

WATER BALANCE STUDIES IN SUDDAGEDDA BASIN (PART-I) - STATUS OF NETWORK, DATA AVAILABILITY & INSTRUMENTATION



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DELTAIC REGIONAL CENTRE
NATIONAL INSTITUTE OF HYDROLOGY
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FOREWARD

The deltaic regional centre was established at Kakinada in Andhra Pradesh to conduct application oriented research and studies in Eastern Coastal Region and Deltaic Region including the Islands. The Regional Coordination Committee which looks into the various technical and scientific work programmes of the regional centre in its meeting held on December 10, 1992 suggested that regional centre should take up the representative basin studies for which Suddagedda basin of Andhra Pradesh was identified as one of the representative basins. It was also decided that studies would be jointly conducted by the State Ground Water Department of Andhra Pradesh and the Regional Centre of NIH.

Dr. P.V.Seethapathi, Scientist 'F' and Technical Coordinator of the regional centre held detailed deiscussion with Shri T.Narasimha Reddy, Director, State Ground Water Department regarding various modalities to be undertaken for this collaborative project. It was agreed during their meeting that State Ground Water Department will assist the NIH Regional Centre for collecting the necessary data as is required for conducting the representative basin studies. While NIH RC will procure the necessary instrumentation and install the same in the basin, the manpower required for collecting the information will be provided by State Ground Water Department. The information, thus , collected will be utilised for conducting the Water balance studies in the representative basin studies.

As a part of this collaborative project between State Ground Water Department of Andhra Pradesh and NIH Regional Centre, Kakinada, the State Ground Water department was requested to prepare a Status report (Status regarding the available instrumentation, network, data availability) on the Suddagedda basin of East Godavari District of Andhra Pradesh for initiating the Water Balance Studies by the Regional Centre of the Institute. The present report, thus forms Part-I of the Water Balance Studies for the Suddagedda basin and is prepared by the State Ground Water Department of Andhra Pradesh.

Satish Chandra
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Director

PREFACE

Andhra Pradesh has essentially been an agrarian state and due to the vagaries of monsoon frequently experienced in the State, emphasis has been laid on programmes envisaging to provide irrigation facilities, during the post independence period. However, planning of water resources development projects needs a substantial understanding of the various hydrological processes that go on in the basin and their inter-relationship. It is gratifying to note that the Deltaic Regional Centre, National Institute of Hydrology, Kakinada proposes to take up comprehensive water balance studies in a representative basin in coastal Andhra Pradesh in association with the Ground Water Department, Government of Andhra Pradesh. This status report (part-I) has been prepared in this context to provide a preliminary data base and to facilitate detailed planning for various data observations and hydrologic studies to cover both surface water and groundwater domains in Suddagedda basin, East Godavari District proposed for the above studies.

The data and maps presented in this report are based on the data compilation made from various organisations including Irrigation Department, Chief Planning Officer, Kakinada, A.P. State Remote Sensing Application Centre, apart from the extensive extractions from the Ground Water Department's own data records and technical reports. The co-operation extended by the above organisations in making available the required data is greatly acknowledged. The report has been prepared by Sri R V V Rao, Assistant Director (H), Rajahmundry under the guidance of Sri P Prakasam, Deputy Director (H), Hyderabad of this department. Ample assistance was extended by Sri K Seshu Babu, Deputy Director, Rajahmundry, Sri B P Varma, Assistant Director (Hg), Sri G Sreenivasa Rao, Assistant Hydrogeologist and Sri U V Rao, Assistant Engineer, Ground Water Department, Kakinada in preparation of this report. It is hoped that the proposed studies in Suddagedda basin will greatly aid in a proper understanding and quantification of the various hydrological processes and to establish an interrelationship between them and prove to be of utility in other areas with similar hydrologic environs in the state.

Dt:15.3.1993

(T Narasimha Reddy)
Director
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1.0 INTRODUCTION

The Deltaic Regional Centre , National Institute of Hydrology, Kakinada, as a part of its programme for 1993-94, proposed to take up representative basin studies in Suddagedda basin in Andhra Pradesh during 1993-94 in association with the Ground Water Department, Government of A.P. This report has been prepared by the Ground Water Department to reflect the various hydrological, hydrogeological and geohydrological parameters of the above basin to indicate the present status of development of surface water and ground water resources and also the existing hydrological data observation stations. The Suddagedda basin lies between North latitudes $17^{\circ}09'10''$ and $17^{\circ}30'45''$ and East longitudes $82^{\circ}08'30''$ and $82^{\circ}19'15''$ occupying an area of 526 Sq. km. The area falls in the Survey of India toposheets No. 65 K/3, K/4, K/7, K/8 and K/12. The basin covers Prathipadu Mandal and parts of Rajavommangi , Pithapuram and Gollaprolu Mandals. There are 57 villages falling in the basin area (Annexure-I). The total population of the basin area is about 2 lakhs. The average annual rainfall of the basin area is 1059 mm (Annexure-II),

2.0 PHYSIOGRAPHY

The basin area represents almost an upland terrain and the maximum and minimum elevation of the basin area are 700 m. and of 20 m. respectively. The area is drained by Suddagedda stream. The basin area has a series of hill ranges in the northern side which forms a part of eastern ghats. The proposed basin has a general slope towards south-southeast. The general trend of the hill ranges is in northeast-southwest.

The ephemeral hill streams working their way through the undulatory hilly tracts join together to form the stream "Kuntidevivagu" which is called later on as Suddagedda on flowing further downstream. The drainage pattern of the basin is dendritic to subdendritic (Plate-I)

The basin area enjoys tropical climate with hot summers and cold winters. The area receives rainfall from both the monsoons. More than half of the rainfall is contributed by southwest monsoon between June and September while the remaining rainfall is by north-west monsoons during the months of October and November. The average annual rainfall is 1059 mm (Prathipadu Station)

3.0 LAND USE

The predominant soils in the basin are black clay, red and light brown sandy soils. Towards the northern part of the basin, red soils are predominant in the hilly tracts and valley portions while in the middle part of the basin light brown soils and towards the southern part black soils are predominant (Plate-II). The main crops grown in the area are paddy, banana, sugarcane and commercial crops like chillies and cotton. The northern part of the basin is mostly occupied by cashew and mango orchards. Paddy and banana are grown under Subbareddysagar project and under wells. Rainfed crops like pulses and gingelli are also grown in the area. The total irrigated area under surface water sources is 6981 hectares, out of which an extent 1758 hectares is under Subbareddysagar and 5223 hectares is under Minor Irrigation tanks.

The proposed Suddagedda basin covers an area of 526 Sq. Km. The upper part of the basin is occupied by the hilly tracts of Rajavommangi Mandal (partly). The middle part is entirely covered by Prathipadu Mandal and has an area of 227 Sq.Km. i.e. 43.16 % of

the basin area. The lower part is covered by Gollaprolu Mandal (partly) and Pithapuram Mandal (partly). The entire northern part is covered by deciduous forest and degraded forest lands. About one-third part of Prathipadu Mandal is being irrigated by Subbareddyasagar and some minor irrigation sources like tanks (Plate-III). The land utilisation particulars of Prathipadu Mandal are given in Annexure-IV.

4.0 HYDROGEOLOGY

A major portion of the proposed basin is underlain by Khondalites, granites and charnockites. The central and western parts of the basin are underlain by alluvium of Suddagedda stream. The southern part of the basin is underlain by Khondalite suite of rocks, basaltic formation (deccan trap) and Tirupati sandstones. The crystalline rocks generally hard and compact in nature. The basaltic formation is mostly weathered. The Tirupati sandstones are fine to medium grained and are intercalated with clay (Plate IV).

Groundwater in the basin area occurs under water table and semiconfined conditions. Groundwater in the crystalline rocks is restricted to weathered and fractured zones and is being exploited mostly by dug wells, dug-cum-bore wells and bore wells at places. Depth of the dug wells ranges between 8 m and 12 m with an average yield of 30,000 lpd to 50,000 lpd filter point wells/shallow tube wells in the central and western part of the basin are constructed down to 30 m to 50 m. These wells are yielding about 15,000 lph to 30,000 lph. In some zones of limited extent, bore wells are constructed down to 40 m to 60 m with an average yield of about 8,000 lph to 15,000 lph. Groundwater is exploited in Tirupati sandstone formation by means of tube wells. The depth of tube

wells is in the range of 80 m to 130 m yield of the tube wells ranges between 30,000 lph and 50,000 lph (Plate IV).

