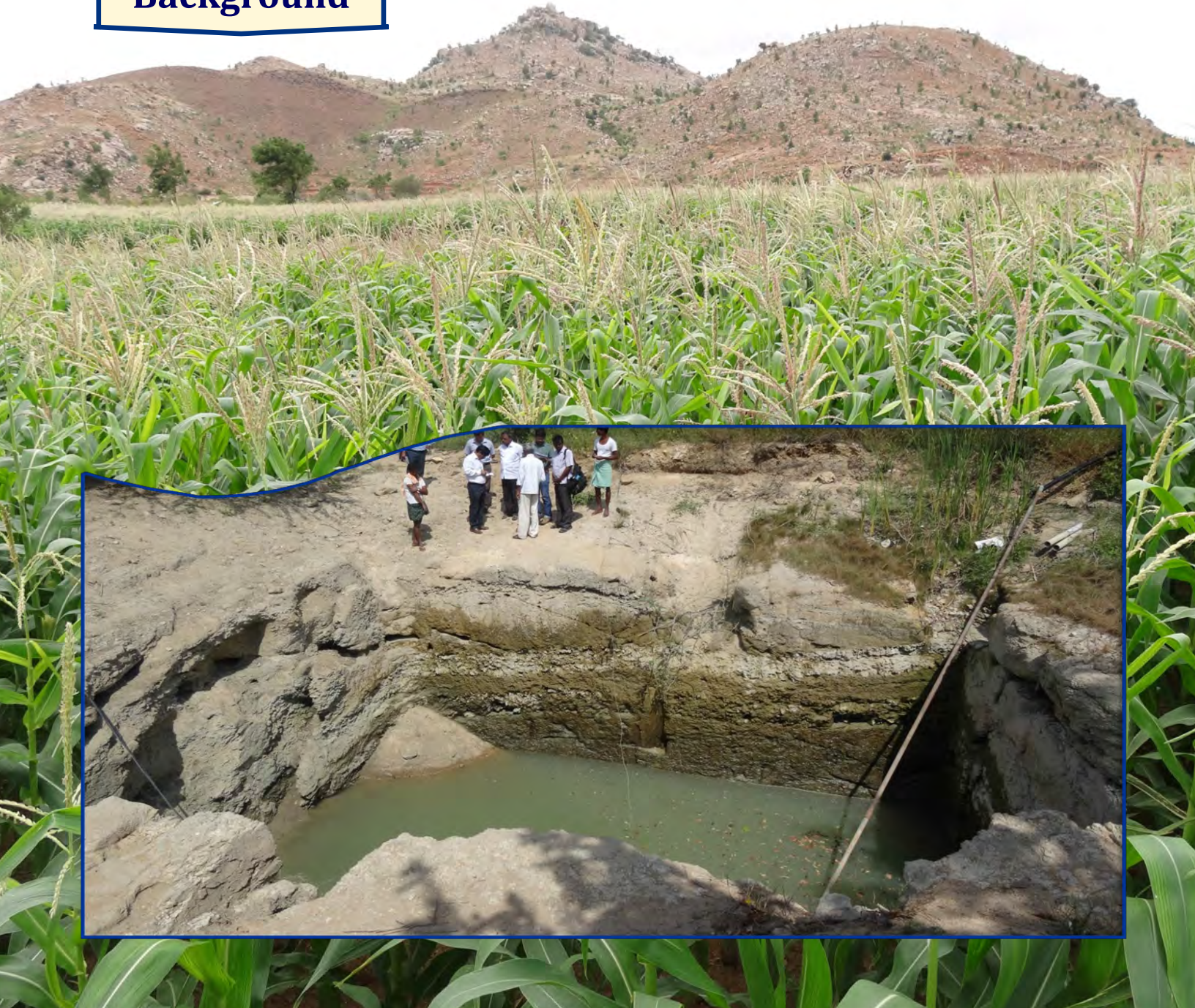


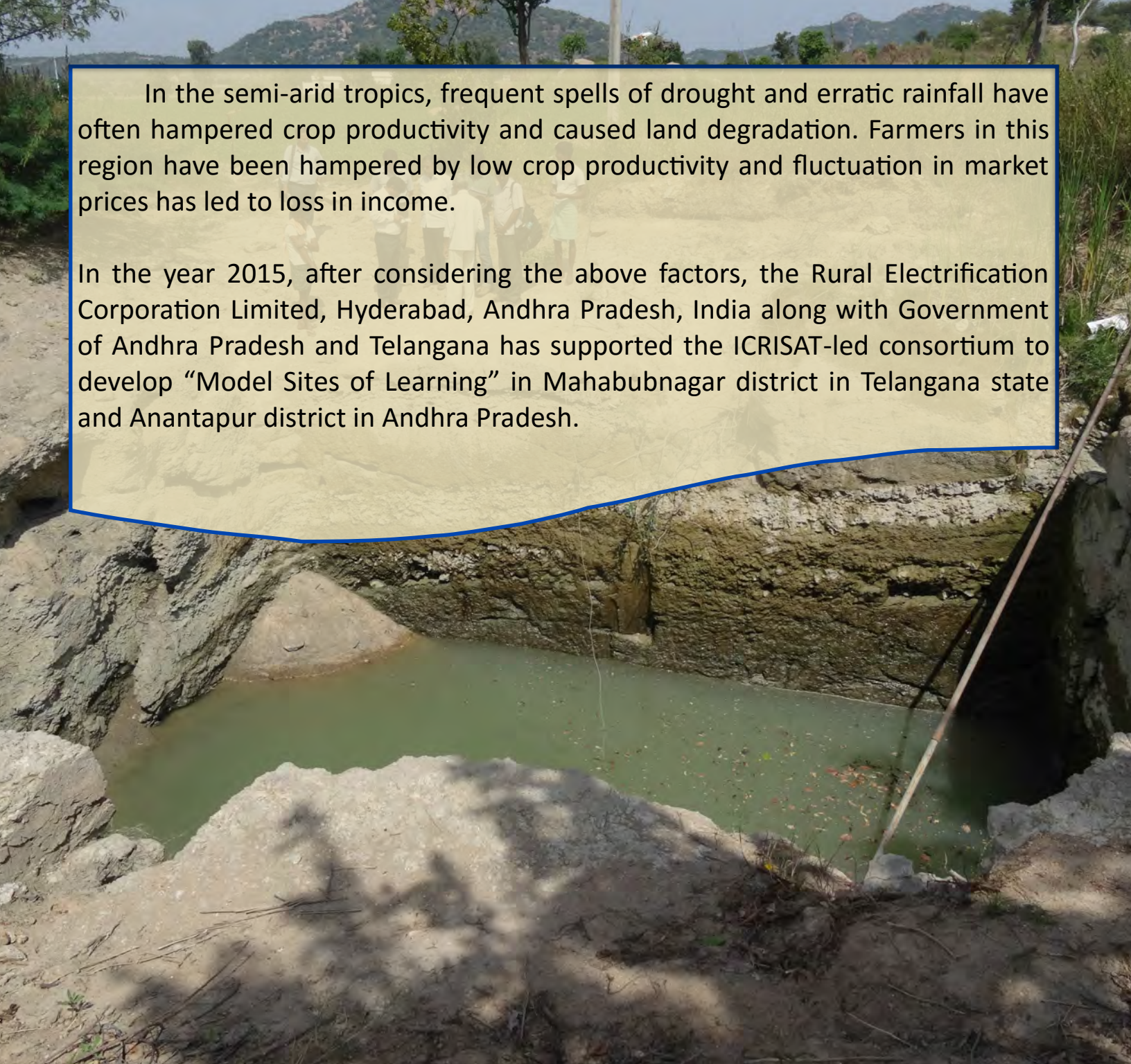
RECL-ICRISAT Watershed

Farmer-centric Integrated Watershed Management for Improving Rural Livelihoods in Anantapur, Andhra Pradesh and Mahabubnagar, Telangana



Background





In the semi-arid tropics, frequent spells of drought and erratic rainfall have often hampered crop productivity and caused land degradation. Farmers in this region have been hampered by low crop productivity and fluctuation in market prices has led to loss in income.

In the year 2015, after considering the above factors, the Rural Electrification Corporation Limited, Hyderabad, Andhra Pradesh, India along with Government of Andhra Pradesh and