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Agricultural Land Distribution and Irrigation Potentiality: A Case Study of Guntur District, A.P

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Abstract

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18 per cent of India's gross domestic product (GDP) and provides employment to 50% of the countries workforce. India is the world's largest producer of Pulses, Paddy, Wheat, Spices and spice products. Andhra Pradesh is with agriculture as a major source of income for about 60% of its population. In the last 70 years, the annual growth rate of agriculture has been 2.88%, which is far below the target growth of 4% per annum. Even today maximum percentage of land and water resource potentiality is under the hands of few farmers (Forward caste) followed by Backward caste farmers, where as Schedule caste and Schedule Tribes farmers are the marginalized agricultural social groups. This situation has caused the disparities among farmers agricultural land and irrigation water potentiality. The present paper examined intra-regional disparities in agriculture land holdings and irrigation potentiality in Guntur District of Andhra Pradesh.

Keywords: Agriculture; Irrigation; Land distribution; Gross Domestic Product (GDP); Schedule Caste; Schedule Tribes

Introduction

Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture. Agriculture is an important sector of Indian economy as it contributes about 18% to the total GDP and provides employment to over 60% of the population. Rural Andhra Pradesh is predominantly agricultural with more than three fourth of its work force engaged directly in Agriculture sector. Andhra Pradesh "the bejeweled rice bowl of India". Agriculture is the chief source of income to the State's economy.

The coastal region is pride of its deltaic areas formed by the three rivers - the

Godavari, the Krishna and the Penna. The irrigation potentiality due to the major rivers, relatively high rainfall improves the groundnut water resources improves in the region. This region also progressed industrially. Though the pressure of population is high on land in the region, because of fertility of the soil and adequate irrigation and rainfall, it is economically better than the drought prone Rayalaseema region of the state.

Land is one of the major natural resources of any region. The nature and magnitude of economic activities industrial or agricultural - mainly depend on the quantum of land resources and the manner in which they are used.

In this paper agricultural land distribution and its water potentiality are studied.

Objective

To study the distribution of the agricultural land among various social groups and their irrigation potential.

Hypothesis

1. Distribution of agricultural land is depending on communal categories.
2. Variation in agricultural land among the farmers is due to social and economical status.
3. Irrigation potentiality depends on the different natural, social and economical factors of the farmers.

Data sources and methodology

For the present study to know the agricultural land distribution and irrigation potentiality, primary data is collected for this, a field survey was conducted by employing a questionnaire on the topic. Six revenue mandals have been selected based on systematic purposive factors like geographic location, located in high rainfall receiving area, located in a drought-prone area, located in areas with high intensity of small and marginal farmers, located in urban influence conditions etc. 330 samples are collected. Percentages and averages were taken into consideration for analysis purpose.

Study area

Guntur district is stationed in central coastal Andhra Pradesh, India, on the Bay of Bengal's coast, with a coastline of about 100 kilometers and is located between $15^{\circ}18'$ - $16^{\circ}50'$ N latitude and $79^{\circ}19'$ - $80^{\circ}55'$ E longitude. This district lies in deltaic region of the river Krishna. The district has an area of about 11400sq.km with a population of 48.9 lakh (2011 census). The district's population density is 430 per sq.km. 33.81% of the total population lives in urban and the remaining in rural. The literacy rate and sex ratios are 67.4% and 1003 respectively. The river flows on the North and north-eastern borders of Guntur district and districts Krishna and Guntur are separated by river Krishna. It is bordered on the south by Prakasam district and on the west by Telangana state.

Six sample mandals were chosen and all sample mandals and the villages are scattered in all directions of the district in varied topographical, soils, irrigation potential, rainfall, urban influence conditions.