During the surveys, water samples were collected and analysed to know the suitability of groundwater for agricultural purpose. The pH ranges between 6.91 and 8.18. Concentration of the total dissolved solids ranges from 463 to 6630 mg/l. The specific conductance ranges from 724 to 10360 microsiemens/cm. In general, the quality of groundwater is suitable for agricultural purpose. Groundwater is insipid in and around Gollaprolu due to trap formation. (Specific conductance 10,360 microsiemens/cm). Chemical analysis data of the water samples is enclosed. (Annexure-V).

5.0 HYDROLOGY

Suddagedda basin has a drainage density of 1.13 km/sq.km. The basin is drained by minor river Gokavaram "Yeti Calva" (also called Kuntidevi vagu). The stream is called Suddagedda as it flows further downstream. Subbareddysagar project, a major tank across the above stream, has a storage capacity of 5.1 MCM. The salient features of the project are given in the Annexure VI and VII.

In the proposed Suddagedda basin area, the Ground Water Department has two observation wells at Prathipadu and Gollaprolu. These observation wells are being monitored for ground water level fluctuations since 1974. The groundwater water levels during pre monsoon (May) and post monsoon (November) periods since 1974 to 1992 have been given in Annexure VIII. The hydrographs of these observation wells have been shown in Plate No. V and VI. The hydrographs (yearwise) from 1988 to 1992 have also been shown alongwith data statement (Annexure IX, IX A and IXB, plate No.s VII

and VIII).

A study of the data of the two observation wells for the period from 1974 to 1992 reveals that Prathipadu well recorded a minimum of 1.19 m bgl (November, 1992) and a maximum of 5.71 m bgl. Gollaprolu well recorded a minimum of 0.39 m bgl. (November, 1976) and a maximum of 5.83 m. bgl (May, 82).

6.0 CHEMICAL QUALITY

Water samples of Prathipadu and Gollaprolu observation wells are subjected to chemical analysis during pre and post monsoon periods of every year since 1974 analytical reports of chemical constituents are enclosed (Annexure-X and XI). The pH of the Prathipadu observation well ranges from 7.60 to 8.12 (pre monsoon), 6.9 to 8.04 (post monsoon) and the Gollaprolu observation well ranges from 7.40 to 8.10 (pre monsoon), 7.39 to 8.46 (post monsoon). The concentration of total Dissolved Solids of Prathipadu observation well ranges from 297 to 1632 mg/l (pre monsoon) 610 to 1875 mg/l (post monsoon). The concentration of total dissolved soils of Gollaprolu observation well ranges from 660 to 1850 mg/l during premonsoon season and it is in the range of 138 to 1754 mg/l in the post monsoon season.

7.0 STATUS OF GROUNDWATER DEVELOPMENT IN PROPOSED SUDDAGEDDA BASIN AREA

The proposed Suddagedda basin comprises of 4 mandals viz, Rajavommangi (partly), Prathipadu, Gollaprolu (partly) and Pithapuram (partly). Groundwater in the basin area is being exploited mainly by means of dug/dug-cum-bore wells and bore wells. In southern part of the basin groundwater is being tapped through medium duty tube wells. The bore wells constructed by

Ground Water Department have resulted in good yields. The lithological data and well assembly particulars of the bore wells constructed by the department are shown in Plate IX and X and the details are given in Annexure -XII, A, B, C, D, E, F, G, H, I, & J. The location of Bore wells/ Tube wells for which lithologs are provided in Annexures are indicated in plate No.IV.

The groundwater recharge in the area is mainly from precipitation and Suddagedda stream. The calculated annual recharge, from the rainfall for Suddagedda basin is of the order of 54.44 MCM. The annual draft from the wells is of the order of 6.08 MCM. The balance groundwater available for further exploitation is estimated at 48.36 MCM.

SURFACE WATER RESOURCE POTENTIAL AND UTILISATION

The main river flowing in the basin is Suddagedda. The river Suddagedda rises in Vatangi reserved forest in Yellavaram taluk at an elevation of 700 m MSL. The salient features of Suddagedda basin are given in Annexure-XIII. Statements showing the yield calculation of Suddagedda basin, utilisation of yield sub-basin wise, catchment areas of sub-basins, Area influenced by different raingauge stations and ayacut particulars sub-basins -wise, are enclosed (Annexure Nos. XIV, a, b, c, and d.).

STATEMENT SHOWING THE VILLAGE, FALLING IN THE PROPOSED SUDDAGEDDA
BASIN

1. Rajavommangi Mandal:

1) Vatangi, 2) Chikilinta, 3) Pedda Pellampadu, 4) PeddaGarsngi, 5) Karridevulapalam, 6) Kandalingamparthi, 7) Kothapalli, 8) Balijipadu, 9) Vanchangi, 10) Marcdubaka, 11) Vagurti, and 12) Vegipalam.

2. Prathipadu Mandal:

1) Kandapalli, 2) Bapannadhara, 3) Singavarm. 4) Ulligagula, 5) Kotanagiri, 6) Buradakata, 7) Giriginapuram, 8) Mettuchinta, 9) Pandavulapalam, 10) Kittunuripata, 11) Gokavaram, 12) Vemulapalam, 15) Puddipalam, 15) Rovutpalam, 15) Podurupaka, 16) Totapalli, 17) Venkatanagaram, 18) Chintaluru, 19) Sorabhavoram, 20) Uttarakanchi, 21) Lompakalova, 22) Pudda Penkaralpui 23) China Punkarlapudi, 24) P.Jaganadhapuram, 25) Vakapalli, 26) Potuluru, 27) Ommangi, 28) T.Rayavaram, 29) Gluru, 30) Rachapalli 31) Dharamvaram, and 32) Prathipadu.

3. Pithapuram Mandal:

1. Simhadripuram, 2) Kothapata, 3) Veldurti, 4) Dentamuru, 5) Rayavaram and 8) Timmapuram.

4. Gollaprolu Mandal:

1. Kodavali, 2) Chendurti, 3) Vanndpudi, 4) China Jagganpata, 5) Tatiparti, 6) Chebrolu and 7) Gollaprolu.

ANNEXURE - II

STATION: PRAITHIPADU

STATEMENT OF RAINFALL PARTICULARS FROM 1956 TO 1992
MANDAL : PRAITHIPADU

DISTRICT : EAST GODAVARI

Sl. No.	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total (12 months)	Total (June, July, Sep., Oct., November) (6 months)	Remarks
1)	1955	15.2	1.01	-	5.6	53.5	65.2	215.5	136.1	115.69	7.1	40.2	45.1	711.91	657.5	
2)	1967	-	-	123.0	1.2	9.5	119.4	257.6	52.8	66.80	304.0	-	25.1	1021.00	862.6	
3)	1968	-	15.50	23.8	30.2	5.6	70.0	68.9	40.8	304.00	254.0	108.2	-	951.20	875.9	
4)	1969	-	-	-	7.0	517.4	125.2	142.1	137.2	172.09	101.2	111.0	32.0	1345.10	788.7	
5)	1970	-	13.60	-	40.6	45.6	145.8	234.0	150.3	258.50	307.4	-	-	1340.00	1209.8	
6)	1971	-	59.12	-	93.4	78.6	63.6	123.5	153.4	102.40	136.2	-	-	909.50	678.1	
7)	1972	-	6.00	-	55.1	14.5	174.0	34.7	61.4	308.40	209.2	-	-	993.50	856.5	
8)	1973	-	-	-	-	35.0	37.8	73.2	73.0	82.00	270.0	10.0	-	501.80	545.8	
9)	1974	-	15.00	-	-	15.0	75.0	30.0	148.0	53.00	303.4	17.0	-	716.40	688.4	
10)	1975	-	-	-	-	15.6	142.4	204.2	179.3	353.60	335.6	40.0	-	1277.30	1262.0	
11)	1976	-	-	-	-	74.8	69.4	327.4	178.4	123.60	46.4	352.4	-	1212.40	1197.6	
12)	1977	-	-	7.6	76.4	58.4	117.6	134.4	80.8	177.80	94.2	223.2	5.4	1055.00	906.0	
13)	1978	-	-	24.2	59.6	-	349.4	161.6	233.8	158.90	57.1	9.8	5.8	1070.20	980.6	
14)	1979	-	15.60	-	19.0	204.4	149.6	115.0	25.2	154.00	59.4	171.1	-	955.80	771.2	
15)	1980	-	-	-	4.8	23.6	365.0	132.8	252.5	97.70	232.4	9.78	-	1125.00	1096.6	
16)	1981	-	-	-	29.9	96.5	135.6	273.0	138.3	184.00	42.7	-	-	899.50	775.0	
17)	1982	9.3	2.00	-	4.3	35.7	118.8	123.0	181.1	171.20	156.1	7.7	-	843.20	757.9	
18)	1983	-	4.00	2.7	-	93.5	163.9	135.9	374.4	337.70	263.0	52.1	5.4	1524.00	1415.4	
19)	1984	-	2.70	20.2	36.0	42.2	155.3	169.6	46.8	153.90	110.9	-	-	757.50	656.5	
20)	1985	24.7	-	-	8.5	27.8	174.5	156.2	127.1	151.70	172.6	11.0	2.2	859.90	775.5	
21)	1986	51.2	24.50	-	64.5	97.4	50.1	31.8	272.5	98.30	111.8	121.2	-	990.50	955.7	
22)	1987	7.2	-	12.5	-	69.3	49.4	276.4	266.8	122.10	312.8	122.3	17.0	1275.00	1168.8	
23)	1988	-	-	-	62.0	131.2	13.2	509.6	150.4	214.40	76.2	7.6	-	1164.80	971.4	
24)	1989	-	-	54.4	-	51.0	186.3	335.9	205.6	70.70	84.1	1.6	13.0	1065.80	947.2	
25)	1990	-	125.00	92.5	-	863.4	151.6	130.4	499.4	182.00	102.6	7.1	-	2076.10	1994.4	
26)	1991	37.6	-	-	7.4	-	115.5	130.1	45.6	237.00	74.0	64.6	-	717.70	667.8	
27)	1992	29.0	45.30	-	-	65.4	153.4	327.6	128.0	124.00	192.8	66.6	-	1062.90	1015.2	
														Grand Total	28551.51	
														Average	1038.95	

