

# **CENTRAL GROUND WATER BOARD** MINISTRY OF WATER RESOURCES, RIVER DEVELOPMENT AND GANGA REJUVENATION

# **GOVERNMENT OF INDIA**

# STATUS OF GROUND WATER LEVEL SCENARIO, DURING PRE-

# MONSOON SEASON-2015 (MAY)

# (ANDHRA PRADESH)



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#### **EXECUTIVE SUMMARY**

- During Pre-monsoon season of May 2015, total 873 wells were monitored (764 DW+109 Pz).
- 2. During the year June-2014-May-2015, state received deficit of 24% rainfall as compared to June-2013-May-2014.
- 3. The minimum and maximum depth to water level varies from 0.02 to 49.3 m bgl.
- 4. Water Levels in the range of 5 to 10 m bgl are predominant covering about 47% of the total geographical area, represented by 33 % of the wells.
- 5. Fluctuations in water level during May-2015 WRT May-2014 shows a maximum rise of 6.7 m in Chittor district and maximum fall of 25.52 m in Prakasham district.
- 6. Due to deficit rainfall of 24 % during the year 2014-15 as compared to previous year, the fall in water levels in the range of 0-2 m covers maximum area (61% of state), represented by 49 % of wells.
- Water level fluctuations during May-2015 WRT decadal mean of May-2005-2014, shows a fall in water levels in 73% of the area and maximum fall of 29.55 m is observed in Cuddapah district.

# STATUS OF GROUND WATER LEVEL SCENARIO, DURING PRE-MONSOON SEASON-2015 (MAY)

### (ANDHRA PRADESH)

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# STATUS OF GROUND WATER LEVEL SCENARIO, DURING PRE-MONSOON SEASON-2015 (MAY)

#### (ANDHRA PRADESH)

## **1. INTRODUCTION**

Depth to Water level data was collected from monitoring wells known as Ground water monitoring wells in Andhra Pradesh during May, 2015. The number of operational wells after the monitoring in January, 2015 are 881 (772 dug wells and 109 piezometers). Ground water monitoring wells abandoned during May, 2015 are 17 (17 dug wells) whereas 9 Ground water monitoring wells (DW) were established during this period. Thus the number of operational wells after present monitoring stands at 873 (764 dug wells and 109 piezometers).

During May 2015, a total number of 133 Ground water monitoring wells (130 dug wells & 3 Piezometers) are dry. The maximum number of dry wells (28 DW) are from Chittor districts due to less rainfall received during June 2014 - May 2015. Total 41 wells (16 dug wells and 25 piezometers) could not be monitored due to various reasons like inaccessibility, damaged roads, installation of pumps, jamming of piezometer caps, roots entered etc. District wise status of Ground Water monitoring wells is presented in **Annexure-I.** 

Based on the rainfall data and water level data collected from the Ground water monitoring wells during May, 2015 and the earlier periods, the following seven maps are prepared on 1:5 million scales.

#### **ANNEXURE-I**

#### STATUS OF MONITORING OF GROUND WATER MONITORING STATION (GWMS), ANDHRA PRADESH (AS ON

#### S. District No of Stations to No of Stations as No. be monitored where WL data Monitored as not Monitored Abandoned Established on 31/05/2015 Recorded Dry due to Various Reasons DW Total DW DW DW Pz DW Pz Total DW Pz DW Pz Pz Total Pz Total Total Total Pz Total Anantapur Chittoor Cuddapah East Godavari Guntur Krishna Kurnool Nellore Prakasam Srikakulam Visakhapatnam Vizianagaram West Godavari Total

#### 31/05/2015)

#### 2. RAINFALL

The rainfall data collected from India Meteorological Department and compiled from Weekly Weather reports has been used to analyze the rainfall for the period June 2004 to May 2015. District-wise rainfall data for the period June-13-May-14, Jun'14-May'15, decadal mean (Jun-May) of 2005-2014 and normal of June-May and the departure of Jun'14-May'15 rainfall with all the rest of the periods is given **Table 1** and various thematic maps are given in **Fig. 1, Fig. 2 and Fig. 3**.

