

POWERGRID-ICRISAT Watershed

Improving Rural Livelihoods through Farmer-Centric Integrated Watershed Management





పవన్ స్టేట్ ఆర్థిక సహాయంతో

దొడ్డిశాట్ సాంకేతిక సహకారంతో

RSDS నిర్వహణలో

బెటెంబెర్ల వాటర్ షెడ్

పని పనులు : పశుపాపక ట్రాంకు తిరగు

రైతు పనులు : ప్రభుత్వ స్థలము

గ్రామము : వీరాయిపల్లి

పని జరిగిన కాలం: డిసెంబర్-2015

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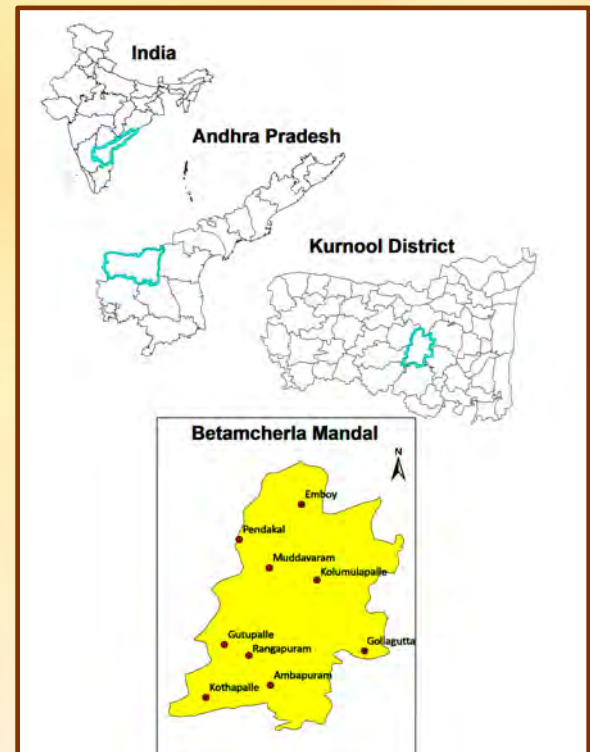
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Overview

In the semi-arid Rayalaseema region, frequent spells of drought and erratic rainfall have often hampered crop productivity and caused land degradation. The farmers are struggling with inconsistent income levels and farmers often receive jolts when they market their produce due to fluctuating prices. Considering the above key factors, the Power Grid Corporation of India Limited (POWERGRID), Gurgaon, India and the ICRISAT-led consortium collaboratively initiated farmer-centric integrated watershed management to improve rural livelihoods in Kurnool district of Andhra Pradesh.

The overall goal of this initiative is to increase agricultural productivity and improve the livelihoods of rural poor in fragile dryland areas on a sustainable basis by enhancing the impact of integrated watershed management programs. More than 5000 farmers including men and women are directly benefited through this farmer-centric watershed management program in the ten villages of Pendekal, Muddavaram, Emboy,, Bugganipalle, Mandlavaripalli, Marrikunta, Musalai cheruvu, Rudravaram, Veeraipalli and Venkatagiri having a total geographic area of 6852 ha.



*Bethamcherla mandal in Kurnool district
Andhra Pradesh*

Objective

- ◆ To establish “Model Sites of Learning” in Andhra Pradesh for harnessing the potential of rainfed areas by adopting the integrated water resource management approach.
- ◆ To enhance water availability and its (green and blue water) use efficiency for diversifying the livelihood systems in the target villages by adopting integrated water resource management approach.
- ◆ To build capacity of the farmers in the region for improving rural livelihoods through knowledge sharing and dissemination strategy.



Consortium Partners



- ◆ Power Grid Corporation of India Limited
- ◆ District Water Management Agency, Government of Andhra Pradesh
- ◆ Department of Agriculture, Government of Andhra Pradesh
- ◆ ICRISAT Patancheru, Telangana
- ◆ Community based Organization (Watershed Committee and Farmers)
- ◆ RSDS-NGO, Kurnool
- ◆ Digital Green

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. Suitable sites were selected based on technical feasibility taking into farmers' opinion.