Note: - All readings are in mm.

LIST OF MINOR IRRIGATION TANKS

Mandal	Sl.No.	Name of the tank	Name of the village	Ayacut in hec.
Prathipadu	1	Gopaludu tank	Ommangi	76.74
	2	Venkatupotireju tank	Eluru	46.23
	3	Ura tank	Prathipadu	49.60
	4	Tommayya tank	Charmaveram	50.60
	5	Kotha tank	Rechepalli	69.40
	6	Lingaraju tank	Rechepalli	46.90
	7	Yerre tank alias Ramulu tank	Chintaluru	48.20
	8	Ura tank	P.Segannadha puram	50.70
	9	Dhara tank	Lampakalave	47.40
	10	Kerrivari tank	Lampakalova	60.00
	11	Pata tank and Chinna tank	Vemulapalam	58.40
	12	Challayamme tank	Vemulapalem	41.60
	13	Katha tank	Pada Eankbrl- apudi	46.10
	14	Govindapuram tank	Prathipadu	171.72
	15	Nalla tank	Biahadripuram	95.98
	16	Parraju tank	Dharmavaram	94.13
	17	Padda tank	Carabhavaram	143.12
	18	Yerra tank alias Pedda tank	Chiataluru	61.80
	19	Nella tank	Peda Baekarla pudi	160.00
	20	Tumaladoddi tank	"	167.00
	21	Eudumula tank	China Bankarla pudi	102.00
	22	Venkannadora tank	Peda Bankarla pudi	251.29
	23	Ramabhadriraju tank	Dharmavaram	207.80
	24	Subbareddysagar project	Gokavaram	1758.33

Gollaprolu	1	Atchayya tank	Chendurthi	60.70
	2	Jagganna tank	China Jaggam- peta	72.09
	3	Yerrabanda tank	Chebrolu	40.67
	4	Ava tank	Chendurthi	193.04
	5	Raju tank	Kodavali	121.04
	6	Pedda tank	Totiparti	100.35
	7	Pedda tank	Chandurthi	430.75
Pithapuram	1	Pedda tank	Dontamuru	67.49

SOURCE: Irrigation Division, Peddapuram.

ANNEXURE - IV

LAND UTILISATION PARTICULARS OF PRATHIPADU MANDAL FOR THE YEAR
1990-91.

Sl.No.	Land utilisation particulars	Area in hec.
1.	Total geographical area	17603.15
2.	Forest	962.99
3.	Barren and cultural land	1411.42
4.	Land put to non agricultural uses	1159.8
5.	Permanent pastures and other grazing lands	1081.10
6.	Land under miscellaneous tree crops	443.31
7.	Culturable waste	454.7
8.	Other fallow lands	90.94
9.	Current fallows	1120.47
10.	Net area shown	10878.4
11.	Total cropped area	11464.6
12.	Area sown more than once	586.2

Source: Chief Planning Office, Kakinada.

ANALYTICAL REPORTS OF WATER SAMPLES COLLECTED DURING SURVEYS IN THE VILLAGES
FALLING IN "SUDGAGEDDA BASIN" AREA

Sl. No. of the Mandal/Village	Name of the Aquifer depth tapped	Date of collection	pH	Sp. Cond. at 25°C in Micro SACS/cm	TDS cal- culated by multi- plic- ation of Sp. cond. by 0.64	CO ₃ mg/ lit.	HCO ₃ mg/ lit.	RESULTS											S.A.R.	RSC
								Ca mg/ lit.	Mg mg/ lit.	Na mg/ lit.	K mg/ lit.	Cl mg/ lit.	F mg/ lit.	No. of ions	Hard- ness	Temp. of sample	CaCO ₃ eqv.	Ca mg/ lit.		
1)	Pochhipadu Dharmavararam	10.00	8.2.86	6.91	5420	3439	Nil	6.30	12.30	1122	0.50	889	2	38.65	0.05	104	141	040	13.34	-4.20
2)	Gollaprolu Gollaprolu	4.00	13.6.88	7.40	6750	4343	Nil	246	1097	1097	0.40	689	13	29.96	0.33	403	219	1900	6.87	-33.09
3)	"	4.60	18.5.88	7.80	10360	6653	Nil	273	5132	0.50	1350	5	59.48	0.13	16.4	33.55	2500	11.90	-44.49	
4)	Pillihapuram Pillihapuram	5.30	21.10.88	7.40	5790	3706	Nil	231	1660	0.10	500	250	320	156	1440	320	156	1440	5.73	-24.21
5)	Pochhipadu Pochhipadu	15.00	28.10.88	0.18	688	632	Nil	394	7.88	1.13	-	71	3	3.09	0.15	2.00	4.77	540	1.68	1.11
6)	Gollaprolu Chendrolu	70.00 B.W.	21.1.89	7.31	1254	603	Nil	282	5.64	200	-	142	2	6.17	0.05	2.40	4.03	320	-	-
7)	Chendrolu	8.00	25.2.89	7.99	724	463	Nil	276	90	5.64	0.20	40	2	1.74	0.05	5.6	39	300	1.00	-0.49
8)	"	102.00 T.W.	6.5.89	7.66	6910	4363	Nil	151	1370	0.40	754	14	144	301	1800	144	301	1800	8.20	-28.93
9)	Chendrolu	105.00	27.3.89	7.14	727	465	Nil	169	103	0.30	73	10	64	19	240	64	19	240	12.05	-1.38
10)	Pochhipadu Pochhipadu	13.00	16.8.89	7.96	1362	884	Nil	315	221	0.20	96	100	96	34	380	3.20	1.56	380	2.14	1.30
11)	Pandavula- palam	12.10	26.8.89	7.06	1603	1026	Nil	306	259	0.50	94	8	80	92	580	4.17	2.90	580	1.70	-5.41
12)	Pochtururu	11.00	20.12.89	7.08	1266	812	Nil	255	196	0.50	70	2	72	65	440	3.04	0.20	440	1.45	-3.68
13)	Pochhipadu	11.00	4.1.90	7.57	7450	4794	Nil	200	1645	0.50	880	55	472	123	1700	30.26	1.41	1700	9.26	-29.96
14)	Dharmavararam T.W.	93.00	61.91	7.12	1506	965	Nil	4.00	46.39	-	132	5	23.60	10.36	63	440	440	2.74	-0.56	
15)	Gollaprolu Chendrolu	110.00 T.W.	28.2.91	7.61	3330	2144	Nil	190	652	1.00	386	10	144	107	800	13.39	0.26	800	5.93	-12.20

Notes:- 1) The temperature at which pH is determined is the temperature of the sample.
2) PS: Probably safe.

ANNEXURE VI

DETAILS OF SUBBAREDDYSAGAR

Subbareddysagar project was taken up in the year 1966 across Yati calva near Gokavaram village of Prathipadu Mandal of East Godavari district. The scheme provides for irrigation facilities to an extent 4,000 acres comprising of 2,470 acres of new ayacut and 1,530 acres of old ayacut for stabilisation.

