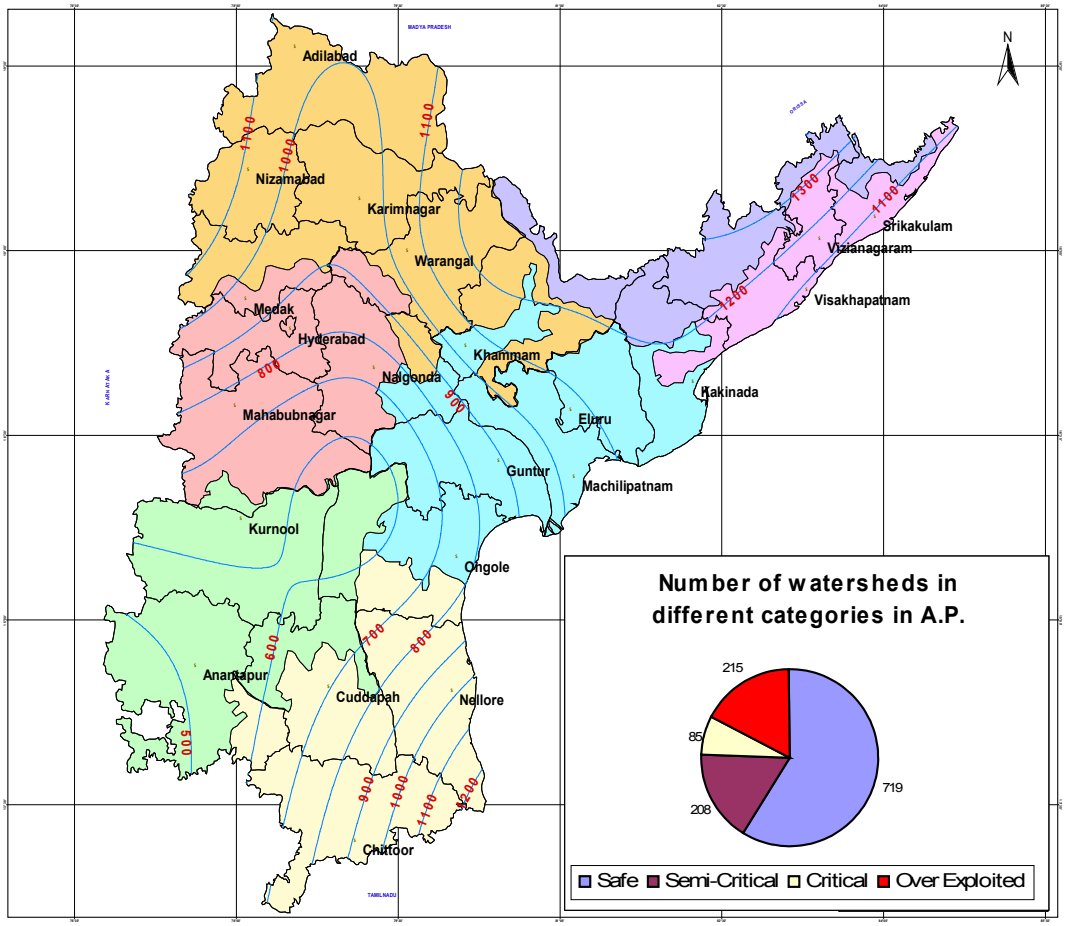
VOLUME -I I

GOVERNMENT OF ANDHRA PRADESH
GROUND WATER DEPARTMENT

GROUNDWATER RESOURCE 2004-05
ANDHRA PRADESH
(A.P. GWD Formates)