			Rainfa	all (mm)	Departure of June'14-May'1 rainfall from							
S. No.	District	June-14 -May 15	June-13 -May 14	Decadal Mean (2005-14)	Normal	June-13 -May 14	Decadal Mean (June-May)	Normal June-May				
1	Anantapur	487	542	608	573	-10.2%	-20.0%	-15.0%				
2	Chittor	721	793	933	898	-9.0%	-22.7%	-19.7%				
3	Cuddapah	499	654	658	717	-23.7%	-24.2%	-30.4%				
4	East Godavari	563	1141	1126	1106	-50.7%	-50.0%	-49.1%				
5	Guntur	651	1098	919	872	-40.7%	-29.2%	-25.3%				
6	Krishna	576	1251	1120	1027	-54.0%	-48.6%	-43.9%				
7	Kurnool	664	686	723	680	-3.1%	-8.1%	-2.3%				
8	Nellore	751	802	1046	1092	-6.5%	-28.2%	-31.2%				
9	Prakasam	499	932	835	806	-46.4%	-40.2%	-38.1%				
10	Srikakulam	1104	1578	1201	1165	-30.1%	-8.1%	-5.3%				
11	Vishakhapatnam	1056	1237	1125	1121	-14.7%	-6.2%	-5.8%				
12	Vizianagaram	1105	1116	1175	1140	-1.0%	-5.9%	-3.1%				
13	West Godavari	765	1256	1153	1160	-39.1%	-33.6%	-34.1%				
	State Mean	726	1007	971	950	-27.9%	-25.2%	-23.6%				

Table-1: Salient Features of Rainfall and its Variability in Andhra Pradesh State.

#### 2.1 Rainfall Departure (June 14-May 15) with Normal Rainfall of Same Period (Fig.1):

This map gives departure of June 14-May15 rainfall with normal rainfall of the same period. It is prepared to correlate with depth to water level map of May 2015. During the period June 14-May15, the state has received 24 % less rainfall than normal rainfall. It ranges from -49% in East Godavari to -2.3 in Kurnool district. The deficit rainfall is observed Chittoor, East Godavari, Guntur, Krishna, Nellore, Prakasam and West Godavari districts and in rest it received normal rainfall.



Fig.1: Rainfall Departure (June-14-May-15, WRT Normals of same Period).

#### 2.2 Rainfall Departure June 14 to May-15 With respect to June 13 to May-14 (Fig.2):

This map gives departure of Jun'14-May'15 rainfall with Jun'13-May'14 rainfall. It is prepared to correlate with water level fluctuation map of May 2015 with May 2014. **Table 1** indicates that state has received 726 mm of rainfall during the period Jun'14 to May'15, which is 28 % less than the rainfall received during the same period last year and 25 % less than the decadal mean(2005-2014) and 24% less than the normal rainfall. The state received about 1007 mm of rainfall during the same period last year. The departure in percentage ranges from -54% in krsihna district to -1% in Vizianagaram district.



Fig.2: Rainfall Departure (June14-May-15 WRT June 13-May-14).

**2.3 Rainfall Departure, June 14-May15 with Decadal Mean June-May (2005-2014) (Fig 3):** This map gives departure of Jun'14-May'15 rainfall with decadal mean rainfall (Jun-May). It is prepared to correlate with water level fluctuation map of May 2015 with Decadal mean (May 2005-2014). **Table 1** indicates that the decadal mean rainfall (Jun-May) of the state is 971 mm. The departure in percentage ranges from -50% in East Godavari district to -6% in Vizianagaram district.



Figure-3: Rainfall Departure (June-14-May-15, WRT to Decadal Mean,

June-May, 2005-2014).

# 3. DEPTH TO WATER LEVEL DURING PRE-MONSOON SEASON (MAY-

# 2015)

The depth to water levels are summarized below and presented in **Fig.4.** The area wise distribution is presented as pie and percent distribution of wells as bar diagram.