Telangana has supported the ICRISAT-led consortium to develop “Model Sites of Learning” in Mahabubnagar district in Telangana state and Anantapur district in Andhra Pradesh.

Anantapur district profile

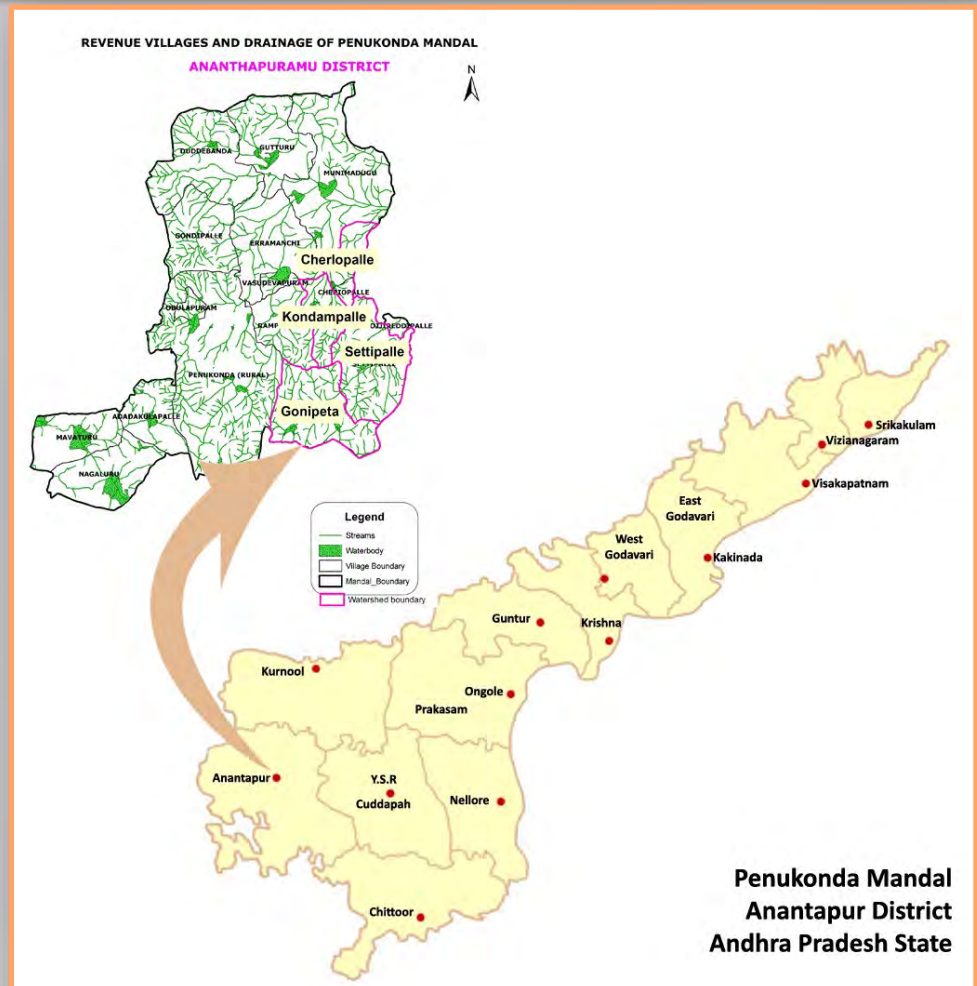
Anantapur is the southern-most district of the Rayalaseema region of Andhra Pradesh. The district lies between the coordinates 13° 40' to 15° 15'N latitude and 76° 50' to 78° 30'E longitude.

While agriculture remains the most important economic activity of the district, it has also been affected by high levels of instability and uncertainty. Being located in the rain-shadow region of Andhra Pradesh, the district is drought-prone and with an annual rainfall of 536 mm.