Analysis

Samples were chosen from different socio-economic status groups such as Scheduled Caste (SC), Schedule Tribe (ST), Backward Caste (BC) and Other Communities (OC). In

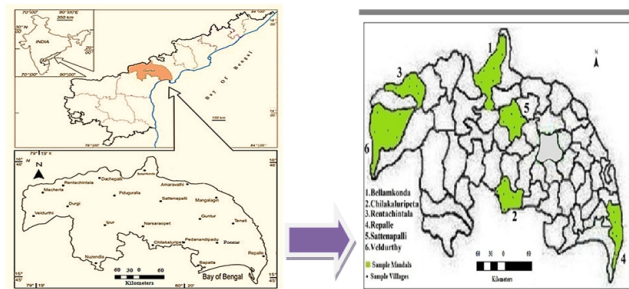


Fig. 1. A) Location map of Guntur District and selected mandals, A.P, B) Location of sample mandals and villages of Guntur district

Table 1. List of sample mandals and villages

S. No.	Name of the Mandal	Name of the Villages
1.	Repalle	Karumuru
		Kaitapalle
		Morlavanipalem
		Singupalem
		Piratlanka
		Pulichintala
2.	Bellamkonda	Emmajigudem
		Chityala
		Vannayapalem
		Papayapalem
		Pedamakkena
		L. Garlapadu
3.	Sattenapalli	Komerapudi
		Gorantla
		Rentapalle
		Pothavaram
		Tatapudi
		Gottipadu
4.	Chilakaluripeta	Manukondavaripalem
		Rajapeta
		Gundlapadu
		Sirigiripadu
		Kandlakunta
		Rachamallipadu
5.	Veldurthy	Potlavedu
		Manchikallu
		Pasarlpadu
		Jetipalem
		Goli
		Mallavaram
6	Rentachintala	

each sample mandal, 5 sample villages are chosen and in each village 11 samples are collected for the study. In each mandal, 55 samples are taken. 10 sample among them are from Schedule Caste (18%), and 5 are from Schedule Tribe (7.7%), and 15 are from Backward Caste (27.6%) and 25 are from Other Caste farmers (46%), altogether there are 330 samples.

The following table indicates mandal and village wise sample distribution by following social weightage.

Table 2. Distribution of Samples - Mandal & Village wise

S. No.	Name of the Mandal	Name of the Villages	SC	ST	BC	OC	TOTAL
1	Repalle	Karumuru	2	1	3	5	11
		Kaitapalle	2	1	3	5	11
		Morlavanipalem	2	1	3	5	11
		Singupalem	2	1	3	5	11
		Piratlanka	2	1	3	5	11
2	Bellamkonda	Pulichintala	2	1	3	5	11
		Emmajigudem	2	1	3	5	11
		Chityala	2	1	3	5	11
		Vannayapalem	2	1	3	5	11
		Papayapalem	2	1	3	5	11
3	Sattenapalli	Pedamakkena	2	1	3	5	11
		L. Garlapadu	2	1	3	5	11
		Komerapudi	2	1	3	5	11
		Gorantla	2	1	3	5	11
		Rentapalle	2	1	3	5	11
4	Chilakaluripeta	Pothavaram	2	1	3	5	10
		Tatapudi	2	1	3	5	10
		Gottipadu	2	1	3	5	10
		Manukondava	2	1	3	5	10
		ripalem					
5	Veldurthy	Rajapeta	2	1	3	5	10
		Gundlapadu	2	1	3	5	11
		Sirigiripadu	2	1	3	5	11
		Kandlakunta	2	1	3	5	11
		Rachamallipadu	2	1	3	5	11
6	Rentachintala	Potlaveedu	2	1	3	5	11
		Manchikallu	2	1	3	5	11
		Pasarlapadu	2	1	3	5	11
		Jetipalem	2	1	3	5	11
		Goli	2	1	3	5	11
		Mallavaram	2	1	3	5	11
			60	30	90	150	330
			(18%)	(7.7%)	(27.6%)	(46%)	(100%)

The selected sample landholders possessing 803.5 acres of agricultural land Community wise on an average 9.7 per cent SC, 4.67 per cent ST, 18.6 per cent BC and 66.96 per cent OC community farmers are having agricultural land respectively. 85.63% of the agricultural land is under the control of OC & BC communities i.e., out of 803.50 acres of total agricultural land 668 acres are under those two community farmers.