The action plan in Bethamcherla Watershed, Kurnool includes:

- ◆ Soil and water conservation activities (like, nala plugs, rock filled dams, sunken pits, farm ponds, percolation tank, masonry check dam, well recharge pits).
- ◆ Soil health test and use of micronutrients.
- ◆ Productivity enhancement through crop demonstrations and use of improved cultivars.
- ◆ Horticulture development
- ◆ Afforestation
- ◆ Livelihood development
- ◆ Income-generating activities





Soil and water harvesting

Various soil and water conservation structures constructed included 28 farm ponds, 8 check dams, 2 percolation tanks, 12 rock-filled dams, 25 loose boulder structures and one drinking water pond for cattle.

- ◆ The soil and water conservation structures have created a net storage capacity of 81200 m³ resulting in total conservation of 203000 m³ in 2-3 fillings.
- ◆ Also, one percolation tank was constructed recently with 58700 m³ capacity with 144 m long bund length and 5.8 ha water spread area with an average depth of 1 m.
- ◆ Soil and water conservation interventions have reduced runoff by 50% and soil loss significantly.





POWERGRID - ICRISAT WATERSHED

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Use of micronutrients

A total of 275 soil samples were collected from selected villages and analyzed at ICRISAT laboratory. Soil analysis results revealed severe deficiency for organic carbon (17-85% deficiency), sulphur (36-100%), zinc (58-100%) and boron (0-75%). Based on the soil test results, crop-wise fertilizer recommendations were provided to farmers. About 75% of farmers families have been benefitted and crop specific fertilizer recommendations were

Villages	OC	Av P	Av K	Av S	Av Zn	Av B	Avail-Fe	Avail-Cu	Avail-Mn	Ca	Mg
	% deficient										
Emboy	18	0	0	36	73	0	0	0	0	18	0
M. Pendekal	17	6	0	94	78	39	0	0	0	78	0
Mandlavaripalle	85	0	15	100	85	54	0	31	0	100	0
Marrikunta	75	33	33	92	92	75	0	33	0	100	0
Muddavaram	50	23	3	65	58	18	15	0	0	70	0
Musalai Cheruvu	46	8	0	77	77	23	0	15	0	100	0
Pendekal	50	20	5	55	60	30	5	0	0	70	0
Rudravaram	67	0	17	83	100	44	0	17	0	94	0
Veeraiahpalle	45	30	10	95	80	50	0	35	0	100	0
Venkatagiri	50	25	0	75	100	50	0	0	0	50	0
Mean	50	15	8	76	75	35	4	12	0	80	0



Crop productivity

- ◆ As a productivity enhancement initiative, 267 demonstration plots were established with improved technologies such as improved cultivar seeds, seed treatment, soil test based fertilizer application that included micro and secondary nutrient application and integrated pest management practices.
- ◆ The results showed productivity improvement by 22% in maize, 25% in pigeonpea, 10% in groundnut, 35% in foxtail millet and 9% in paddy. In some cases, farmers reported during the interaction with POWERGRID delegates, that 10-50% increase in different crops was been.





Table 1: Additional economic gain and additional yield gain due to improved practices

Crop	Average % increase in Improved Practice over Farmers Practice	Additional yield gain (kg/ha)	Additional economic gain ₹/ha
Maize (65 ha)	22	750	7500
Groundnut (35 ha)	10	150	6800
Pigeonpea (350 ha)	25	220	8800
Paddy (50 ha)	9	250	4500
Foxtail millet (200 ha)	35	400	8800

Afforestation



Avenue and bund planting (23200 plants) in 58 farmer fields, teak plantation (2600 plants) in 7 farmer's fields, horticulture plants in four farmer's fields were planted as a part of the project.



Animal Health Camps



పవన్ గ్రీడ్ & ఇక్రిశాట్ ICRISAT
వారి సౌజన్యంతో
ఉచిత వశువైద్య శిబిరం
పశువైద్యకళాశాల, కర్నూలు.
క్రామము: బెలంపల్లి నాలర్షెడ్ పేరి: 02-2017
సంస్థలు: రూరల్ స్ట్రెటిజీ & డెవలప్‌మెంట్ సొసైటీ, డోన్



A total of three animal health camps in three watershed villages were conducted. This activity included vaccination, deworming and treatment for deformities in cattle and other livestock.