The district has a total geographical area of 19.13 lakh hectare. For administrative purposes, the district is divided into three revenue divisions, namely, Anantapur, Dharmavaram, and Penukonda; there are sixty-three revenue mandals. Anantapur district has a total geographical area of 19,13,000 ha with nearly 13% of the district's area under forests. The gross cropped area is 11,36,000 ha, and the net sown area accounts for 69.6% of the total geographical area. The district has a cropping intensity of 106%. Only 10.5% of the area is under non-agricultural use while permanent pastures constitute 2.2%. The district has the highest per capita cultivated land (0.29 ha). The district has a population of 36,40,478 with 5,89,465 rural households.

It has only 10% of area under irrigation with groundnut occupying maximum area under rainfed condition accounting for over 75% of the cropped area. Other important crops are sunflower (6.4%), greengram (4.9%), pigeonpea (3.6%), rice (3.4%) and sorghum (2.2%). The productivity of the major crops is less than half a tonne per hectare reflecting the harsh production environment in the district.

The district had over 21,000 ha under horticulture in 2000-01, which has increased to nearly 48,000 ha in 2005-06 with its share growing from 4.3% to 6.8% of the total area under horticulture in the state. Area under vegetables has marginally declined.



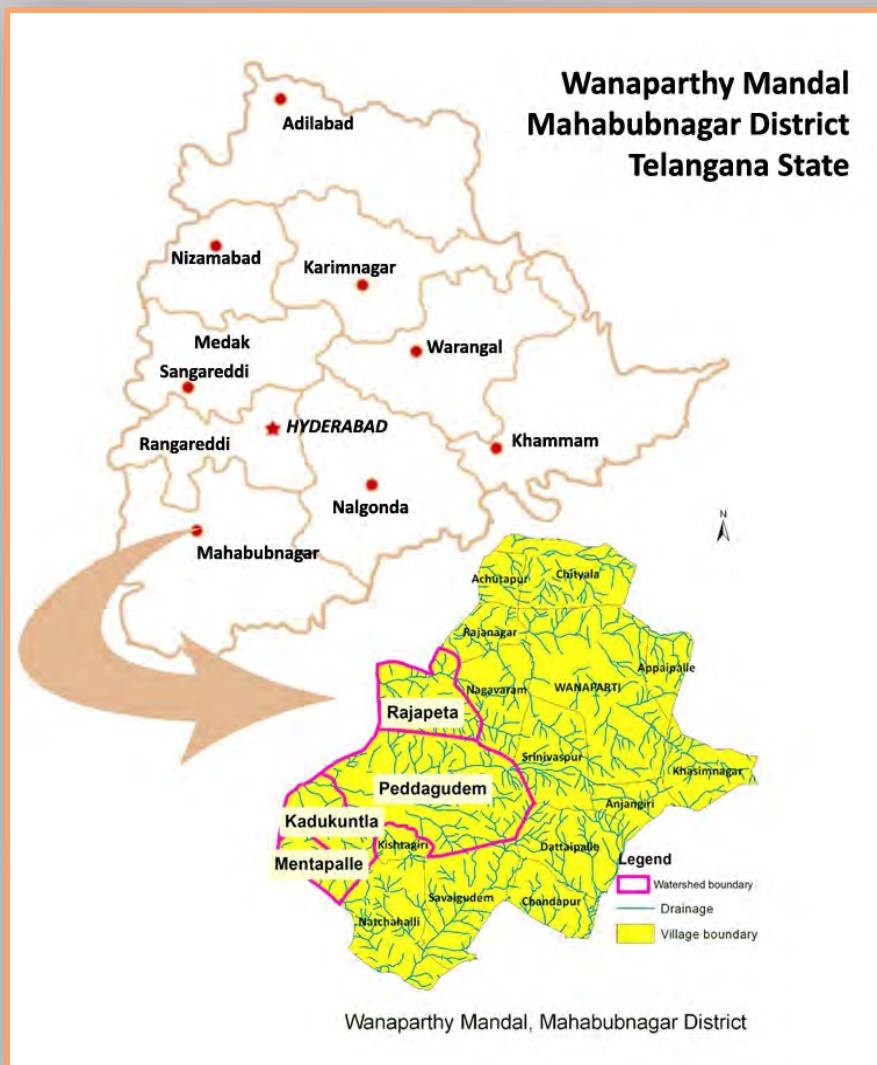
Mahabubnagar district profile

Mahabubnagar is the largest district in Telangana in terms of area (18432.00 sq. km) covered. It is also known as Palamoor. The district is situated between the coordinates 77° 15' to 79° 15'E, of the eastern longitudes and 15° 55' to 17° 20'N, of northern latitudes.

Mahabubnagar occupies 18,47,000 ha with nearly 17% of the area under forests. While gross cropped area is 7,37,000 ha, a little over 44% account for net sown area with a cropping intensity of 108%. About 5% of the area is under non-agricultural use while permanent pastures constitute 2%. The current fallows in the district account for 34.4%. The district has a population of 35,13,934 and over 40 people per every 100 of the villagers are literate and this literacy rate is the lowest. As much as 73.2% of the population is engaged under agricultural activities. The district also has the highest number of cattle (7,03,754). The district boasts of the highest number of sheep / goats (7,73,222).