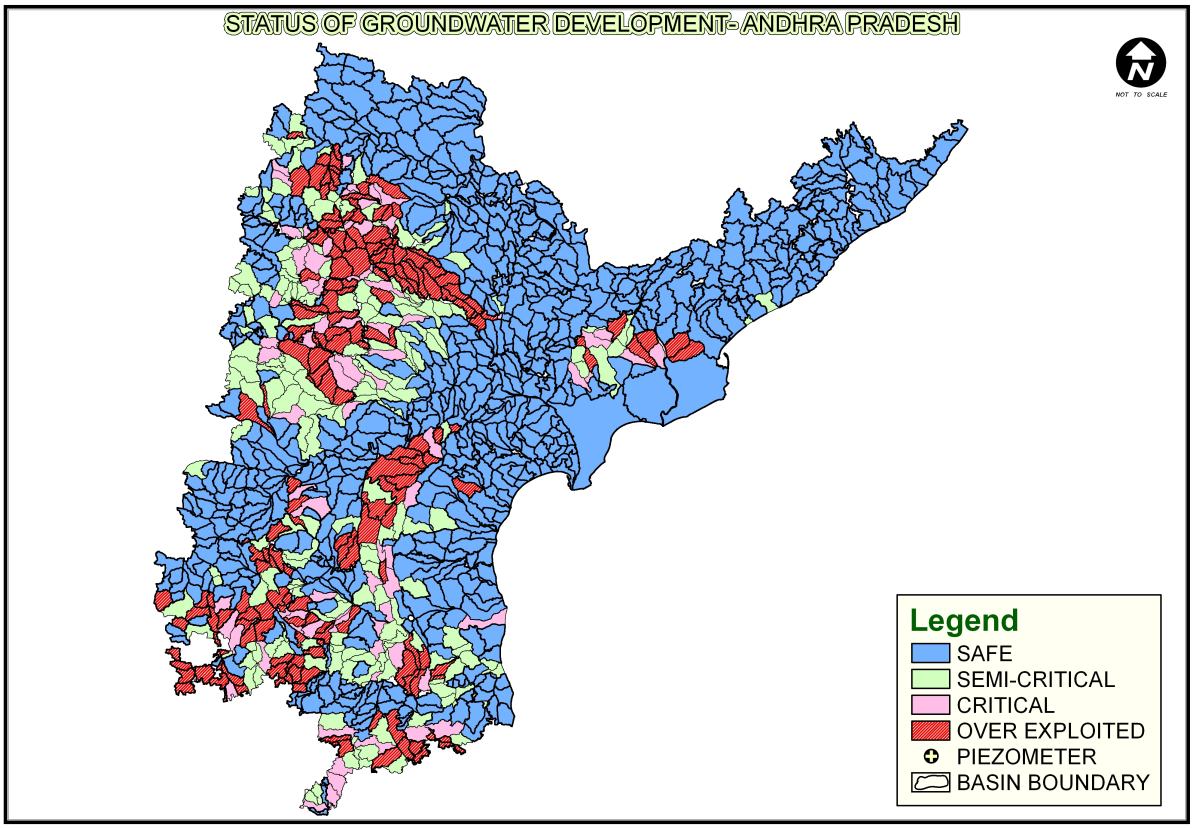


P.Sreenivas Prasad
Director

June, 2006
Hyderabad

GOVERNMENT OF ANDHRA PRADESH
GROUND WATER DEPARTMENT

LIST OF OVEREXPLOITED VILLAGES IN ANDHRA PRADESH PRAPOSED FOR NOTIFICATION



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Volume - II
Groundwater Resources
Andhra Pradesh

SALIENT FEATURES

- There are 22 lakh wells in the state and 26 lakh hectares is irrigated under ground water.
- Groundwater's share in the total water resources used in the state matches surface water.
- The stock of groundwater in the rocks is usually many times over that which is annually replenished. A third of the wells depend on this reserve stock at one point or the other during the year.
- Groundwater is the main source for irrigation in areas, which are not served by canal system.
- When the monsoon fails groundwater remains the sole source.
- Social problems related to groundwater exploitation are mild as compared to what generally happens in the case of surface water projects. There is no displacement of land holders, submergence of productive lands and forest lands, etc.
- Environmental issues associated with groundwater development are imperceptible and hardly evoke intense reactions at least in its initial stages.
- Since groundwater development follows a slow sluggish and imperceptible growth as well as fall, there is often time to adapt to changes, except in coastal aquifers where well water salinization is relatively a fast process and could take place over a few months or at the most few years. Salinization is almost an irretrievable process.
- Other problems such as groundwater-dependent wetland desiccation, loss of seepages and base flows, loss of vegetation and shift of species are not often seen as serious problems and none seem to complain about it. But these are serious concerns and need to be addressed.
- Groundwater is developed by individuals with minimal support of the government, but energy to pump with is now totally free of under agricultural sector.

- In many areas limit to groundwater is set by the rainfall and the recharge, but it can be due to poor geological conditions as observed in NE regions (Srikakulam, Vizianagram and Visakhapatnam) of the state which has good potential recharge but have rocks that are very poor aquifers.

- Water quality aspects need immediate attention and may become dominant in the future. The problem of fluoride and arsenic as natural contaminants in groundwater has already reached endemic proportions. Farm chemicals form another set of offenders.

- Comparatively lesser groundwater use is for following reasons
    a) Productive aquifers are few,
    b) Availability of alternate sources like big tanks or canal system and
    c) Socio-economic reasons

- Irrigation dependent solely on groundwater can sustain not more than 15% to 20% of the total land area. Any excess indicates groundwater mining.