- 1. An analysis of depth to water level data of 787 wells (**Annexure-II**) shows, water levels in the range of 0.02 (Krishna district) to 49.3 mbgl (Prakasam district).
- Shallow water level in the range of 0 to 2 m bgl covers an area of about 4374 Km<sup>2</sup> (3% of state area) and mostly observed in Guntur, East and West Godavari districts.
- 3. Water levels in the range of 2 to 5 m occupies about 48600 Km<sup>2</sup> area (30% of the total geographical area of the state), occupying mostly coastal region of the State.
- 4. During May, majority of the water levels are in the range of 5 to 10 m bgl occupying about 75,580 Km<sup>2</sup> area (47%) and represented by 33 % wells.
- 5. Water levels between 10-20 m bgl covers about 27520 Km<sup>2</sup> (17%) representing 11.8% wells.
- Deep water levels in the range of 20-40 m bgl and > 40 m bgl covers about 1% and <0.1% of the total geographical area respectively, representing < 1% of total wells covering mostly Cuddapah and Chittoor districts.</li>







#### **ANNEXURE-II**

## SUMMERISED RESULTS OF DEPTH TO WATER LEVEL, A.P. (PRE-MONSOON-2015 (MAY).

S. No.	District Name	No. of wells analyzed	De Wat (n	epth to er Level n bgl)	No. & Percentage of wells showing depth to water table (mbgl) in the range of									e of		
			Min	Max	0 - 2	%	2 - 5	%	5 - 10	%	10 - 20	%	20-40	%	> 40	%
1	Anantapur	39	0.25	18	6	15.38	7	17.95	14	35.9	12	30.8	0	0	0	0
2	Chittoor	48	1.26	21.25	1	2.08	7	14.58	18	37.5	21	43.8	1	2.1	0	0
3	Cuddapah	34	4.05	47.45	0	0	4	11.76	15	44.12	13	38.2	1	2.9	1	2.9
4	East Godavari	93	0.02	9.6	27	29.03	46	49.46	20	21.51	0	0	0	0	0	0
5	Guntur	101	0.47	39.5	15	14.85	54	53.47	24	23.76	7	6.9	1	1	0	0
6	Krishna	71	0.02	19.8	8	11.27	38	53.52	21	29.58	4	5.6	0	0	0	0
7	Kurnool	43	0.65	16.97	5	11.63	15	34.88	18	41.86	5	11.6	0	0	0	0
8	Nellore	61	1.37	17	4	6.56	26	42.62	22	36.07	9	14.7	0	0	0	0
9	Prakasam	71	0.91	49.3	5	7.04	26	36.62	32	45.07	7	9.9	0	0	1	1.4
10	Srikakulam	42	0.73	10.4	3	7.14	13	30.95	23	54.76	3	7.1	0	0	0	0
11	Visakhapatnam	76	0.4	23.65	14	18.42	34	44.74	22	28.95	5	6.6	1	1.3	0	0
12	Vizianagaram	48	0.66	9.64	3	6.25	28	58.53	17	35.42	0	0	0	0	0	0
13	West Godavari	60	0.34	16.99	14	23.33	25	41.67	14	23.33	7	11.7	0	0	0	0
	Total	787	0.02	49.3	105	13.3	323	41	260	33	93	11.8	4	0.5	2	0.25

# 4. WATER LEVEL FLUCUATION DURING MAY 2015 with RESPECT TO MAY 2014

Water level fluctuation data of May 2015 with respect to May 2014 is presented in **Annexure-III and Fig.5** An analysis of 724 wells shows that water level rise is recorded in 30.4% wells (220 nos) covering an area of about 23% of the total geographical area. About 76% of the area have shown a fall in water level representing 64% wells (463), while in the rest, <1 % wells (4) no fluctuation is recorded. Fall in water levels is mainly due to less rainfall (-28%) than the last year. Area wise water level fluctuations are shown as pie diagram and percentage of wells as bar diagram.

Water level rise of more than 4 m is recorded maximum in Anantapur district district (2 wells) while water level fall of more than 4 m is recorded in Srikakulam and Cuddapah district.

#### 4.1 RISE IN WATER LEVELS:

- During May 2015, the minimum and Maximum rise in water level of 0.01 m and 6.7 m is noticed in Chittoor district.
- 2. Prakasam district have shown a very negligible rise in water levels as compared to other district (Min 0.02 and Max 2.56 m).
- 3. Water level rise of <2 m is recorded in 27.2% wells covering about 22 % of total geographical area, covering mostly Vishakhapattanam.
- 4. 2 to 4 m and > 4 m rise in water levels is observed in 2.2 % and 1% of wells, covering about 1% and < 1% geographical area respectively.