Salient features of the scheme:

1) Total ayacut	:	1619 hectares.
2) Catchment area (considered)	:	103.55 Sq.Kms.
3) Catchment area (free)	:	89.77 Sq.Kms.
4) Catchment (interrupted)	:	13.83 Sq.Kms.
5) Total yield	:	24.1 MCM
6) Capacity of the reservoir at FRL (279.00)	:	5.1 MCM
7) Dead storage	:	0.69 MCM
8) Live storage	:	4.43 MCM
9) Surplus weir	:	
a) Length	:	91.46 m.
b) Type	:	High coefficient oge type.
c) Maximum flood discharge	:	521 cumecs.

Channel system:-

1) <u>Left side</u>		
a) Length	:	3.620 Kms.
b) Bed width	:	3.35 m.
c) F.S.depth	:	1.22 m
d) Bed fall	:	0.27 m/um
e) Discharge	:	2.24
f) Ayacut	:	1429 hectares.
g) Sill level	:	+ 75.31 m
h) Size of vent	:	12.2 x 1.067
2) <u>Right side</u>		
a) Length	:	2.615 m
b) Bed width	:	1.067 m
c) F.S.depth	:	0.610 m
d) Discharge	:	2.520 cumecs.
e) Ayacut	:	190.28 hectares
f) Still level	:	+ 77.74 m.
g) Vent size	:	0.610 m x 0.92 m.

Source:- Irrigation Division,
Peddapuram.

ANNEXURE - VII

CONTOUR CAPACITY TABLE OF SUBBAREDDY SAGAR

Contour	Capacity 10-Mcft.	Cumulative capa- city in Mcft.	Remarks
237	4.10	5.38	
242	7.90	12.25	
247	11.35	24.03	Sill of left main canal
248	2.95	27.53	
249	2.95	30.53	
250	2.95	33.48	
251	2.95	36.43	
252	2.95	39.38	
253	3.68	43.06	
254	3.68	46.74	
255	3.68	40.42	Sill of right main canal
256	3.68	54.10	
257	3.68	57.78	
258	4.30	62.17	
259	4.30	66.56	
260	4.39	70.95	
261	4.39	75.34	
262	4.39	79.73	
263	5.10	84.83	
264	5.10	89.33	
265	5.10	95.03	
266	5.10	100.13	
267	5.10	105.23	
268	5.69	110.92	
269	5.69	116.61	
270	5.69	122.30	
271	5.69	127.99	
272	5.69	133.68	
273	6.67	140.35	
274	6.67	147.02	
275	6.67	153.09	
276	6.67	160.36	
277	6.69	167.03	
278	7.78	174.81	
279	7.78	182.59	F.R.L. (Present F.R.L.)
280	7.78	190.37	
281	7.78	198.15	
282	7.78	205.93	M.W.L. (Proposed F.R.L.)
283	8.10	214.03	
284	8.46	222.16	
285	8.46	230.95	Proposed M.W.L.
286	8.46	239.41	
287	8.41	247.87	T.B.L.

	Present	Proposed
Note:- Net Capacity	182.59 Mcft	205.93 Mcft
Dead Storage	(-) 24.63 Mcft	(-) 24.63 Mcft
Useful usage	157.96 Mcft	181.30 Mcft
	4.42 MCM	5.08 MCM
1 Mcft = 11.574 C/s for one day		
1 Cu-sec = 0.0864 Mcft.		

Source : Irrigation Division, Peddapuram.

ANNEXURE VIII

STATEMENT SHOWING THE WATER LEVEL READINGS OF PRATHIPADU AND GOLLAPROLU OBSERVATION WELLS IN EAST GODAVARI DISTRICT COLLECTED DURING THE PRE-MONSOON (MAY) AND POST-MONSOON (NOVEMBER) PERIODS FROM 1974 TO 1992.

Sl. No.	Location of the Ob.well	1974		1975		1976		1977		1978		1979		1980	
		May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.
	Total depth in m.bgl.														
1)	Prathipadu	-	6.29	8.03	3.70	6.74	3.09	5.00	4.82	6.70	4.60	6.46	5.92	6.40	4.16
2)	Gollaprolu	4.58	0.82	3.24	0.84	4.12	0.39	3.21	0.52	2.58	1.20	2.31	0.40	3.15	1.09
	Total depth in m.bgl.														
Sl. No.	Location of the Ob.well	1981		1982		1983		1984		1985		1986		1987	
		May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.
	Total depth in m.bgl.														
1)	Prathipadu	5.80	5.30	7.20	6.70	9.65	5.55	6.73	7.47	9.64	9.82	Dried	Dried	Dried	Dried
2)	Gollaprolu	2.68	1.18	5.83	1.00	3.40	0.50	3.80	2.18	3.89	1.91	5.76	1.82	3.45	0.81
	Total depth in m.bgl.														
Sl. No.	Location of the Ob.well	1988		1989		1990		1991		1992					
		May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.				
	Total depth in m.bgl.														
1)	Prathipadu	3.06	2.09	4.54	2.21	1.49	1.59	4.60	1.47	4.19	1.19				
2)	Gollaprolu	2.41	1.20	2.89	1.74	0.45	1.53	2.03	1.18	2.89	1.90				

All readings are in mts. from bgl.

*Total depth changed from 9.90 to 6.49. (O.B.WELL changed)

ANNEXURE VIII A
STATEMENT OF RAINFALL PARTICULARS FROM 1972 TO 1992.

Station : Pithapuram.

Sl. No.	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Remarks
1)	1972	-	9.4	-	48.1	3.80	133.3	145.7	44.2	103.8	404.7	14.6	-	957.60	
2)	1973	-	-	-	-	29.60	48.8	154.2	137.0	130.1	234.0	50.0	-	783.70	
3)	1974	-	2.20	1.40	2.60	69.40	93.50	160.60	117.60	190.30	470.0	29.0	-	1138.70	
4)	1975	-	5.8	-	-	16.0	203.4	130.00	165.0	211.1	271.50	17.80	-	1071.40	
5)	1976	-	-	6.4	11.0	8.20	69.80	312.4	195.2	66.0	84.0	4456.2	-	1289.20	
6)	1977	-	-	-	46.4	26.4	185.2	182.2	175.6	58.4	82.4	403.8	-	1166.60	
7)	1978	-	-	-	66.6	13.0	251.6	143.8	163.0	144.0	45.6	60.0	7.40	920.80	
8)	1979	-	53.40	-	6.40	152.6	115.0	119.0	93.80	137.70	55.60	316.80	-	1111.10	
9)	1980	-	-	-	-	33.70	319.0	90.90	175.10	68.60	-	78.60	8.60	954.20	
10)	1981	5.60	-	12.20	-	151.60	147.30	214.20	159.0	216.5	104.0	56.6	-	1079.30	
11)	1982	-	-	-	21.60	49.60	66.80	155.0	190.80	59.5	176.4	33.2	-	751.00	
12)	1983	-	43.60	-	-	69.20	136.20	69.60	272.4	302.0	260.6	15.89	-	1230.40	
13)	1984	17.00	3.60	-	-	82.4	102.5	149.2	108.0	250.4	95.2	-	-	808.30	
14)	1985	22.40	-	-	-	54.0	94.2	177.0	193.3	36.9	263.6	26.2	-	897.90	
15)	1986	40.00	-	-	10.40	125.0	71.20	130.0	290.40	230.4	63.40	117.4	22.0	1032.20	
16)	1987	16.80	-	-	21.2	54.4	44.4	130.0	157.6	119.8	242.4	159.0	22.2	1037.00	
17)	1988	-	-	-	24.2	54.6	24.4	57.0	261.4	258.2	90.80	-	-	1061.10	
18)	1989	-	-	44.0	3.8	20.5	133.2	320.0	158.2	158.2	73.60	-	-	697.60	
19)	1990	-	92.20	86.8	-	490.8	87.1	125.1	159.9	102.4	153.2	26.2	-	1338.70	
20)	1991	27.60	-	-	24.0	-	272.3	130.0	103.9	360.6	133.5	159.3	6.0	1227.40	
21)	1992	87.6	2.6	-	-	49.2	190.6	265.0	255.6	252.7	156.3	280.4	-	1509.00	

Note:- All readings are in mm.

District : East Godavari.

Block : Pithapuram.

A N N E X U R E I X

STATEMENT SHOWING THE WATER LEVEL READINGS OF FRATHIPADU OBSERVATION WELL, FRATHIPADU (M), EAST GODAVARI DISTRICT
THE YEAR 1988 TO 1992.

Sl. No.	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1)	1988	-	-	-	-	-	3.89	3.99	1.42	1.69	1.52	2.09	2.44
2)	1989	2.89	3.34	3.74	4.19	4.54	4.14	3.66	1.61	1.56	1.22	2.21	2.62
3)	1990	3.25	3.46	3.42	4.24	1.49	1.54	1.19	0.96	1.34	0.95	1.59	2.08
4)	1991	2.43	2.93	3.59	3.15	4.60	5.32	3.99	1.97	1.69	1.44	1.47	2.01
5)	1992	2.50	2.53	2.86	3.65	4.19	3.56	3.05	1.14	1.24	1.82	1.19	1.84

All readings are in mts. from bgl.