Table 3. Total agricultural land of sample farmers (Acres)

S.No.	Name of the mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	17	07	25	95	144
2	Bellamkonda	05	02	22	75	104
3	Sattenapalli	10	06	23	79	118
4	Chilakaluripeta	17	08	25	104	154
5	Veldurthy	14	07	29	85	135
6	Rentachintala	15	7.5	26	100	148.5
Total		78	37.5	150	538	803.5
Percentage		9.7	4.67	18.67	66.96	100

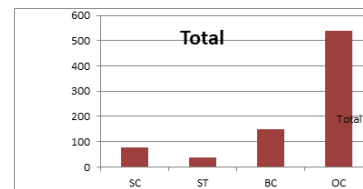


Fig. 2. Total agricultural land of sample farmers (Acres)

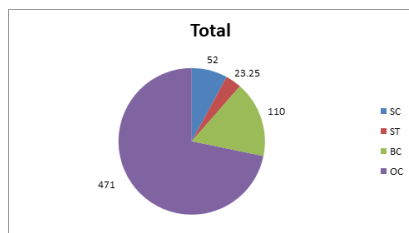
It clearly reflects that maximum of agricultural land is in the hands of economically and socially forward communities. Majority of SC and ST farmers are possessing very limited agricultural land, moreover the majority of SC and ST farmers landless and working as agricultural labourers, at the time of sample survey the SC and ST farmers who have agricultural land are only taken into confidence.

Sample farmers' agricultural land under irrigation

The total agricultural land of selected sample householders is 803.5 acres of which 656.25 acres of land is under irrigated which amounts to 82.70% and the remaining 17.30% of the land is either un-irrigated or rain-fed. Community wise on an average, 7.92 per cent SC, 3.55 per cent ST, 16.76 per cent BC and 71.77 per cent OC community farmer's agricultural land respectively have irrigation facility. All the sample farmers are aware of the Micro-irrigation system, even though Government is providing Micro-irrigation equipment at a subsidized price, none of them practising it, because during the rainy season the huge quantity of water is available for use.

Table 4. Sample farmers' agricultural land under irrigation (Acres)

S.No	Name of the mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	16.5	07	26.5	94.5	144.5
2	Bellamkonda	5.5	1.5	21	67	095
3	Sattenapalli	9.5	5.25	22	81	117.75
4	Chi-lakaluripeta	17	8.5	25	104	154.5
5	Veldurthy	00	00	1.5	57.5	056
6	Rentachintala	3.5	01	14	67	85.5
	Total	52	23.25	110	471	656.25
	%	7.92	3.55	16.76	71.77	100

**Fig. 3.** Sample farmer's agricultural land under irrigation (Acres)

Sample farmers' agricultural land under canal irrigation

Majority of irrigated land of sample farmers is found in Repalle mandal with 50.50 acres (24.2%) and followed by Chilakaluripeta mandal with 41 acres (19.6%) and Bellamkonda mandal with 33.75 acres (16.14%).

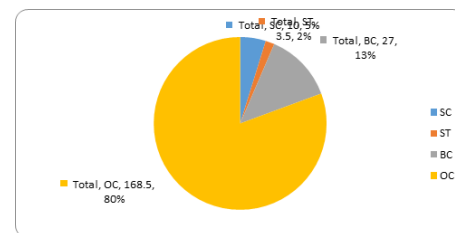
The lowest canal irrigated among the sample mandals is noticed in Rentachintala mandal with 21 acres (10.05%). Repalle, Chilakaluripeta and Bellamkonda mandals have represented more land under canal irrigation because Repalle mandal which is located in the coastal belt and comes under west canal of Prakasam barrage famously known as Krishna water development area. In the district important canal command area is under Nagarjuna Sagar right canal command area and 90% of the mandal irrigated by this canal irrigation system.

The third highest canal irrigated sample mandal is located central Northernmost part of the district which also comes under Nagarjuna Sagar right canal command irrigation system and Guntur canal command area which is a part of Krishna water development system. The sample mandal Rentachintala is located in the Northwestern part of the district and this mandal is located in an upland area which not included under Nagarjuna Sagar right canal command area, hence most of the mandal depends on well and tank irrigation.