#### 4.2 FALL IN WATER LEVELS:

- During the period an appreciable fall in water levels is observed with minimum 0.01 m (Nellore) and maximum 25.52 m (Prakasam district) covering about 1,21134 Km<sup>2</sup> area (76% of the total geographical area).
- Fall in water levels of less than 2 m is observed in all districts of Andhra Pradesh state covering an area about 97760 km<sup>2</sup> (61%). This range is observed in 48.75% of wells.
- Water level fall between 2 to 4 m is noticed in all districts of Andhra Pradesh state covering an area about 18620 km<sup>2</sup> (12%). This range is observed in 10.5% of wells.
- More than 4 m water level fall is observed in all districts of Andhra Pradesh State except Vizainagaram districts covering an area about 4754 km<sup>2</sup> (3%). This range is observed in 4.7% of wells.







#### **ANNEXURE-III**

# SUMMERISED RESULTS OF WATER LEVEL FLUCTUATIONS, A.P. (PRE-MONSOON, 2015 (MAY).

S. No.	District	No of wells Analyzed	Range of Fluctuations (m)				No. of wells/Percentage Showing Fluctuation													No of ells	
			R	Rise Fall			Rise							Fall							
			Min	Max	Min	Max	0-2	%	2-4	%	>4	%	0-2	%	2-4	%	>4	%	No	No	
1	Anantapur	35	0.07	4.58	0.21	6	12	34.29	1	2.86	2	5.71	10	28.57	6	17.1	4	11.43	15	20	
2	Chittoor	48	0.01	6.7	0.2	6.98	8	16.67	2	4.17	1	2.08	15	31.25	3	6.25	4	8.33	11	22	
3	Cuddapah	32	0.12	4.9	0.35	6.16	3	9.38	0	0	1	3.13	10	31.25	4	12.5	4	12.5	4	18	
4	East Godavari	83	0.01	2.05	0.05	4.89	25	30.12	1	1.2	0	0	50	60.24	4	4.82	1	1.2	26	55	
5	Guntur	94	0.02	4.47	0.01	18.38	29	30.85	3	3.19	1	1.06	48	51.06	9	9.57	4	4.26	33	61	
6	Krishna	63	0.03	1.82	0.03	6.68	11	17.46	0	0	0	0	43	68.25	4	6.35	3	4.76	11	50	
7	Kurnool	38	0.17	3.12	0.13	6.82	12	31.58	4	10.5	0	0	16	42.11	2	5.26	3	7.89	16	21	
8	Nellore	59	0.03	1.97	0.01	4.43	16	27.12	0	0	0	0	27	45.76	9	15.3	1	1.69	16	37	
9	Prakasam	61	0.02	2.56	0.04	25.52	7	11.48	1	1.64	0	0	37	60.66	8	13.1	3	4.92	8	48	
10	Srikakulam	40	0.02	4.95	0.1	8.16	5	12.5	0	0	1	2.5	20	50	9	22.5	5	12.5	6	34	
11	Visakhapatnam	73	0.02	2.52	0.01	9.39	37	50.68	4	5.48	0	0	23	31.51	8	11	1	1.37	41	32	
12	Vizianagaram	44	0.07	4.12	0.08	3.5	17	38.64	0	0	1	2.27	23	52.27	3	6.82	0	0	18	26	
13	West Godavari	54	0.05	1.73	0.01	6.7	15	27.78	0	0	0	0	31	57.41	7	13	1	1.85	15	39	
	Total	724	0.01	6.7	0.01	25.52	197	27.2	16	2.2	7	0.96	353	48.75	76	10.5	34	4.7	220	463	

### 5. WATER LEVEL FLUCTUATION - DECADAL MEAN OF MAY (2005-2014) WITH MAY 2015

Water level fluctuation of May, 2015 with reference to Decadal means of May, (2005-2014) is presented in **Annexure-IV and Fig.6.** An analysis of 734 wells data shows a rise in water levels in 265 wells (36.1%) and fall in 458 wells (62.4%) covering an area of 41,388 km<sup>2</sup> (26%) and 1,16,693 km<sup>2</sup> (73%) respectively. This fall in water levels with respect to decal mean is mainly due to less rainfall (-25.2%) during the same period.

Perusal of the map shows a general fall in water levels. Water level rise of more than 4 m is recorded in East Godavari, Krishna, Prakasam and Vizianagaram districts, while water level fall of more than 4 m is recorded in most of the districts except Vizianagaram district.