- During rainy season, rainfall effectively contributes to about 300 to 400 mm of the water need in many areas. Supplemental irrigation during rainy season can support up to 30 or 40% of the total land area, provided rain is well spread out and is trapped in small dams, check dams, percolation tanks, etc.

- Recharge in command areas is very high and in some cases equals annual rainfall.

- There is need for more exploitation of groundwater in command areas.

- At the planning stage simultaneous plan for extraction of groundwater from closely spaced open dug wells must be envisaged in all command areas.

- Government support in form of heavy subsidy for using groundwater and making surface water costlier and supplying it alternate seasons or years.

- Social organisations should educate farmers in command area and encourage use of groundwater.

- Using groundwater in command areas prevents water loggings, retains soil fertility and makes water available in tail ends or in other needy areas.

Trends

- The analysis of rainfall during 1974-2001 indicates deficit rainfall in all the 18 years in one or the other parts of the State.

- Region wise analysis of rainfall pattern further suggests that every year at least 3 districts in the state are likely to have deficit rainfall.

- Mean hydrograph of the state records a fall of 1.95 metres in last 7 years (1998-2004). There is likely to be an improvement by about a metre (May 1998 to May 2006 trend) due to good monsoon

- In some districts like East and West Godavari, delta areas and coastal plains (sedimentary and alluvial areas) the groundwater use exceeds annual replenishment by 2 to 4 times, but the aquifers are so thick that wells continue to give copious water.

- In areas where aquifers are poor and estimated groundwater balance is available and if the water table is shallower than 6 to 8 metres, closely spaced dug wells can be tried parts of the safe areas may not be potential, because of the shallow basement and other hydrogeological conditions. Hence, even ins Safe villages/w.s/mandals also failures will occur after site specific local investigations. Another way is to make low yielding bore-wells and fit them with hand-pumps instead of electric driven pumps.

- parts of the safe areas may not be potential, because of the shallow basement and other hydrogeological conditions. Hence, even ins Safe villages/w.s/mandals also failures will occur

- Recharge is small component of total rainfall and averages about 100 mm for the state.

- It is not pumping per se that depletes ground water storage, but only that component of pumped water that evapotranspires. Average annual precipitation has remained almost same the evapo-transpiration has greatly increased, from 400 mm/year when farmers grew only one rain-fed crop, to an average of 600 mm/year under the current, irrigated two-crop-per-year system. Before irrigation development and during the early years of small-scale irrigation, precipitation exceeded evapo-transpiration. Excess water recharged the underlying aquifer and at times even filled the aquifer completely.

Management

- The National Water Policy enunciates periodic assessment of groundwater potential, the state follows the guidelines and periodic assessment and monitoring is taken up.

- Closer monitoring is needed to bring out heterogeneities in development. It is a fact that automated monitoring systems give unbiased and precise data at close intervals.

- Close interval data is useful in pointing out exact cause of a change in water level.

- It allows a better decision support and better planning for corrective actions.

- Sustainable development and management of groundwater resource requires quantitative and continuous assessment of the resource.

- To arrest water-table declines in ground water-irrigated areas, sustainability begins not with reducing irrigation pumping per acre, but with reducing the total pumpage and making efforts to increase recharge.

- Small earthen dams form a supplemental source of irrigation which also effectively recharges groundwater water. It is estimated that 30% of the recharge to groundwater is through these tanks and commands under the tanks.

- Narrow valleys where active groundwater irrigation is seen are sustained because of recharge from the minor irrigation tanks. It will become unsustainable in absence of these tanks.

- Groundwater, in hard rock areas is a local resource and influence of cluster of wells (which are about 30 or 40 metres deep) will be marginal beyond a radius of 2 or 3 km and hence the influence of recharge will also be quite local. Only a series of tanks can bring noticeable improvement in groundwater and surface water availability. Hence, urgent need to study optimum tank storage and tank density to increase water.