Guntur district, in general, has been benefiting by the three irrigation systems v.i.z., (1). Nagarjuna Sagar right canal

Table 5. Sample Farmers Agricultural Land under canal Irrigation Source wise (Acres)

S.No	Name of the mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	03	01	10	36.5	50.5
2	Bellamkonda	1.5	0.25	04	28	33.75
3	Sattenapalli	02	1.25	3.5	31	37.75
4	Chilakaluripeta	3.5	01	6.5	30	41
5	Veldurthy	00	00	01	24	25
6	Rentachintala	00	00	02	19	21
	Total	10	3.5	27	168.5	209
	%	4.8	1.7	13.7	80.6	100

**Fig. 4.** Sample Farmers total Agricultural Land under canal Irrigation (Acres)

command irrigation system (2). Krishna water development irrigation system (Prakasam barrage right canal) and (3). Guntur canal command area which is having source from Prakasam barrage. However, some mandals are also have been practising surface and tube well irrigation and tank irrigation. As per the farmer's perception, in recent days usage of tube well irrigation got familiarized due to recent technology in construction of tube wells and potentiality of underground water in the river Krishna basin and other sub-streams.

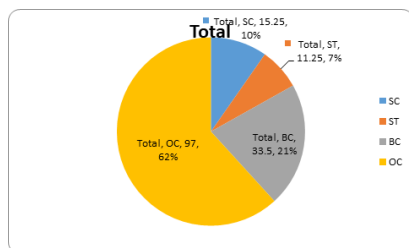
Sample farmer's agricultural land under tank irrigation (acres)

The total irrigation land of sample farmers under tank irrigation is 157 acres. Tank irrigation is practising in all the sample mandals. Among the sample mandals, Chilakaluripeta mandal stood first position with 42 acres (26.75%) followed by people Repalle and Rentachintala mandal with 32.5 acres (20.7%) and 24 acres (15.29%) respectively. In the sample mandals Veldurthy mandal has noticed with lowest agricultural land under tank irrigation with 14.5 acres (9.24%)

As per historical evidence of Guntur district tank irrigation has been continuing as irrigation source in the earlier days the importance of tank irrigation was noticed in all sides of the district. In course of time, the construction of Nagarjuna Sagar dam and Prakasam barrages canal irrigation occupied first position in majority of the mandals, however, still good number of mandals are having source of irrigation from tanks.

Table 6. Sample farmers' agricultural land under tank irrigation (acres)

S.No.	Name of the mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	4.50	2.5	5.5	20	32.5
2	Bellamkonda	0.75	0.75	6.5	13	21
3	Sattenapalli	1.50	2.0	4.5	15	23
4	Chilakaluripeta	6.00	5.0	10.0	21	42
5	Veldurthy	0.0	1.0	1.50	12	14.5
6	Rentachintala	2.50	0.0	5.50	16	24
	Total	15.25	11.25	33.5	97	157
	%	9.70	7.20	21.3	61.7	100

**Fig. 5.** Sample farmers' total agricultural land under tank irrigation (acres)

Chilakaluripeta mandal and Repalle mandals are located in canal command areas famously known as Nagarjuna Sagar right canal command area and Krishna water development command area. So whenever adequate rainfall and rain failure occurs the tanks were filled with the source of canal commands.

Due to its physiographic structure, the majority of Rentachintala mandal does not cover under canal irrigation system. Therefore tank irrigation has been continuing as one important source of irrigation in Rentachintala mandal.

Veldurthy mandal is located in the head of Nagarjuna Sagar right canal command area, hence one part of the Veldurthy mandal is under canal irrigation and the rest of the agricultural area comes under the tank and other irrigation systems. That is how this mandal is noticed with lowest tank irrigated area among the sample farmers.

Sample farmers' agricultural land under surface well irrigation (acres)

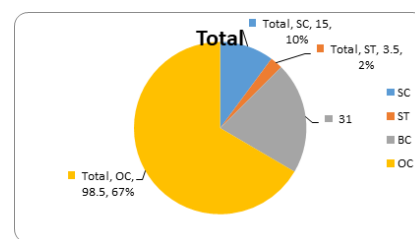
Guntur district is known for good rains all along the south-west monsoon period moreover the district also picks up a considerable amount of rainfall from Northeast monsoons, hence since older days i.e., before the construction of Nagarjuna Sagar dam and Prakasam barrage canal command systems surface wells used to contribute major role in the district irrigation system along with tank irrigation.