#### **5.1 DECADAL RISE IN WATER LEVELS:**

- 1. During May 2015, the minimum rise in water level of 0.01 m in East Godavari district and maximum of 4.92 m in Krishna district is observed.
- 2. West Godavari district have shown a very negligible rise in water levels as compared to other district (Min 0.04 and Max 1.75 m).
- Water level rise of < 2 m is recorded in 32.1 % wells covering about 25% of total geographical area (39740 Km<sup>2</sup>) and it is mainly observed in East Godavri Vishakhapattanam and Vizianagaram Districts.
- 2 to 4 m and > 4 m rise in water levels is observed in 4 % wells, covering about 1% area.

#### **5.2 DECADAL FALL IN WATER LEVELS:**

- During the period an appreciable fall in water levels is observed with minimum 0.01 m (West Godavari ) and maximum 29.55 m (Cuddapah district) covering about 1,16,693 Km<sup>2</sup> area (73%).
- Fall in water levels of less than 2 m is observed in all districts of AP state covering an area about 85,200 km<sup>2</sup> (53%). This range is observed in 46.7% of wells.
- Water level fall between 2 to 4 m is noticed in all districts of AP state covering an area about 23,370 km<sup>2</sup> (15%). This range is observed in 10.5% of wells.
- 4. More than 4 m water level fall is observed in all districts of State except Vizianagaram district covering an area about 8123 km<sup>2</sup> (5%). This range is observed in 5.2% of wells.







#### ANNEXURE-IV

## SUMMERISED RESULTS OF WATER LEVEL FLUCTUATIONS (May-2015) WITH DECADAL MEAN, (May-2005-14).

S. No.	District	No of wells Analyzed	Range of Fluctuations (m)				No. of wells/Percentage Showing Fluctuation												Total We	No of ells
			Ri	Rise		Fall		Rise							Rise	Fall				
			Min	Max	Min	Max	0-2	%	2- 4	%	>4	%	0-2	%	2- 4	%	>4	%	No	No
1	Anantapur	35	0.12	3.87	0.15	6	11	31.43	3	8.57	0	0	10	28.57	8	22.9	3	8.57	14	21
2	Chittoor	48	0.05	3.61	0.01	6.55	7	14.58	2	4.17	0	0	20	41.67	9	18.8	6	12.5	9	35
3	Cuddapah	34	0.12	3.76	0.35	29.55	3	8.82	1	2.94	0	0	13	38.24	7	20.6	6	17.65	4	26
4	East Godavari	84	0.01	4.14	0.02	4.57	32	38.1	5	5.95	1	1.19	40	47.62	3	3.57	1	1.19	38	44
5	Guntur	94	0.02	2.71	0.02	18.38	34	36.17	4	4.26	0	0	44	46.81	9	9.57	3	3.19	38	56
6	Krishna	64	0.03	4.92	0.08	6.92	13	20.31	0	0	1	1.56	43	67.19	4	6.25	3	4.69	14	50
7	Kurnool	39	0.1	2.67	0	6.57	15	38.46	4	10.3	0	0	14	37.9	4	10.3	2	5.13	19	20
8	Nellore	59	0.03	1.97	0.08	6.17	18	30.51	0	0	0	0	28	47.46	7	11.9	6	10.17	18	41
9	Prakasam	64	0.02	4.29	0.06	20.55	10	15.63	0	1.56	1	1.56	37	57.81	12	18.8	3	4.69	11	52
10	Srikakulam	41	0.03	1.78	0.04	8.16	11	26.83	0	0	0	0	25	60.98	3	7.32	2	4.88	11	30
11	Visakhapatnam	73	0.02	3.86	0.05	4.52	39	53.42	6	0	0	0	21	28.77	6	8.22	1	1.37	45	28
12	Vizianagaram	44	0.04	4.45	0.02	2.78	24	54.55	0	2.27	1	2.27	17	38.64	2	4.55	0	0	25	19
13	West Godavari	55	0.04	1.75	0.01	6.88	19	34.55	0	0	0	0	31	56.36	3	5.45	2	3.64	19	36
	Total	734	0.01	4.92	0	29.55	236	32.15	25	3.4	4	0.5	343	46.73	77	10.49	38	5.17	265	458