ANNEXURE - IX-B

STATEMENT OF RAINFALL PARTICULARS FROM 1990 TO 1992
MANDAL : GOLLAPROLU

STATION: GOLLAPROLU

DISTRICT : EAST GODAVARI

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec. Total
1990	-	87.6	89.3	-	701.4	72.6	120.6	241.6	143.0	164.6	12.2	1720.4
1991	53.6	-	-	30.4	4.4	133.0	51.4	229.4	239.5	33.4	60.8	860.8
1992	7.5	3.5	-	-	14.2	75.3	250.6	201.9	60.6	85.4	143.7	967.2

Note:- All readings are in mm.

— Indicates no rainfall during the month.

ANNEXURE - X

ANALYTICAL REPORT OF PRATHIPADU OBSERVATION WELL IN EAST GODAVARI DISTRICT FOR THE PERIOD FROM 1982 TO 1990.

Sl. No.	Year/Month	Date of collection	Aquifer depth tapped in m.	Temp. in Micro Siemens/cm at 25°C	TDS calcu- lated by multi- plic- ation of sp. cond. by 0.84	CO ₂ mg/ lit.	HCO ₃ mg/ lit.	R E S U L T S			Total hardness expressed as CaCO ₃	RSC		
								Ca mg/ lit.	Mg mg/ lit.	SO ₄ mg/ lit.				
1)	May, 82	14.5.82	5.00	7.64	1150	Nil	231	150	417	141x 20	58	280	3.04	0.98
2)	Nov, 82	13.11.82	7.50	8.24	1252	Nil	176	160	5.09	0.51	2.80	280	CS-51	-1.65
3)	May, 83	11.5.83	10.45	7.70	1244	Nil	365	153	6.96	0.51	3.20	1.97	CS-51	0.80
4)	Nov, 83	17.11.83	4.55	5.90	2120	Nil	7.30	3.75	4.35	2.05	2.60	3.62	CS-51	-4.99
5)	May, 84	12.5.84	1.53	7.62	1150	Nil	290	305	2.13	30	104	68	CS-51	-1.81
6)	Nov, 84	25.11.84	8.27	7.50	1275	Nil	160	176	1.49	13	32	39	CS-51	0.13
7)	May, 85	10.5.85	10.64	8.08	977	Nil	325	150	5.22	0.51	4.40	1.97	CS-51	1.92
8)	Nov, 85	12.11.85	10.62	7.80	953	Nil	5.90	2.96	4.39	1.02	1.60	2.30	CS-51	2.05
9)	May, 85						368	70	92	44	32	39	CS-51	2.55
10)	Nov, 86						7.35	1.37	4.00	1.13	1.60	3.21	CS-51	US
11)	May, 87													
12)	Nov, 87													
13)	May, 88	26.5.88	4.82	7.60	1186	Nil	572	150	114	4	48	53	CS-51	0.68
14)	Nov, 88	24.11.88	3.05	7.09	2300	Nil	7.44	4.23	4.96	0.10	2.40	4.36	CS-51	PS
15)	May, 89	25.5.89	5.50	7.23	464	Nil	442	390	273	28	104	58	CS-51	-1.13
16)	Nov, 89	25.11.89	3.17	7.76	1964	Nil	8.84	10.72	11.87	0.72	5.20	4.77	CS-51	-0.02
17)	May, 90	25.5.90	2.45	6.12	2550	Nil	3.20	1.13	1.30	0.18	2.40	0.82	CS-51	PS
18)	Nov, 90	22.11.90	2.55	8.06	2930	Nil	270	323	280	7	32	63	CS-51	-3.03
							9.40	5.11	12.17	0.18	1.60	2.03	CS-51	PS
							397	432	315	14	36	52	CS-51	-1.03
							7.94	12.19	15.70	0.36	4.40	7.52	CS-51	PS
							499	397	433	26	64	132	CS-51	-1.61
							9.90	11.05	18.83	0.66	3.20	0.39	CS-51	PS

A N N E X U R E I X A

STATEMENT SHOWING THE WATER LEVEL READINGS OF GOLLAPROLU OBSERVATION WELL, GOLLAPROLU (M), EAST GODAVARI DISTRICT
THE YEAR 1988 TO 1992.

Sl. No.	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1)	1988	-	1.12	-	-	2.25	-	-	0.77	0.54	0.60	1.19	1.36
2)	1989	1.45	1.64	1.78	2.63	4.16	4.01	0.75	0.70	0.80	1.15	1.73	1.79
3)	1990	1.35	1.81	1.93	1.95	0.46	0.72	0.97	1.61	1.69	1.50	1.53	1.59
4)	1991	1.75	-	1.83	1.89	2.03	1.80	2.25	2.51	2.29	2.21	1.15	1.65
5)	1992	1.83	2.06	2.50	2.76	2.69	2.98	2.24	1.01	1.50	1.25	1.90	1.97

All readings are in mts. from bgl.

ANNEXURE - XI

ANALYTICAL REPORT OF COLLAPROLU OBSERVATION WELL IN EAST GODAVARI DISTRICT FOR THE PERIOD FROM 1982 TO 1990

Sl. No.	Year/ Month	Aquifer depth tapped in m.	Date of collection	pH	Sp. Cond. at 25°C in Micro-siemens/cm.	TDS cal- culated by micro-siemens/cm.	CO ₂ mg/lit.	HCO ₃ mg/lit.	R E S U L T S										Total Hardness CaCO ₃	SAR	RSC
									F mg/lit.	Cl mg/lit.	NO ₃ mg/lit.	Ca mg/lit.	Mg lit.	12	13	14	15	16			
1)	May, 82	6.63	28.5.82	7.46	2990	1050	Nil	347 6.94	9	378 10.66	11	369 17.35	7	40 -2.00	95 7.91	490	7.83 C ₄ -S ₂	-2.87 PS			
2)	Nov, 82	1.80	22.11.82	7.56	1972	1262	Nil	304 6.08	Nil	240 6.77	-	286 12.43	20	72 3.65	34 2.60	320	6.95 C ₃ -S ₂	-0.32 PS			
3)	May, 83	4.20	28.5.83	7.56	1181	743	Nil	317 6.34	Nil	93 2.63	-	139 6.04	8	24 1.20	51 4.19	270	3.68 C ₃ -S ₁	+0.95 PS			
4)	Nov, 83	1.70	18.11.83	7.39	643	412	Nil	240 4.80	Nil	84 1.80	-	50 2.17	7	56 2.60	24 1.97	240	1.41 C ₃ -S ₁	0.23 PS			
5)	May, 84	3.48	9.5.84	8.10	1032	660	Nil	330 6.60	Nil	106 2.89	-	100 4.70	5	80 4.00	44 3.62	320	2.41 C ₃ -S ₁	-1.02 PS			
6)	Nov, 84	3.07	22.11.84	8.46	2500	1600	93 1.86	242 4.84	93 1.86	500 14.10	-	277 12.04	156 3.99	136 6.60	39 3.21	500	5.33 C ₄ -S ₂	-3.31 PS			
7)	May, 85	4.78	8.5.85	7.87	2240	1434	Nil	238 4.76	Nil	342 9.64	-	251 10.91	88	80 4.00	49 4.05	400	5.44 C ₃ -S ₁	-3.27 PS			
8)	Nov, 85	2.80	18.11.85	7.82	2740	1754	Nil	366 7.36	Nil	504 14.21	-	281 12.22	200 5.12	88 4.40	102 8.38	640	4.83 C ₄ -S ₂	-5.43 PS			
9)	May, 86	6.65	15.5.86	7.51	2630	1683	Nil	370 7.40	Nil	422 11.90	-	260 11.30	155 3.36	144 7.20	53 4.36	580	4.70 C ₄ -S ₁	-4.16 PS			
10)	Nov, 86	2.71	19.11.86	7.09	215	138	Nil	57 1.14	Nil	11 0.51	8+20	21 0.91	3 -0.00	8 0.40	10 0.32	60	1.17 C ₁ -S ₁	-0.08 PS			
11)	May, 87	6.60	23.5.87	7.40	2230	1427	Nil	153 2.86	Nil	413 11.65	0.20	256 11.13	145 3.66	64 3.20	63 5.18	420	5.44 C ₃ -S ₂	-5.72 PS			
12)	Nov, 87	6.55	26.11.87	7.90	2300	1472	Nil	343 6.86	Nil	440 12.41	0.10	240 10.43	133 3.40	144 7.20	24 1.97	460	4.67 C ₄ -S ₂	-2.31 PS			
13)	May, 88	4.15	21.5.88	7.40	2560	1638	Nil	225 4.86	Nil	500 14.10	0.10	246 10.70	154 3.34	112 5.60	73 6.00	560	4.44 C ₄ -S ₂	-7.14 PS			
14)	Nov, 88	2.09	23.11.88	7.76	1763	1120	Nil	289 5.78	Nil	320 9.02	0.10	166 7.22	157 4.02	72 3.60	49 4.03	380	3.70 C ₃ -S ₁	-1.85 PS			

