/year in the area.

10.0 RECOMMENDATIONS

1. Restriction of further Ground Water Development through bore wells has to be avoided by strictly implementing APWALTA Act in the villages that are categorized as OE (9) Mandals. However, villages /mandals under Safe – Semi Critical Category can be developed in a phased manner. The development of ground water should be taken up hand-in-hand with the management as well as artificial recharge to ground water.

2. Proper Planning and care has to be taken in selection of sites for bore wells in future with the help of remote Sensing maps, geophyscial and hydrogeological studies.

3. Involvement of NGOs and local bodies in implementation of artificial recharge schemes and maintenance at village/mandal level is essential.

4. Rooftop rain water harvesting both in urban and rural areas should be made mandatory to enhance the groundwater resources.

5. Since the district is water scarce, land use system should place emphasis on cultivation of high value, low water requiring crops such as pulses, oilseeds. The suggestion of Agriculture Department has to be implemented, according to seasons.

6. Studies are to be taken up to check the recurrence of fluorosis, especially in the Kowdipalle and Narspur areas, and remedial measures have to be implemented. In a fluoride endemic area, it is not necessary that every water sources is contaminated. The good sources may be identified by qualified persons and the people can be educated to consume water supply only from such sources.

7. Mutual interference between two adjacent bore wells i.e., 250-300 m and 160 m per dug well as per APWALTA Act has to be strictly implemented.

8. Awareness among farmers has to be created at village/mandal level by organizing campaigns by the experienced Scientists/Engineers on water conservation methods, change of cropping pattern, etc.

9. Improved irrigation methods viz., sprinkler and drip irrigation techniques are to be adopted proper training needs to be imparted to the farmers so that the usage of ground water can be reduced.

10. Water literacy regulation should be developed for sustainable use of ground water.

11. Large scale artificial recharge structures like percolation tanks, check dams, farm ponds, embankment structures should be taken up on watershed basis and sound technical background so as to augmeent ground water storage. It is important to take up artificial recharge structures based on the topography, soil, slope, surface run off available and hydrogeological conditions rather than target oriented in achieving the numbers.

12. Developmental plans should be prepared based on prioritization of areas. The demarcation of areas can be taken up, based on stage of ground water development and water level decline over the years.

13. Awareness on conservation of water should be created amongst school children as they are the pioneers of the future generations by organizing painting competitions, debates, rallies, quiz programmes etc.

14. More emphasis has to be given to school children on water conservation, water harvesting techniques and environmental protection by including a chapter in their curriculum

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