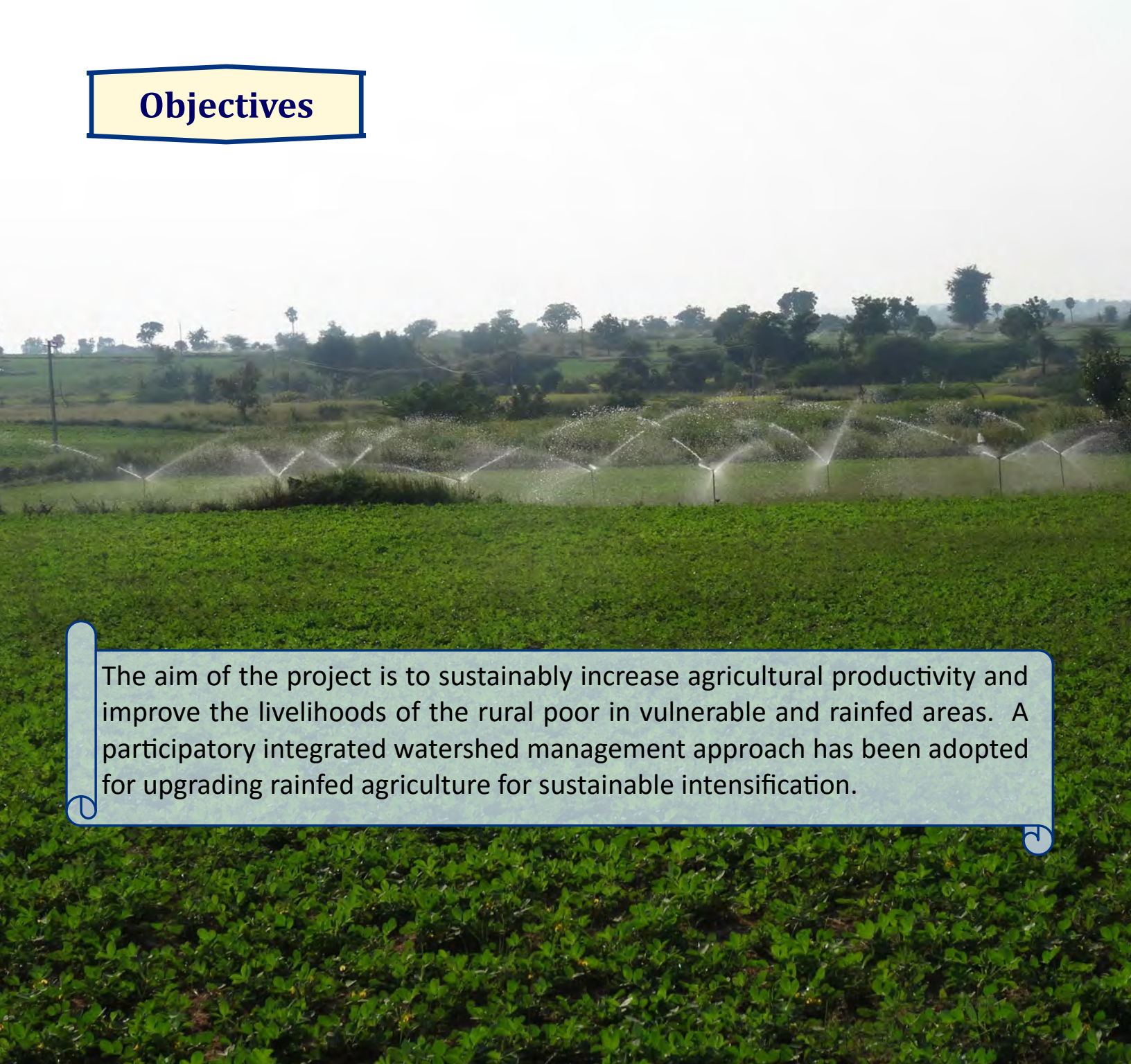
Mahabubnagar district receives 749 mm rainfall annually with the highest drought frequency. The district has one of the lowest share of irrigated area (19%) next only to Anantapur and Adilabad. However, sorghum and groundnut have lost area to maize, castor, rice, pigeonpea and greengram since the year 1995.

Despite this, sorghum constitutes 17% of the area under cropping in the district. All the three major crops are giving a productivity of less than a tonne per ha, somewhat higher than those obtained in Anantapur, another drier district in the state. Area under horticulture crops in this district has increased nearly 4 times to 24,988 ha in 2005-06 over a period of 5 years. Also, area under vegetables has seen a slight increase.



The district had the lowest annual growth (26%) of agricultural advances for the last two decades. The district has 20 APMCs with a network of 2.7 APMCs for every lakh ha of net sown area.

Objectives



The aim of the project is to sustainably increase agricultural productivity and improve the livelihoods of the rural poor in vulnerable and rainfed areas. A participatory integrated watershed management approach has been adopted for upgrading rainfed agriculture for sustainable intensification.

Consortium Partners

- Rural Electrification Corporation Limited, Andhra Pradesh and Telangana
- Government of Andhra Pradesh and Telangana state and line departments
- KVK in the state
- ICRISAT, Patancheru, Telangana
- Local NGO: A local NGO is engaged along with ICRISAT staff for social mobilization on ground implementation of works.
- Community based organizations (Watershed committee, Self Help Groups, farmers of project villages, etc.)



Project site description

- ◆ The REC-ICRISAT watershed project implemented in Penukonda Mandal of Anantapur district in Andhra Pradesh covers four villages (Kondampalle, Gonipeta, Settipalle and Cherlopalle) with a total geographical area of 6,811 ha, including 3,150 ha of area under cultivation and covers 1480 households with a population of 8700 members.
- ◆ The important crops cultivated are groundnut, maize, paddy, finger millet and sunflower.
- ◆ In Wanaparthy district (formerly Mahabubnagar district) of Telangana, the project is working in the four villages of Rajapet, Kadakuntla, Peddagudem, and Mentapalle with a total geographical area of 5401 ha and includes 3968 ha of area under cultivation, it covers 2285 households and has a population of 11726 members.
- ◆ The baseline analysis showed lower crop yields, and identified good potential for improvement in productivity and livelihoods.





Salient features

The salient features included forming a consortium approach to help undertake science-led interventions in order to benefit farmers, convergence, farmers participation, monitoring mechanism, holistic development, capacity building and knowledge-based entry point activity to build rapport with the community.