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
15) Nov, 89	1.75	27.11.89	7.59	2820	1677	1111	265	5.73	451	12.72	0.10	213	160	144	51	570	3.88	-5.69
16) Nov, 90	1.53	23.11.90	8.26	1545	969	1111	173	3.46	240	6.77	0.50	167	150	48	29	240	4.70	-1.32
17) May, 91	2.03	28.5.91	7.32	4820	3085	1111	140	2.80	785	22.17	0.10	726	325	72	112	640	12.47	-10.01
18) Nov, 91	1.18	26.11.91	8.63	993	656	38	134	0.76	135	3.04	0.20	134	7	48	19	200	4.14	-0.52
19) May, 92	2.09	21.5.92	9.45	1419	908	45	216	4.32	252	7.11	1.25	165	62	24	33	220	5.42	+0.81
												6.04	2.10	1.20	3.21		3.52	

ANNEXURE - XII

STATEMENT SHOWING BORE WELLS DRILLED IN PRATHIPADU MANDAL, EAST GODAVARI DISTRICT

Sl. No. of the Village	Name of the Mandal/Village	Depth drilled in bgl.	175 mm. casing lowered (in bgl.)	Yield (lph.)	Geology	Remarks
1)	Prathipadu T. Royavaram - I	60.00	15.20	18,000	Khondalites	Drilled under deposit work.
2)	T. Royavaram - II	56.60	11.90	18,000	Khondalites	-do-
3)	T. Royavaram - III	44.00	13.75	27,000	Khondalites	-do-
4)	T. Royavaram - IV	55.00	10.00	6,000	Khondalites	-do-
5)	T. Royavaram - V	42.00	11.50	6,000	Khondalites	-do-
6)	Peda Sankarlapudi	56.60	10.00	36,000	Khondalites	Drilled under deposit work for Panchayatraj Department.
7)	Prathipadu	50.40	13.00 (150 mm. casing)	4,200	Khondalites	I.T.D.A. work.
8)	P. Jagannadhapuram-I	49.60	15.80 (150 mm. casing)	18,000	Khondalites	I.M.P. programme.
9)	P. Jagannadhapuram-II	55.70	12.80 (150 mm. casing)	15,800	Khondalites	-do-
10)	Eluru	51.50	14.70 (175 mm. casing)	18,000	Khondalites	-do-
11)	Pandavulapalem	37.00	15.00 (150 mm. casing)	9,000	Khondalites	Tribal Sub-plan.

ANNEXURE - XII-A

LITHOLOGICAL LOG OF THE BORE WELL DRILLED AT PEDASANKARLAPUDI VILLAGE,
PRATHIPADU MANDAL, EAST GODAVARI DISTRICT

1) Well No. : IR-01-304-EG.
 2) Location : Village : Pedasankarlepudi
 Mandal : Prathipadu
 District : East Godavari

Depth range (m.)		Thickness (m.)	Description of the sample
From	To		
0.00	3.80	3.80	Top soil, brown colour
3.80	10.00	6.20	Sticky clay with gravel, brown colour
10.00	13.20	3.20	Khondalites (fractured)
13.20	31.80	18.60	Weathered khondalites, grey colour
31.80	38.00	6.20	Weathered khondalites with quartzites, grey colour
38.00	50.40	12.40	Weathered khondalites with fracturing, grey colour
50.40	56.60	3.20	Hard-fracturing.

ANNEXURE - XII.B

LITHOLOGICAL LOG OF T.RAYAVARAM-1.

1) Well No. : IR-01-298-EG
 2) Location : Village : T.Rayavaram
 Mandal : Prathipadu
 District: East Godavari

Depth (mts.)		Thickness (m.)	Lithology
From	To		
0.00	3.80	3.80	Top soil, brown colour
3.80	7.00	3.20	Clay, brown colour
7.00	10.00	3.00	Clay with kankar brown colour.
10.00	13.20	3.20	Admixtures of kankar, pieces of granite gneiss, grey colour
13.20	19.40	6.20	Weathered granitic gneiss, grey colour
19.40	25.60	6.20	Weathered gneiss with minor fractures. Black colour
25.60	50.40	24.80	Semi weathered gneiss fine to medium grained ash colour
50.40	60.00	9.60	Hard granite gneiss, ash colour.

ANNEXURE - XII, C

LITHOLOGICAL LOG OF T.RAYAVARMA-II

1) Well No. : IR-01-299-ED
 2) Location : Village : T.Rayavarma-II
 Mandal : Prathipadu
 District : East Godavari

Depth (m.)		Thickness(m.)	Lithology
From	To		
0.00	3.80	3.80	Top soil, brown colour
3.80	7.00	3.20	Clay with fine sands, light brown colour
7.00	10.00	3.00	Clay (sticky) grey colour
10.00	13.20	3.20	Clay with fine sands grey colour
13.20	13.40	6.20	Weathered khondalites, fine grained grey colour
19.40	28.80	9.20	Weathered khondalites fine grained, grey colour
28.80	31.80	3.20	Weathered khondalites medium to coarse grained, light grey in colour
31.80	38.00	6.20	Weathered khondalite, intrusion of quartzites light pink to green colour
38.00	41.00	3.00	Weathered khondalites, fractured zone grey colour
41.00	47.20	6.20	Soil weathered khondalites, fine grained light pinkish quartzites
47.20	50.40	3.20	Intrusion of biotite gneiss (banded)
50.40	56.60	6.20	Soil weathered khondalites quartzite, light pink colour, fine medium grained
56.60	58.60	2.00	Khondalites hard, light pink colour

ANNEXURE - XII:D

LITHOLOGICAL LOG OF T.RAYAVARAM-III.

1) Well No. : IR-01-300-EG
 2) Location : Village : T.Rayavaram - III
 Mandal : Prathipadu
 District : East Godavari

Depth (m.)		Thickness (m.)	Litholog,
From	To		
0.00	3.80	3.80	Top soil brown colour
3.80	7.00	3.20	Clay with medium sands, brown colour
7.00	10.00	3.00	Clay with fine sands and kankar, brown colour
10.00	13.20	3.20	Admixures of clay, medium grained sands and kankar, brown colour
13.20	16.20	3.00	Weathered khondalites, grey colour
16.20	19.40	3.20	Weathered khondalites, grey colour with quartzite pieces
19.40	25.60	6.20	Semi weathered khondalites grey colour (fine to medium grained)
25.60	28.60	3.00	Semi weathered khondalites, fine grained grey colour
28.60	34.80	6.20	Semi weathered khondalites, fine grained, grey colour
34.80	41.00	6.20	Fractured rock (khondalites)
41.00	44.00	3.00	Gneisses intrusion (banded) light grey to pale pink colour.

ANNEXURE - XII.E

LITHOLOGICAL LOG OF T.RAYAVARAM - IV

1) Well No. : IR-01-301-EG
 2) Location : Village : T.Rayavaram - IV
 Mandal : Prathipadu
 District : East Godavari

Depth (m.)		Thickness (m.)	Lithology
From	To		
0.00	3.80	3.80	Top soil brown colour
3.80	10.00	6.20	Sticky clay brown colour, clay with fine sands
10.00	13.20	3.20	Weathered khondalites
13.20	16.20	3.00	Weathered khondalites with quartzite pieces grey colour
16.20	19.40	3.20	Weathered khondalites medium grained, grey colour
19.40	22.40	3.00	Slight fractured zone
22.40	25.60	3.20	Intrusion of weathered gneisses; grey colour
25.60	28.60	3.00	Semi weathered khondalites with minor fracture zone grey colour
28.60	31.80	3.20	Semi weathered khondalites, fine grained
31.80	34.80	3.00	(Banded nature) gneisses, grey colour
34.80	47.20	12.40	Semi weathered khondalite grey colour (fine to medium grained)
47.20	53.40	6.20	Hard khondalite, very fine to fine grained grey colour
53.40	55.00	1.60	Basement

ANNEXURE- XII.F

LITHOLOGICAL LOG OF T.RAYAVARAM - V

1) Well No. : IR-01-302-EG
 2) Location : Village : T.Rayavaram - V
 Mandal : Prathipadu
 District : East Godavari

Depth (m.)		Thickness (m.)	Lithology
From	To		
0.00	3.80	3.80	Top soil, brown colour
3.80	7.00	3.20	Clay with fine sands, brown colour
7.00	10.00	3.00	Clay with fine sands, brown colour
10.00	13.20	3.20	Clay with medium grained sands, brown colour
13.20	16.20	3.00	Weathered khondalites fine grained, brown colour
16.20	22.40	6.20	Weathered khondalites, very fine to fine grained, grey colour
22.40	25.60	3.20	Highly weathered, khondalites, with clay fine grained, brown colour
25.60	28.60	3.00	Admixtures of clay, ferruginous material with quartzitic pieces grey colour
28.60	35.00	6.40	Semi weathered khondalites, light grey colour (very fine to fine grained)
35.00	38.00	3.00	Hard rock fine grained
38.00	42.00	4.00	Basement very fine grained (even)

ANNEXURE - XII.G

GOVERNMENT OF ANDHRA PRADESH
GROUND WATER DEPARTMENT

Topoquadrant : 65 K/4

Well No. IR-G1-242-EG.