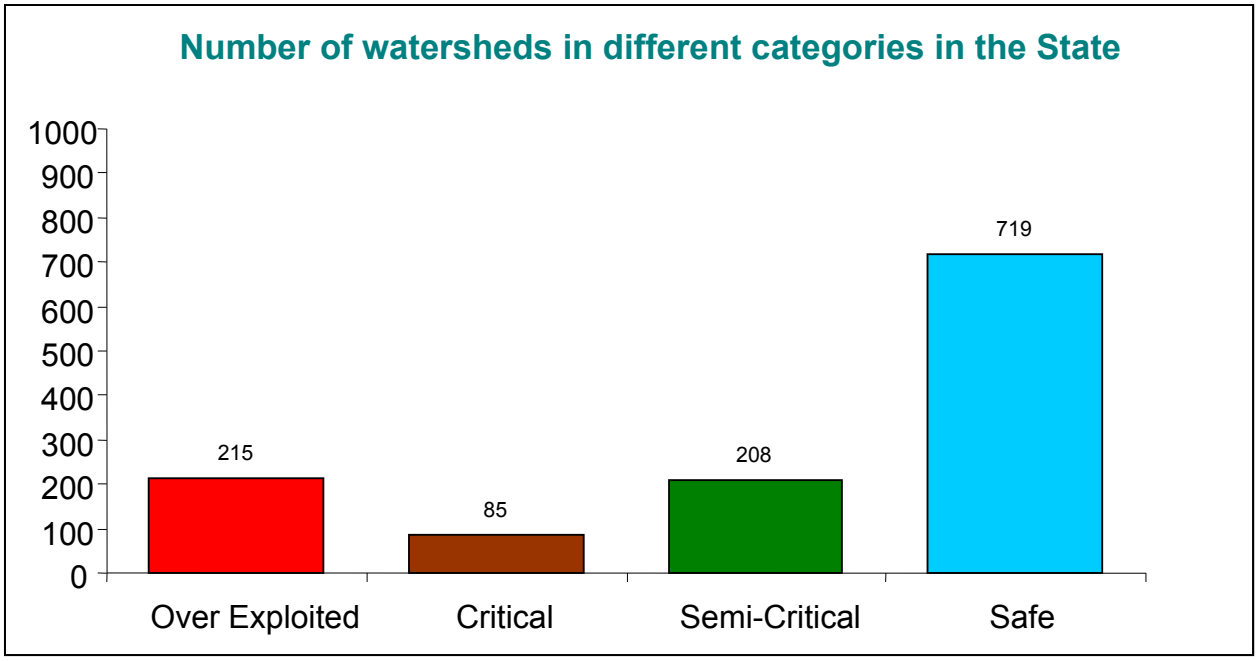
- As a first step groundwater resource is assessed with watersheds as units.

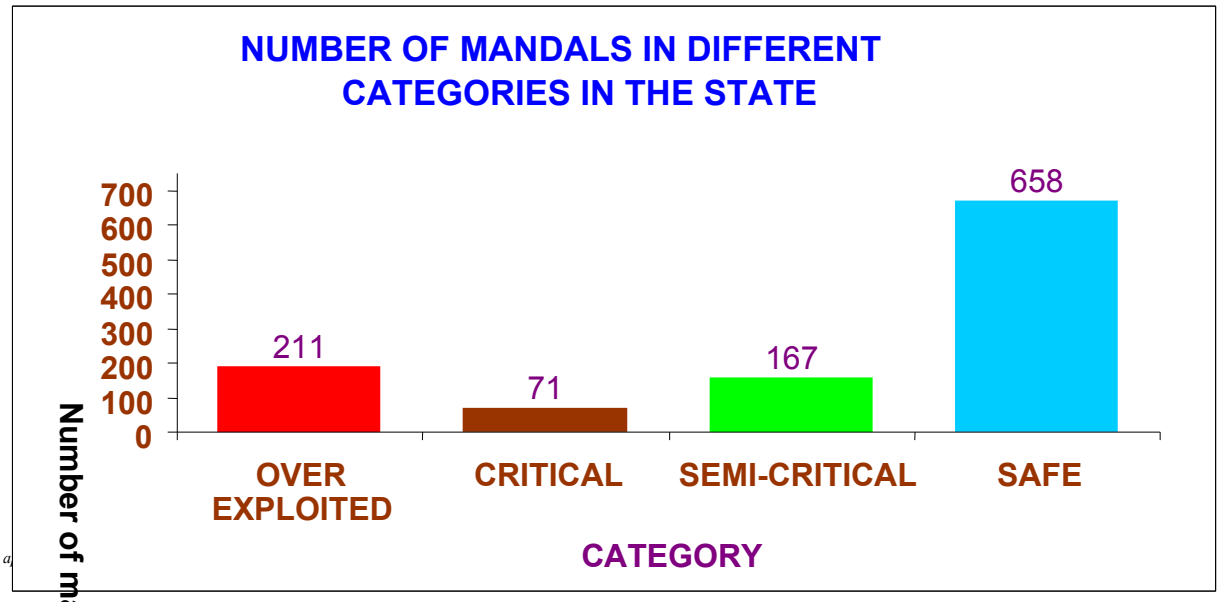
- Andhra Pradesh is the only State to attempt to bring out micro level segregation of areas.