In surface tank irrigation the sample mandal Chilakaluripeta ranked the first position with 35.5 acres (23.98%), whereas Sattenapalli ranked second position with minute difference of 0.5 acres, with total 35 acres of land (23.64%) followed by Repalle mandal with 29 acres (19.59%) of land. In olden days due to good amount of rains and presently developed canal irrigation, canal areas the underground potentiality has enormously increased. In these circumstances still surface wells are existing in the sample mandal.

The lowest irrigated land under surface wells is noticed in Veldurthy mandal with 8.5 acres (5.74%). The physiographic structure of the underground and underground water potential is responsible for low irrigation area under surface wells. It is a general trend has been observed in majority sample villages that surface well irrigation becoming lesser due to the construction of tube wells into deeper and deeper depths.

Table 7. Sample farmers' agricultural land under surface well irrigation (acres)

S.No	Name of the Mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	4.5	1	5.5	18	29
2	Bellamkonda	2	0.5	7	14	23.5
3	Sattenapalli	4.5	1	9.5	20	35
4	Chilakaluripeta	3	1	4.5	27	35.5
5	Veldurthy	1	0	0	7.5	8.5
6	Rentachintala	0	0	4.5	12	16.5
	Total	15	3.5	31	98.5	148
	%	10.1	2.4	21	66.6	100

**Fig. 6.** Sample farmers' agricultural land under surface well irrigation (acres)

Sample farmer's agricultural land under tube well irrigation

Sample farmers' agricultural land beneath tube well irrigation. In modern days due to development of technology and availability of financial resources. The construction of tube wells became easy and popular. In one-way tube, well irrigation is resulting overexploitation of underground water resources and causing for depletion of underground water table.

However, tube well irrigation becomes fashion and novelty in irrigating agricultural land. In sample mandals Chilakaluripeta mandal stood first rank with 36 acres (25.31%) followed by Repalle and Rentachintala mandals with 32.5 acres (22.84%) and 24 acres (16.87%) respectively.

It is noticed that the mandals which have dominated in canal irrigation and high intensity of rainfall are sources for the tube well irrigation because underground researchers have been made with canal networks and internal streams with rainwater.

Veldurthy mandal ranked lowest position among the sample mandals with 11 acres (7.73%). Some majority of agriculture land is depending on canal irrigation. This mandal ranks last position under tube well irrigation.

Table 8. Sample farmer's agricultural land under tube well irrigation (acres)

S.No	Name of the mandal	Social category				Total
		SC	ST	BC	OC	
1	Repalle	4.5	2.5	5.5	20	32.5
2	Bellamkonda	1.25	0	3.5	12	16.75
3	Sattenapalli	1.5	01	4.5	15	22
4	Chilakaluripeta	4.5	1.5	04	26	36
5	Veldurthy	01	00	01	09	11
6	Rentachintala	01	01	02	20	24
	Total	13.75	6	20.5	102	142.25
	%	16.2	4	13.4	66.4	100

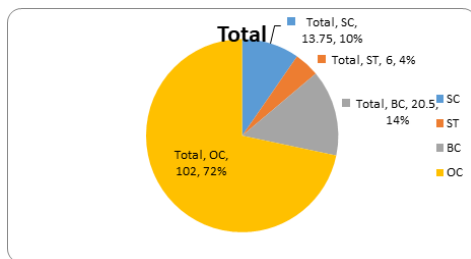


Fig. 7. Sample farmer's agricultural land under tube well irrigation (acres)

However, the farmers to be aware of the judicious consumption of irrigation water, practising crop rotation cultivation of more area with less amount of water by adopting micro-irrigation techniques as a part of sustainable irrigation practices.

Sample farmers' agricultural land under rain fed cultivation (in acres)

Guntur district is basically a coastal district and in general, receives good amount of rainfall. In olden days i.e., before

construction of Nagarjuna Sagar dam and Prakasam barrage and canal command areas, majority farmers used to depend on surface well irrigation, tank irrigation, and onset of monsoons, but after the construction of the above-mentioned dams and irrigation canal systems. The scenario of the district agriculture has been undergone revolutionary changes. Henceforth majority mandals of the district comes under the canal irrigation system. It is estimated that around 90%–95% of the district agriculture is under canal irrigation. However some mandals due to their physiographic structure and disconnection to canal irrigation system and topography of the agricultural lands are compiling to depend on rain-fed crop cultivation.