LITHOLOGICAL LOG

- 1) Name of the Project : Tribal Subplan
 2) Location of site:-
 District : East Godavari
 Mandal : Prathipadu
 Village : Prathipadu
 3) Depth drilled : 50.40 m.
 Dia. $\frac{20.00 \text{ cm.}}{15.20 \text{ cm.}}$
 4) Samples collected by : A. Prasad Rao, A.E.E.
 5) Abstract of log : Aquifer zones - 6.00 m.
 6) Drilling method : D.T.H.
 7) Yield : 4,200 lph.

Formation description	Depth zone		Thick- ness (m.)	Cumulative thickness of aquifer zones (m.)
	From (m.)	To (m.)		
Top soil, clay brown, brittle with little sand.	0.00	3.80	3.80	
Clay, yellow, brittle.	3.80	7.00	3.20	
Khondalites, highly wea- thered with clay.	7.00	13.20	6.20	
Khondalites, highly wea- thered with little clay.	13.20	19.40	6.20	
Khondalites highly weathered.	19.40	25.60	6.20	
Khondalites - semiwea- thered.	25.60	31.80	6.20	
Khondalites, semiwea- thered and fractured, with quartz pieces.	31.80	34.80	3.00	3.00
Khondalites, semiwea- thered.	34.80	44.20	9.40	
Khondalites semiwea- thered and fractured.	44.20	47.20	3.00	6.00
Khondalites semiwea- thered.	47.20	50.40	3.20	

ANNEXURE-XII.H

BORE HOLE PARTICULARS OF P.JAGANNADHARAPURAM - I (V), PRATHI-
PADU MANDAL, EAST GODAVARI DISTRICT.

Code No. of well : IR-01-199-CG.
 Name of the Village : P.Jagannadhapuram - I.
 Mandal : Prathipadu.
 District : East Godavari.
 Location : In the lands of P.Naikayya,
 S.No.173/3.
 Geology : Khondalites, Archean age.
 Depth (m.bgl.) : 49.60 m.

Lithology	Depth range (in m.)	
Clay	0.00	9.00
Weathered khondalites	11.90	15.50
Weathered khondalites (fractured)	15.50	45.00
Semi-weathered khondalites	45.00	49.60

150 mm.casing inserted : 15.80 m.
 Discharge : 18,000 lph.

p ^H	E.C. (m.mhos/ cm.)	Total hard- ness	CO ₃	HCO ₃	Na	K	Cl	Ca	Mg	F
			mgg/ lit.	mgg/ lit.	mgg/ lit.	mgg/ lit.	mgg/ lit.	mgg/ lit.	mgg/ lit.	mgg/mgg
8.07	1000	300	Nil	53 1.06	88 3.83	7 0.18	255 7.19	72 3.6	29 2.33	0.4

ANNEXURE XII-I

BORE WELLS PARTICULARS OF P.JAGANNADHAPURAM-II (V),
PRATHIPADU MANDAL, EAST GODAVADI DISTRICT

Code No. of well : IR-01-200-EG.
 Name of the village : P. Jagannadhapuram - II.
 Co-ordinates : 17°20'50" : 82°19'20".
 Name of the Mandal : Prathipadu.
 Name of the District : East Godavari.
 Location : In the lands of M. Rajulu.
 Geology and Age : Khondalites, Archean.
 Total depth (m. bgl.) : 55.70 m.

Lithology	Depth range (in m.)
Clay	0.00 - 12.00
Weathered khondalites	12.00 - 55.70

150 mm. casing blank : 12.80 m.
 Discharge : 16,800 lph.

p ^H	E.C. (m.mhos/ cm.)	Total hard- ness	CO ₃	HCO ₃	Na	K	Cl	Ca	Mg	F
			mg/lit.	mg/lit.	mg/lit.	mg/lit.	mg/lit.	mg/lit.	mg/lit.	mg/lit.
7.71	1053	300	Nil	264 5.28	95 4.13	31 0.79	133 3.73	40 2.00	49 4.05	0.7

ANNEXURE XII-J

BORE WELLS PARTICULARS OF PRATHIPADU MANDAL, EAST GODAVADI DISTRICT ^I

Code No. of well : IR-01-198-EG.
 Name of the villoge : Eluru.
 Name of the Mandal : Prathipadu.
 Name of the District : East Godavari.
 Location : In the lands of Vakapalli Yegu-
 lamma, S.No.251.
 Geology : Granite gneisses, Archaean age.
 Depth (m.bgl.) : 51.50

Lithology	Depth range (in m.)
Clay	0.00 - 12.90
Highly weathered khondalites	12.90 - 14.50
Weathered and fractured khondalites	14.50 - 31.20
Semi-weathered granite gneisses	31.20 - 51.50

Discharge : 18,000 lph.
 Static water level : 6.30 m.
 175 mm. casing inserted : 14.70 m.

ANNEXURE - XIII

SALIENT FEATURES OF SUDDAGEDDA BASIN (EAST GODAVARI DISTRICT)

1. Total catchment area of the basin .. 658.3 Sq.Kms.
(entirely in A.P.)

Total catchment area upto last irrigation work 615.15 Sq.Kms.

2. Taluks lying in the basin:
1. Ellavaram
 2. Prathipadu
 3. Peddapuram
 4. Pithapuram
 5. Tuni

3. Weighted average annual rainfall 1113.05 mm

Weighted average monsoon rainfall 997.00 mm

4. Existing rain gauge stations having influence over the basin:

S.No.	Name of rain gauge station	Extent in Sq.Kms.
1.	Addatigala	Good C.A. 48.43
	-do-	Average C.A. -
	-do-	Bad C.A. -
2.	Prathipadu	Good C.A. 69.59
	-do-	Average C.A. 307.51
	-do-	Bad C.A. 0.93
3.	Pithapuram	Good CA. -
	-do-	Average C.A. 35.66
	-do-	Bad C.A. 153.53 (upto last irrigation work)
	-do-	Bad C.A. 43.15
Total :		658.30 Sq.Kms.

5. Proposed new rain gauge station Kothipudi
6. Existing discharge gauge site NIL
7. proposed discharge gauge site
1. Gokavarau
2. Gollaprolu

8. Yields: 75% dependable yield: (upto last irrigation work)---

9. Utilisation

S.No.	Type of Scheme	Nos.	Ayacut in Ha.	Utilisation in MCM
1.	Category A. By Suddagedda waters	220	7985.18	69.85
2.	-do- By Eleru River waters		10589.38	NIL from Eluru River basin
3.	Category C	2	1286.14	11.25
	Category C3-1	1	263.46	2.31

TOTAL				

10. Net balance of yield:

(For details please refer statement No.2 for average irrigation)

Feasibility of new M.I. Schemes for utilising the above balance yield to the maximum possible extents is being examined.