This volume also gives the mandal wise groundwater resource. The groundwater availability is apportioned from the assessment carried out with watersheds (sub-basin) as units, while the groundwater usage is directly computed for each mandal with usage at the village level, for administrative convenience. Unusually, high stage of groundwater utilisation in some mandals could be due to its location in the most favourable groundwater zones in a cluster of watersheds. Therefore, the stage of groundwater utilisation at mandal or at any other administrative unit does not reflect the true groundwater usage and must be understood with caution.

The state has 1227 groundwater assessment units, which are classified as safe (719), Semi-critical (208), critical (85) and over-exploited (215).

The state has 1107 mandals covering 22 districts (excluding Hyderabad district). 211 of these mandals are over-exploited with respect to groundwater utilisation, while 71 and 167 mandals fall in critical and semi-critical categories respectively. Rest of the 658 mandals are categorised as safe.





WATERSHED WISE CATEGORISATION IN THE DISTRICTS OF ANDHRA PRADESH

S.No	Name of the District	Total No. of Watersheds			Over Exploited	Critical	Semi-Critical	Safe
		C	N	Total				
COASTAL ANDHRA								
1	SRIKAKULAM	12	6	18	---	---	---	18
2	VIZIANAGARAM	20	4	24	---	---	1	23
3	VISAKHAPATNAM	10	32	42	---	---	---	42
4	EAST GODAVARI	39	13	52	2	1	---	49
5	WEST GODAVARI	27	13	40	7	4	4	25
6	KRISHNA	50	7	57	---	3	2	52
7	GUNTUR	58	6	64	3	1	2	58
8	PRAKASAM	24	38	62	12	1	6	43
9	NELLORE	19	26	45	3	---	15	27
RAYALASEEMA								
10	CHITTOOR	NA	75	75	12	8	15	40
11	KADAPA	8	67	75	12	18	29	16
12	ANANTHAPUR	24	75	99	48	7	21	23
13	KURNOOL	33	47	80	13	2	7	58
TELANGANA								
14	MAHABUBNAGAR	8	49	57	8	6	23	20
15	RANGAREDDY	NA	40	40	15	5	10	10
16	MEDAK	NA	53	53	14	12	17	10
17	NIZAMABAD	17	31	48	16	1	10	21
18	ADILABAD	10	28	38	1	---	3	34
19	KARIMNAGAR	31	31	62	22	7	6	27
20	WARANGAL	23	38	61	21	---	2	38
21	KHAMMAM	12	58	70	3	2	2	63
22	NALGONDA	13	52	65	3	7	33	22
	TOTAL	**438**	**789**	**1227**	**215**	**85**	**208**	**719**

NOTE: Only Non-Command part of the Watershed is considered for Categorisation

MANDAL WISE CATEGORISATION IN THE DISTRICTS OF

ANDHRA PRADESH

S.No	Name of the District	Total No. of Mandals	Over Exploited	Critical	Semi-Critical	Safe
COASTAL ANDHRA						
1	SRIKAKULAM	38	---	---	---	38
2	VIZIANAGARAM	34	---	---	2	32
3	VISAKHAPATNAM	43	1	---	---	42
4	EAST GODAVARI	57	11	1	2	43
5	WEST GODAVARI	46	10	4	4	28
6	KRISHNA	50	---	---	6	44
7	GUNTUR	57	2	---	---	55
8	PRAKASAM	56	9	1	7	39
9	NELLORE	46	1	3	6	36
RAYALASEEMA						
10	CHITTOOR	66	18	8	12	28
11	KADAPA	51	15	4	18	14
12	ANANTHAPUR	63	33	5	13	12
13	KURNOOL	54	12	1	4	37
TELANGANA						
14	MAHABUBNAGAR	64	11	7	23	23
15	RANGAREDDY	37	12	2	8	15
16	MEDAK	45	11	11	13	10
17	NIZAMABAD	36	14	3	8	11
18	ADILABAD	52	1	---	3	48
19	KARIMNAGAR	57	21	14	7	15
20	WARANGAL	50	22	2	3	23
21	KHAMMAM	46	3	---	2	41
22	NALGONDA	59	4	5	26	24
	TOTAL	**1107**	**211**	**71**	**167**	**658**

NOTE: Only Non-Command part of the Mandal is considered for Categorisation

MAJOR RIVER BASINS AND 81 SUB- BASINS (TRIBUTARY)OF ANDHRA PRADESH