It is interesting to note that out of six sample study mandals only three mandals are noticed with rain-fed depended agriculture. They are Veldurthy mandal with 78.5 acres of land. In this mandal out of total sample agricultural land, 58.3% of the land is noticed under rainfed and 41.64% under different irrigation sources. Moreover out of the total samples 55, 43 sample farmers (78.18%) are practising rain fed agriculture.

Rentachintala mandal with 62.75 acres of sample agricultural land stood the second position which equivalent 42.23% is remaining 56.67% of agricultural land is having different irrigation sources. In this mandal 27 sample farmers are practising rain fed agriculture. Another sample mandal v.i.z., Bellamkonda is also representing rain-fed agriculture with 9.25 acres of sample agricultural land (8.87%) because Bellamkonda mandal has considerable amounts of land under different irrigation sources.

In sample study mandals v.i.z., Repalle, Sattenapalli, Chilakaluripeta, are identified with no agricultural land under rainfed cultivation because these mandals are well connected with canal command system sourced from Nagarjuna Sagar dam, Prakasam barrage and internal minor streams like Gundlakamma, Naguleru etc.,

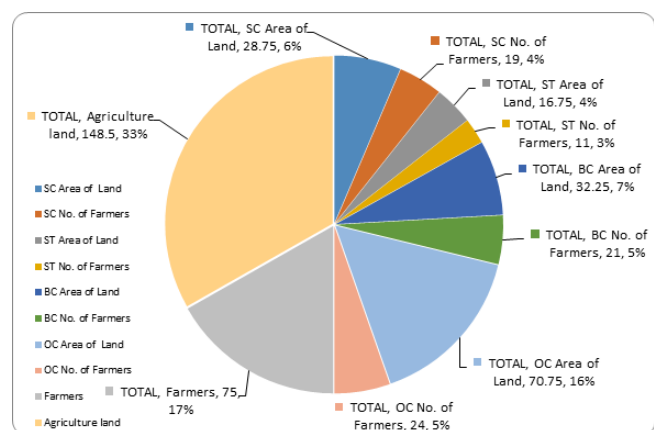


Fig. 8. Sample farmers' agricultural land under rain fed cultivation (in acres)

Table 9. Sample farmers agricultural land under rain fed cultivation (in acres)

S. No	Mandal	SC			ST			BC			OC			Farmers		Agriculture land
		Area of Land	No. of Farmers	Area of Land	No. of Farmers	Area of Land	No. of Farmers	Area of Land	No. of Farmers	Area of Land	No. of Farmers	Area of Land	No. of Farmers	No. of Farmers	of Farmers	
1	Repalle	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
2	Bellamkonda	1.25	02	01	01	00	00	00	00	05	02	05	05	05	02	9.25
3	Sattenapalli	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
4	Chilakaluripet	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
5	Veldurthy	14.5	10	07	05	22.5	14	07	14	34.5	14	34.5	34.5	43	14	78.5
6	Rentachintala	13	07	8.75	05	9.75	07	9.75	07	31.25	08	31.25	31.25	27	08	62.75
	Total	28.75	19	16.75	11	32.25	21	32.25	21	70.75	24	70.75	70.75	75	24	148.5

Conclusion

From the above we can clearly conclude that even after 70 years of independent India, still socio-economic differences persisting and besides Government, people and NGOs should actively involve achieving the most ambitious constitutional goals. In the agricultural sector, the climate change effects in terms of lower yield from crops, increased food prices, changes in food patterns and depleting livestock can have repercussions such as reduced calories intake for women and girl child, higher food insecurity and less milk/nutrition for children, and like. Similarly, degradation of forests may lead to fuel problems of tribal and poor, less income to the district, loss of eco-tourism opportunities, etc. Furthermore, land distribution disparities would impact on water resources is simply a threatened for human existence. These issues have the potential to disrupt the sustainable growth strategy and intensify the poverty in the district. Thus, it is essential that the private sector units, civil society and government should work together to improve environmental performance while pursuing goals of economic development in the state. This would foster a carbon-conscious and climate resilient development path in the district.

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