Name of rain gauge Station.	75% confluence limit	Year of Occurance	Sun of co-efficient of yield in Mcft/Sq.miles Good catchment	Average catchment	Bad catchment
Addateegala	36.60*	1940	28.63	21.47	14.33
Prathipadu	31.15*	1933	20.38	15.29	10.153
Pithapuram	30.22*	1960	18.64	13.09	9.31

ANNEXURE - XIV

STATEMENT SHOWING THE YIELD CALCULATIONS OF SUDDAGEDDA BASIN OF EAST GODAVARI DISTRICT
(At 75 @ DEPENDABLE YIELD)

Name of the sub-basin or sub-minor basin.	Name of Rain Gauge/Stations				Pithapuram				Total Catchment Yield in Mcft.	
	Addateegala		Phattipadu		Good		Average			Bad
	Good C.A. Yield in Mcft	Bad C.A. Yield in Mcft	Good C.A. Yield in Mcft	Average C.A. Yield in Mcft	Bad C.A. Yield in Mcft	Good C.A. Yield in Mcft	Average C.A. Yield in Mcft	Bad C.A. Yield in Mcft		
1.	18.76 535.38	--	16.98 346.05	4.50 68.80	--	--	--	--	--	40.18 950.23
2.	--	--	--	18.70 285.92	--	--	--	1.05 9.77	--	19.75 295.69
3.	--	--	--	35.25 538.98	--	--	2.80 39.14	0.60 5.59	--	38.65 583.71
4.	--	--	9.69 197.45	19.73 301.67	--	--	--	--	--	29.42 499.15
5.	--	--	--	3.03 46.33	--	--	0.37 5.17	0.70 6.51	--	46.10 52.01
6.	--	--	--	24.47 374.14	--	--	--	0.51 1.75	--	24.98 378.89
7.	--	--	--	13.00 198.77	0.36 3.41	--	4.00 55.92	31.87 296.71	--	49.23 554.81
8.	--	--	--	0.05 0.76	--	--	6.60 92.27	24.55 228.56	--	31.20 321.59
	18.70 535.38	--	26.67 543.53	118.73 1845.37	0.36 3.41	--	13.77 192.59	59.28 551.89	--	237.51 3642.08

ANNEXURE - XIV a

STATEMENT SHOWING THE UTILISATION OF YIELD IN SUDDAGEDDA BASIN OF EAST GODAVARI DISTRICT
(For average of Registered ayacut which ever is more)

Name of sub-basin or Minor sub-basin.	Yield available	Existing schemes Category A & B Ayacut Utilisation.	Ayacut & Utilisation under New Schemes Schemes already contemplated but not put on ground (C1)	Schemes sanctioned but not contemplated (C2)	Schemes already contemplated but not sanctioned (C3-1)	Total utilisation C1, C2 & C3-1 (7+9+11)				
2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1) Sub-basin 1	950.23	303.50	37.94	3178.00	397.20	-	-	651.00	81.40	478.60
2) Sub-basin 2 by self	295.69	2257.77	282.22	-	-	-	-	-	-	-
3) Catchment. By open head channels Suddagedda.	-	1779.04	222.38	-	-	-	-	-	-	-
Sub-basin 3. By self catchment.	583.71	2262.46	357.91	-	-	-	-	-	-	-
By open Head Channels of Suddagedda.	-	1181.21	147.65	-	-	-	-	-	-	-
Fed by Eleru waters	-	@ 7468.90	-	-	-	-	-	-	-	-
4) Sub-basin 4.	499.15	2632.34	329.04	-	-	-	-	-	-	-
5) Sub-basin 5.	58.01	534.29	66.80	-	-	-	-	-	-	-
6) Sub-Basin 6.	378.89	2123.02	265.45	-	-	-	-	-	-	-
7) Sub-Basin 7 By self catchment	554.81	4544.48	568.06	-	-	-	-	-	-	-
Fed by Eleru waters	-	@3399.21	-	-	-	-	-	-	-	-

Contd....2.

Sl. No.	Total utilisation	Balance yield available in Mcft (3 - 13)	New Ayacut proposed under Master Plan	Balance yield available in Mcft (14-16)	Cumulative Balance in Mcft	REMARKS
2.	13.	14.	15.	16.	18.	19.
1	516.54	433.69	-	433.69	433.69	
2	282.22	13.47	-	13.47	447.16	
3	222.38	-	-	-	224.78	This balance is let down for utilisation under lower reaches.
3	357.81	225.90	-	225.90	450.68	
	147.65	-	-	-	303.03	
4	329.04	170.11	-	170.11	473.14	
5	66.80	8.79	-	8.79	464.35	The minus balance is supplemented from the balance yield of sub-Basin 4 through the surplus course of the tank (Please vide Irrigation Map).
6	265.45	113.44	-	113.44	577.79	
		Total 4, 5, 6, 8 B	-	274.76	577.79	
7	560.06	13.25	-	(-)	564.54	The minus balance is supplemented from the balance yields of sub-basins 4 & 6 by the supply channel from Urakalava near Tatiparthi (v).
			-	-	-	*The possibility of exploring new schemes for the balance yield under Master Plan is being examined in the up lands of the sub-basins 3 & 6.

-do-

Contd...3.

	1	2.	3.	4.	5.	6	7	8	9	10	11	12
8) Sub-Basin No.8												
By Self catchment			321.59	1512.31	189.04	-	-	-	-	-	-	-
Led by Eleru waters:			-	@15297.86	-	-	-	-	-	-	-	-
Total :			3642.08	45	2466.39	3178.00	397.20	672.00	81.40	478.60		

@ Note: In Sub-Basin Nos.3, 7 and 8 there is irrigation under Yeleru river waters coming from outside the Basin to an extent of 26,166.00 Acres.
The utilisation for this ayacut is shown in Yeleru river Basin report.

13. 14. 15 16 17 18 19

189.04 132.55 - - **132.55 697.09 ** The balance yield in the sub-basin cannot be utilised by proposing new schemes within this sub-basin as the entire area is developed under Suddageḍda and Eleru waters and hence the balance goes to areas waste inevitably.

2944.99

ANNEXURE - XIV b

STATEMENT SHOWING CATCHMENT AREAS OF DIFFERENT SUB BASINS OF "SUDDAGEDDA BASIN"

Name of sub-Basin or sub minor basin	Good catchment areas in Sq.miles	Average catchment area in Sq.miles	Bed catchment area in Sq.miles	Total catchment area in Sq.miles	Remarks
	3.	4.	5.	6.	7.
1.	35.68	4.50	--	40.18	
2.	--	18.70	1.05	19.75	
3.	--	38.05	0.60	38.65	
4.	9.69	19.75	--	29.42	
5.	--	3.40	0.70	4.10	
6.	--	24.47	0.51	24.98	
7.	--	17.00	32.23	49.23	
8.	--	6.65	24.50	31.20	
Total :					237.51
Area Beyond last irrigation works					16.66
Grand Total :					254.17

ANNEXURE - XIV.C

STATEMENT SHOWING THE AREA INFLUENCED BY DIFFERENT RAIN GAUGE STATIONS IN SUDDAGEDDA BASIN.

Sl. No. of sub-basin or sub Minor Basin	Name of Rain gauge Stations		Pithapuram		Total catchment area of each sub-basin.	Remarks.
	Addatheegala	Prathipadu	Good Average	Bad		
1.	18.70	16.98	4.50	--	40.18	
2.	--	--	18.70	--	19.75	1.05
3.	--	--	35.25	--	38.65	2.80 0.60
4.	--	9.69	19.73	--	29.42	--
5.	--	--	3.03	--	4.10	0.37 0.70
6.	--	--	24.47	--	24.98	0.51
7.	--	--	13.00	0.36	49.23	4.00 31.87
8.	--	--	0.05	--	31.20	6.60 24.55
<hr/>						
Total :	18.70	26.67	118.73	0.36	237.51	13.77 59.28
<hr/>						
Area beyond last irrigation work	--	--	--	--	16.66	--
<hr/>						
GRAND TOTAL:	18.70	26.67	118.73	0.36	254.17	13.77 75.94

ANNEXURE - XIV.d

STATEMENT SHOWING THE AYACUT PARTICULARS OF SUDDAGEDDA BASIN IN EAST GODAVARI DISTRICT

Name of sub-basin or sub-minor basin	Registered ayacut in acres	Maximum developed in acres.	Average cultivation in acres.	Average of Registered ayacut which ever is more for which utilisation is worked out.
1	219.09	405.06	301.43	303.50
2	3,536.56	4,426.84	3,340.64	4,036.81
3	10,827.92	13,940.92	10,398.73	11,512.57
4	2,476.12	2,938.08	1,729.02	2,632.34
5	534.39	534.39	381.90	534.39
6	2,031.65	2,885.66	1,964.38	2,123.62
7	7,746.48	9,224.34	6,301.60	7,943.72
8	15,111.97	18,671.33	15,924.85	16,810.17
	42,484.18	53,026.62	40,342.55	15,897.12
<u>ABSTRACT</u>				
By Suddagadda waters	18017.07	22351.00	16176.34	19731.12
By Bleru river water	24467.11	30675.62	24166.21	26166.00
Total :	42484.18	53026.62	40342.55	45897.12

Average of Registered ayacut which ever is more for which utilisation is worked