The action plan includes:

- ◆ Soil and water conservation activities.
- ◆ Soil health mapping and use of micronutrients.
- ◆ Productivity enhancement through crop demonstrations and use of improved cultivars.
- ◆ Horticulture development
- ◆ Afforestation
- ◆ Livelihood development
- ◆ Income-generating activities
- ◆ Capacity building



ICRISAT
Science with a human face

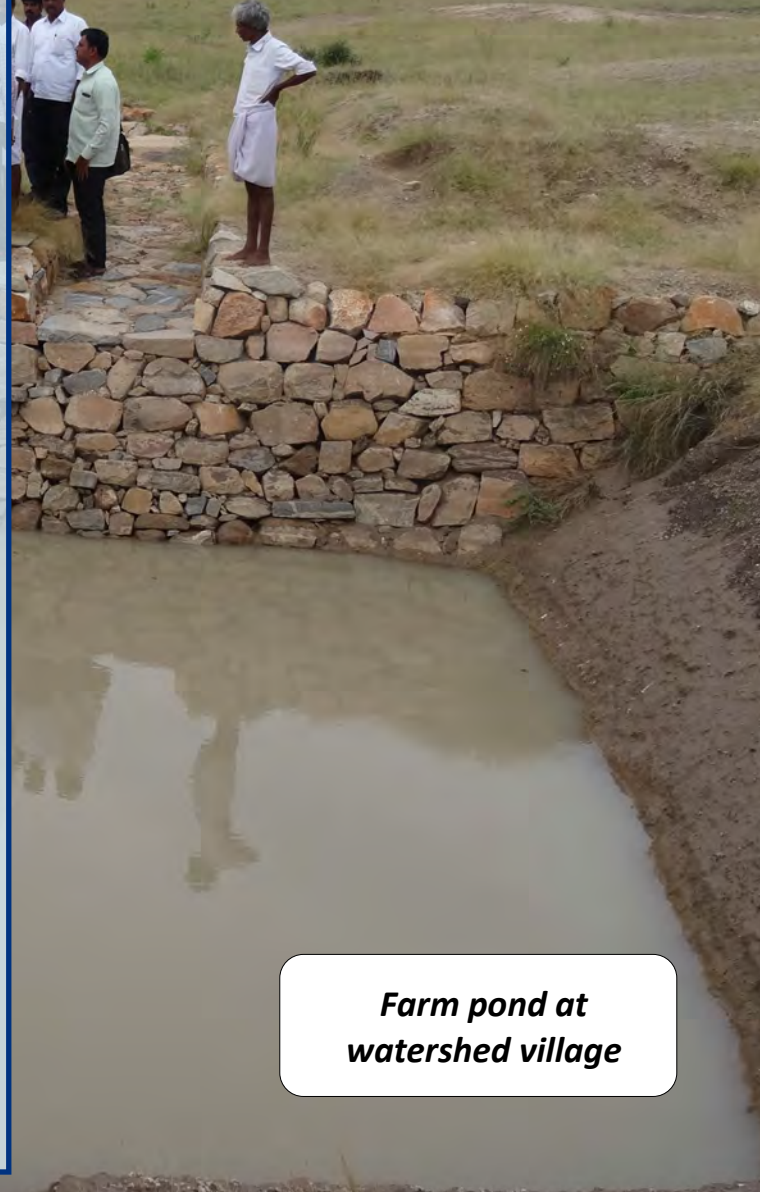
ICRISAT కొండ్ంపల్లి వాటర్ షెడ్ ఆర్.కే.సి. REC
Science with a human face Indian Energy Regulatory Commission

గ్రామం: గోనపేట
పని వివరములు: చెక్ డ్యామ్

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Soil and Water conservation interventions

- ◆ In Anantapur, rainwater harvesting and groundwater recharging structures constructed have created a net storage capacity of 35600 m³ resulting in total conservation of about 70000 m³ of surface runoff water in 2-3 fillings.
- ◆ In the Wanaparthy watershed, a net storage capacity of 39900 m³ resulted in total conservation of about 99500 m³ of surface runoff water in 2-3 fillings.
- ◆ The rainwater harvested has helped in providing supplemental irrigation in critical crop growth stage during extended dry spell also helpful in recharging groundwater, while reducing soil loss.
- ◆ Soil and water conservation interventions such as field bunds, farm ponds, check dams and percolation tanks have reduced runoff by 50% and soil loss significantly.



Farm pond at watershed village



Check dam at Peddagudem; Farm pond at Kondampalle and Rajapet on Tirumala Devuni vagu

Table 1. Soil and water conservation works in Anantapur and Wanaparthy districts

Sl. No.	Works	Anantapur	Wanaparthy
		Quantity (nos.)	
1	Farm ponds	50	80
2	Check dams	12	17
3	Rock filled dams	172	62
4	Sunken pits	21	2
5	Bore well recharge pits	19	28
7	Dug well recharge pits	27	39
6	Farm pond with plastic lining and drip	4	1

***In-situ* moisture conservation**

Also the use of *Broad Bed and Furrow (BBF)* system has resulted in 22% increase in groundnut yields compared with farmers practice in Wanaparthy district, while the border strip system in Anantapur has also been found beneficial in terms of moisture conservation and increased yield by 28% over conventional flat cultivation.





Soil health mapping: An entry point activity

- ◆ To assess the soil fertility status and to help develop a soil health based fertilizer recommendation, stratified geo-referenced soil samples were collected from watershed sites in Anantapur (220 samples) and Wanaparthy (210 samples) districts.
- ◆ The analysis results showed widespread deficiencies of secondary and micronutrients like Sulphur, Boron, Zinc along with macro nutrients and low levels of soil carbon.
- ◆ In Anantapur watershed, the fields were found deficient in 69% for Phosphorus, 15% for Potassium, 77% for Sulphur, 94% for Zinc, 77% for Boron along with low soil carbon level in 87% farmer fields.
- ◆ Similarly, in Wanaparthy watershed, the deficiencies were 13% for Phosphorus, 6% for Potassium, 64% for Sulphur, 69% for Zinc, 63% for Boron along with low carbon levels in 83% of the fields.
- ◆ Based on soil analysis results, soil test-based fertilizer recommendations are developed at village level and are promoted in RECL sites.
- ◆ The participatory trials/demonstrations w.r.t. soil test-based fertilizer application showed 25-27% yield benefit in crops like groundnut and paddy in Anantapur watershed.
- ◆ Similarly, the yield benefit ranged between 14-22% in groundnut crop in Wanaparthy watershed.



Crop productivity enhancement

- ◆ Farmer participatory trials (295 farmers with one ha each) were conducted to evaluate improved crop management practices including soil test-based fertilizer recommendations, improved cultivars such as ICGV 91114/350/351 in groundnut and ICPH 2740 and ICPL 87119 in pigeonpea and *in-situ* moisture conservation practices.
- ◆ The results showed productivity improvement by 25% in groundnut, 27% in pigeonpea and 21% in paddy.
- ◆ The additional economic benefit was ₹ 2515500 in 2.5 years of the project and has benefitted 295 farmers in Wanaparthy district.
- ◆ While in case of Anantapur district, groundnut was the major crop and the additional economic benefit in 2.5 years was ₹ 3200000 and has benefitted 250 farmers.



Distribution of micronutrients to farmer



Table 2. Crop yields (t/ha) in improved practice, REC-ICRISAT watershed, Wanaparthy and Anantapur district 2016-17.

Crop in Wanaparthy district	Improved Practice (IP)	Farmers Practice (FP)	% increase in IP
Castor	1.20	1.03	17
Pigeonpea	0.98	0.77	27
Groundnut	1.91	1.52	25
Paddy	5.91	4.88	21
Crop in Anantapur district	Improved Practice (IP)	Farmers Practice (FP)	% increase in IP
Groundnut	1.85	1.55	19.4
Paddy	2.85	2.55	11.8
Maize	4.35	3.86	12.7

Table 3. Average % increase due to improved practice, additional yield gain in kg per ha and additional economic gain in ₹ per ha

Crop in Wanaparthy district	Average % increase in improved practice over farmers practice	Additional yield gain (kg/ha)	Additional economic gain ₹/ha
Groundnut	27	200	6400
Pigeonpea	50	500	20000
Paddy	25	430	4300
Crop in Anantapur district	Average % increase in improved practice over farmers practice	Additional yield gain (kg/ha)	Additional economic gain ₹/ha
Groundnut	24	400	12800





Effect of micronutrients on groundnut crop in Gonipeta village

Horticulture, afforestation and fodder promotion

- ◆ 550 households were provided with 600 fruit tree saplings to grow in their backyards, which will improve general home nutrition
- ◆ Vegetable cultivation has been taken up by 88 small and marginal farmers in 38 acres in four villages of Wanaparthy watershed.
- ◆ 5,600 different fruit plants of in 48 ha in Penukonda watershed covering 150 families benefitted from horticulture development activity.
- ◆ Activities such as avenue plantation, raising nursery with forest plants, home gardening and planting of forest tree species such as teak, red sandal and *Glyricidia* (20000 plants) by farmers in project villages on the field bunds and wasteland.
- ◆ Also, fodder promotion is a targeted activity in the watershed villages. The variety sorghum CSH 24 MF has been promoted in the watershed villages.



Horticulture development activities in REC-ICRISAT watersheds



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పనిపేరు : చర్ల మొక్కల
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మొక్కల సంఖ్య : 25,000/-
ఆర్థిక సహాయం : REC
గ్రామీణ విద్యుచ్ఛీకరణ కార్పొరేషన్
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పి.వి.ఎ. సమితి,
పెనుకొండ
ICRISAT సొబన్‌తో



**Avenue plantation
REC-ICRISAT
watershed**



**Nursery in FREC-ICRISAT
watershed**

Income-generating activities

Various income-generating activities such as sheep rearing, improving the local goat breeds through crossbreeding with Sirohi goats, vermicomposting, nursery and home gardening were taken up.

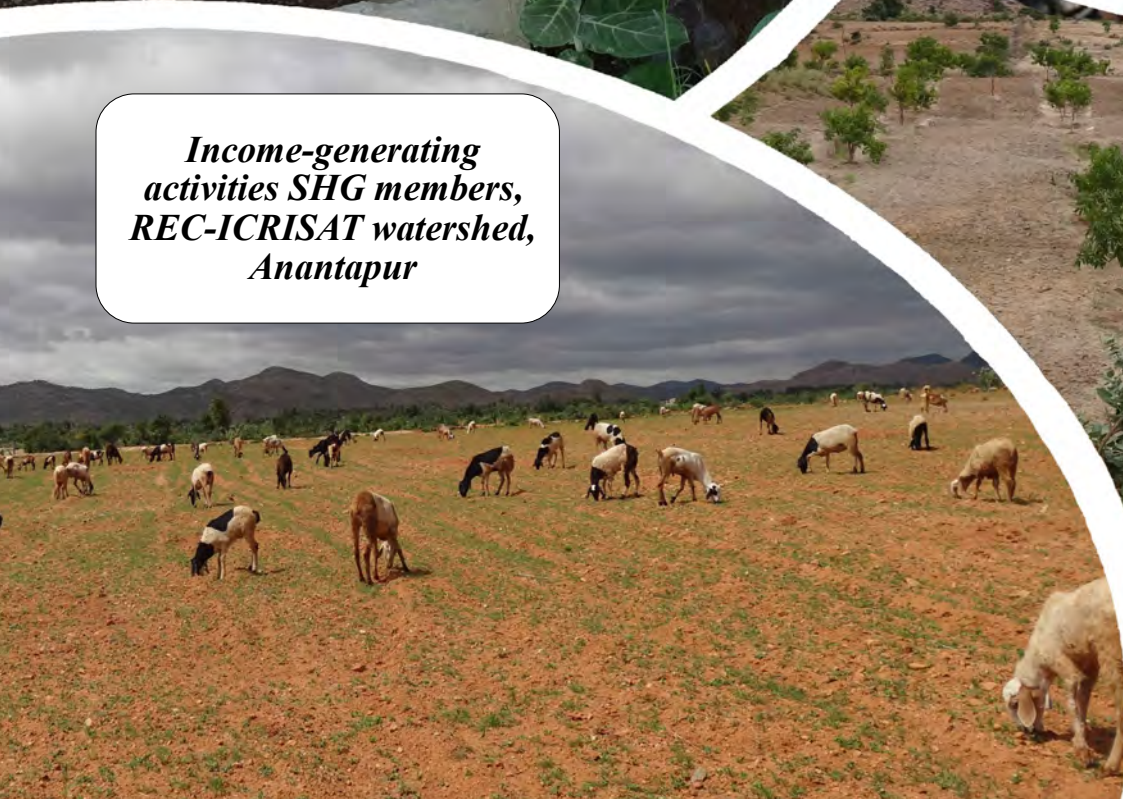
- ◆ Vermicomposting activities taken up by 20 persons raised a net income of ₹1000 – ₹1200 per month.
- ◆ Also, promotion of vegetable cultivation in the backyard or small area in the field has helped in improving nutrition leading to better/balanced food consumption.

Goat rearing by SHG women in Mentepally village and Sirohi bucks for breed improvement at Rajapeta village under livestock development activities, Wanaparthy watershed.





*Income-generating
activities SHG members,
REC-ICRISAT watershed,
Anantapur*



Women empowerment



రోజుకో రూపాయి కూడబెట్టుకో -
నీ కష్టాలు పక్కకు నెట్టుకో.
ఇక్కినాడ - ఆర్.ఎస్. సైబరాబాద్
సమత - పవకొండ
కొంపవలె, వాటికొండ



- ◆ A total of 215 Self Help Group (SHG) women have benefitted from various watershed activities.
- ◆ Also, 120 SHG members raised a monthly income from ram lambs rearing of ₹2400 – ₹2800, petty shops run by 173 members generated a net income of ₹2000 – ₹3000 per month, tailoring by 2 members raised a net income of ₹4000 – ₹5000 per month.

Improving nutrition



With an objective to improve family nutrition and mainstreaming of women farmers, nutri-kitchen gardens are promoted as women-centered activity in the backyards or in small pieces of land.

The farmers are trained in good management practices and about 1000 farmers were provided with inputs like seeds of vegetable crops with tomato, brinjal, cluster bean, okra, bitter gourd and leafy vegetables to cultivate in the backyard in an area of 5-6 m² in both the watersheds (Anantapur and Wanaparthy). It has helped with household consumption and excess can be sold in the market. In addition to this four fruit plants to 700 households were provided to plant in the backyard as a source to help improve diet and nutrition.



***Vegetable cultivation
in REC-ICRISAT
watershed villages***



Capacity Building/ Awareness Creating Activities

Various methods for capacity development such as exposure visits, hands-on training, demonstrations, leadership skill development, talking skills in addition to various watershed activities will be undertaken.





Success Stories

Dugout pond helps revive tank and protect paddy crop in Kondampalle Village in Anantapur district

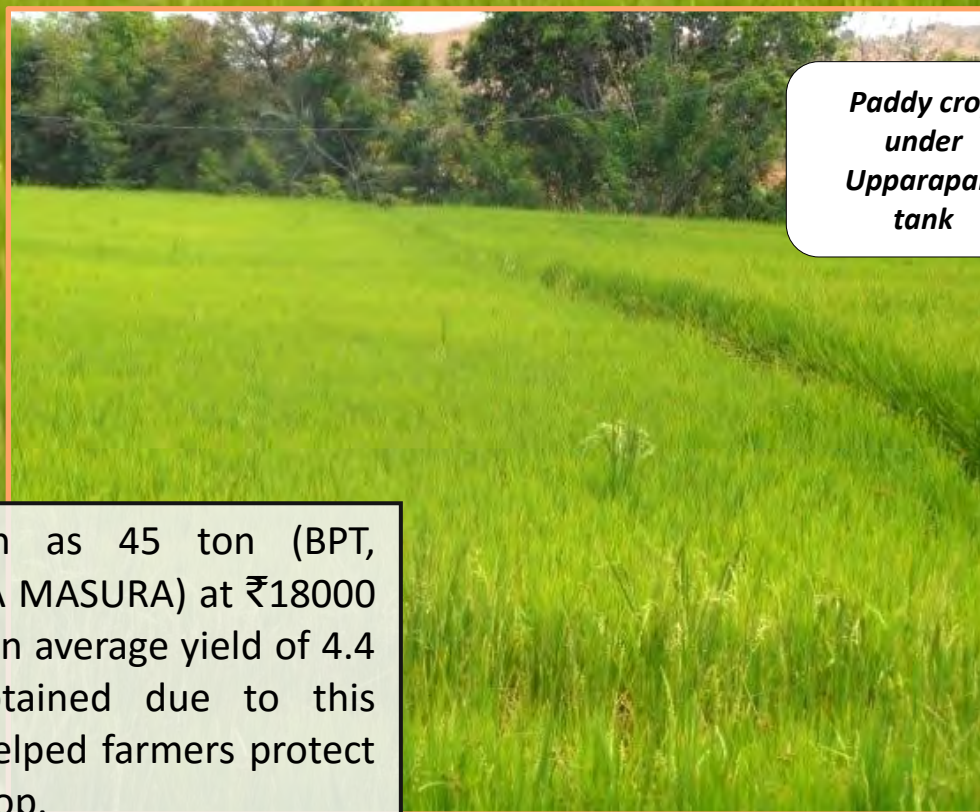
The REC watershed project has helped the village of Gonipeta in Anantapur district to sustain its paddy crop in the drought year of 2016-17. In this village most of the farmers are growing paddy by using a village tank and other irrigation facilities. The tank had become dry due to lack of rainfall and farmers were unable to supply water to the crop at critical stages of growth. It was then decided to construct a dugout pond and the residents of the village requested watershed committee, SAMATHA NGO and ICRISAT to dig out a pond and provide a supply channel to the sluice of the tank.



Farm pond and supply channel in Upparapalle tank

After this intervention, farmers from Gonipeta protected 10 ha of Paddy in Kharif 2016-17 with this intervention 42 farming families are benefited and they are mainly small and marginal farmers.

The technical team visited the site and helped dig a pond (12x12x1 ½) and 320 m supply channel to sluice of the tank. This was done by the committee with the support of the concerned families, for this activity committee spent ₹48,800 only.



*Paddy crop
under
Upparapalli
tank*

As much as 45 ton (BPT, HAMSA, SONA MASURA) at ₹18000 per ton with an average yield of 4.4 t/ha was obtained due to this activity and helped farmers protect their paddy crop.

Water harvesting structure recharges bore well and helps farmer repay loan

A farm pond was constructed in the field of Mr P Hanumantha Naik, a scheduled tribe smallholder farmer from Kondampalle village. He had a bore well in his 0.80 ha of farm, which was supporting 0.20 ha of land for irrigation before the farm pond construction in his field. After the construction of farm pond on the upstream side of bore well, it had a tremendous influence in recharging the water table of the bore well.

Now the farmer has installed a solar pump of 5 hp with the financial support from Rural Development Trust (RDT) and is able to irrigate 0.80 ha of land consisting of groundnut crop. Now he is planning to grow vegetable crops too.



The farmer is very happy and he says that with the additional income from the 0.80 ha of land he is able to repay the loan of ₹55000 (50% subsidy amount) and improve his livelihood.



శ్రీమంతుల వాటిల్ల వనం
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సంపాదన: శ్రీమంతుల వనం
ఇది వాటిల్ల వనం
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The farmer and fellow farmers of the village were very appreciative of the support given by the REC-ICRISAT watershed project.



Vegetables cultivation initiative improved the livelihoods of poor tribal farmers in REC-ICRISAT watershed in Wanaparthy



The REC-ICRISAT watershed project encouraged and sponsored small tribal farmers to take up vegetables cultivation to improve their income and livelihoods.

As many as 88 farmers from four villages of Rajapeta, Peddagudem, Mentapalle, Kadukuntla were benefitted by sowing vegetable seeds in 15 ha of land. Also, vegetable seeds were provided to beneficiaries at 50% subsidy.

For T Nagamma from Rajapeta, she cultivated cluster bean, bitter gourd, brinjal, drum stick, fenugreek leaves (*methi*), green sorrel (*chukka kura*) and coriander in 0.20 ha of land. Having availed the subsidy, the farmer took up the activity and earned a net income of ₹13000 (in 2 months), an amount she had never earned with her past practices.



A total of 220 farmers are cultivating the vegetables in 40 ha and sell their vegetables in Wanaparthy, Kothakota, Pebber and Addakal market. Although vegetable cultivation is remunerative, many small and resource poor farmers were not able to cultivate due to lack of support. These farmers approached the watershed committee to help support vegetable cultivation. Also, farmers have grown vegetables in 0.20 ha of plot and after harvest of this plot again prepared it for next cultivation. Also, farmers got on an average net income of ₹6000 – ₹7000 per month.

These smallholder farmers expressed their gratitude to REC and ICRISAT for the support to improve the farm income and livelihoods as there is a good market for vegetables round the year.

Stitching a respectable income due to watershed project



Anusuya Bai who had an early marriage at the age of 14 years was living a life of misery after her husband's demise. She also had to take care of 2 children and had no income.

Her father and mother supported her to learn tailoring in the village and she has learned skilled tailoring for 3 months to 6 months. Her parents supported her and helped her buy a sewing machine on loan from local moneylenders at an interest of 24 %. She initially earned an income of ₹2000 – ₹3000. But she also needed to repay the interest and approached the Kondampalle watershed committee and ICRIASAT officials and explained her situation. The watershed committee decided to give her a small revolving fund of ₹5000 (Interest free loan) with repayment in small installments.



At present she is busy stitching away in Settipalle Village of Penukonda Mandal .In that process she became a busy skilled tailor and is stitching sari border designs, kurtas etc., and is earning a net income of ₹6000 – ₹8000 per month and is also getting more orders and income during festivals and marriages. Her children now study in corporate schools.

She hopes that the Kondampalle Watershed Committee would help sanction ₹15000 – ₹25000 to help upscale her business and setup a cloth shop.

Additional income through income generating activity for the SHGs, REC-ICRISAT watershed, Kondampalle

As per the action plan of the Kondampalle watershed, which is supported by REC –ICRISAT. The watershed committee identified 120 members from 20 SHGs in four villages, who are below poverty line. These beneficiaries were given ₹3000 (per member) through revolving fund for ram lamb rearing units in January 2015 and the SHG beneficiaries bought ram lambs with the money. After 5 months, farmers sold the ram lamb at rates ranging from ₹5400 – ₹6200 and made a net benefit ranging from of ₹2400 – ₹3200. In a short period of five months, an additional net income of ₹2400 – ₹3200 was a boon to smallholder poor farmers, which improved the livelihoods and helped them sustain their families particularly during drought.



S.No	Name of the SHG	Date of purchase at ₹3000/-	Sold date and Amount (₹)	Earned Amount (₹)
1	Shiridi Sai SHG	02.01.2015	27.05.2015 (5800/-)	2800/-
2.	Janshi Mahila SHG	02.01.2015	27.04.2015 (6200/-)	3200/-
3.	Ganesh SHG	06.01.2015	01.05.2015 (5400/-)	2400/-



Summary

The Rural Electrification Corporation Limited, Hyderabad, Andhra Pradesh, India has supported the ICRISAT-led consortium to develop “Model Sites of Learning” in Wanaparthy district in Telangana state and Anantapur district in Andhra Pradesh with an aim to sustainably increase agricultural productivity and improve the livelihoods of the rural poor in vulnerable rain-fed areas. A participatory integrated watershed management approach has been adopted for upgrading rain-fed agriculture for sustainable intensification.

The soil and water conservation structures constructed have created a net storage capacity of 35600 m³ resulting in total conservation of about 70000 m³ of surface runoff water in 2-3 fillings in case of Anantapur watershed. In case of Wanaparthy watershed, a net storage capacity of 39900 m³ resulting in total conservation of about 99500 m³ of surface runoff water in 2-3 filling has resulted in addition to increased groundwater table and has also reduced the soil loss.

Farmer participatory trials (295 farmers with one ha each) were conducted to evaluate improved crop management practices and the results showed productivity improvement by 25% in groundnut, 27% in pigeonpea and 21% in paddy. The additional economic benefit was ₹2515500 in 2.5 years of the project and has benefitted 295 farmers in Wanaparthy district. While in case of Anantapur district, groundnut was the major crop and the additional economic benefit in 2.5 years was ₹3200000 and has benefitted 250 farmers.

As a part of the project, improved cultivar seeds have been distributed, micro and secondary nutrient fertilizers such as agribor, zinc sulfate, and gypsum have been recommended and afforestation activities have been initiated. Also, to enhance the livelihood opportunity for non-farm households and needy people various income generation activities such as dairy, goat rearing, petty shops, tailoring and vermicompost preparation activities have been taken up.

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