Income-generating activities and women empowerment

Various income-generating activities like sheep and goat rearing, distribution of horticulture plants to 40 Self-Help Group (SHG) beneficiaries, petty shops and micro enterprises were supported in the project through revolving fund to various SHGs. These SHGs are run primarily by women and have enabled them to make extra income.





Table 2: Net gain received by SHG members from various income-generating activities

Activity	Net gain (₹)
Ram lambs rearing (20 members)	3000-4000
Sewing machine (Two members)	2000-3000 per month
Petty shops (tea shop, cloth shop)	2000-3000 per month
Photocopy machine (one member)	900-1000 per month





Farmer to farmer video dissemination

An innovative digital extension system was introduced to reach large number of farmers using a hand held pico projectors to show the videos of improved agricultural practices to farmers as an effective tool. The advantage of farmer to farmer system is the fact that farmers trust fellow farmers to adopt improved management practices.





Capacity building/awareness creating activities

Several capacity building programs such as field days that benefitted 145 farmers and wall writings in all villages to create awareness about the watershed project on various aspects such as participatory soil sampling, soil health, and action plan preparation, farmers training in use and application of improved crop productivity initiatives and integrated pest management were conducted. Also, capacity building program to train SHGs has helped benefited 145 members.

A total of 6623 farmers including men and women were directly benefited through this farmer-centric watershed management program. In addition, more farmers have gained information through wall writing and awareness campaigns.





Success Stories

Water harvesting structures and micronutrient application helped farmer gain increased yield from rainfed crops

Mohanreddy P from Veeraiapalli village has 2 ha of land and has primarily cultivated rainfed crops such as pigeonpea and foxtail millet. The yield of these crops has always been low due to erratic rainfall and poor soil health. Before the watershed project, the farmer would harvest only 1100 kg of pigeonpea and 600 kg of foxtail millet respectively per hectare. He would hardly earn a net income of ₹20,000 – ₹25,000 annually.

It was after the initiation of the watershed project in his village that he slowly started to learn about the importance of rainwater harvesting and micronutrients.

With the help of ICRISAT staff and the local NGO, he constructed a farm pond and also laid stone bunds to arrest soil erosion. The farmer had to contribute only 10 per cent towards the construction of the farm pond.



Farm pond in Mohanreddy's field



Foxtail millet in Mohanreddy's field



The farmer also applied 250 kg of gypsum per ha, 25 kg of zinc sulphate per ha and 2.5 kg agribor (boron) per ha and cultivated varieties such as Asha of pigeonpea and suryanandi of foxtail millet.

With these interventions he received a yield of 1400 kg per ha for pigeonpea crop and 750 kg for foxtail millet. He has stored the harvested crops, as the market price in the present year has been lower than normal.

Also, a total of 800 teak saplings and 200 mango saplings were planted by the farmer as a part of the watershed project. He has managed to save them by providing water from the renovated percolation tank in his village.

Rainwater harvesting structures and vermicomposting activities rejuvenated fallow land

Ramudu from Bugganipalle village has 0.80 ha of land, which was always fallow before the watershed project. Due to drought, the borewell had gone dry and the farmer was earning a net income of only ₹20,000 per year by growing rainfed crops such as pigeonpea and castor.

After the initiation of the watershed project, one check dam, one rock filled dam and loose boulder structures were used to increase the water retention in the village.

After this intervention, the completely dry borewell in Ramudu's field was restored and he managed to harvest 27 ton of onion crop during *Kharif*. Unfortunately due to severe crash in the onion market in the year 2015, the farmer was unable to make any income from onion crop.



During the second year of the project, two vermicomposting units were constructed by the farmer by contributing 20% cost towards the intervention. After this intervention, the farmer has managed to save 25% of the costs that he would use for buying fertilizers and has managed to improve the overall soil quality due to the use of vermicompost in his land. At present he is cultivating K6 variety of groundnut as a *Rabi* crop and is expecting good returns.



Groundnut K6 variety during Rabi season in Ramudu's field



Vermicomposting unit in Ramudu's field

Micronutrient application from watershed project help farmer cope with the vagaries of nature

Ayyaswamy from Marrikunta village in Kurnool district has often had a dry borewell due to erratic rainfall in his village. He primarily depends on rainfed agriculture to cultivate 2 ha of land.

Before the watershed project, he would cultivate local variety of pigeonpea and foxtail millet as intercrop and would receive only 1000 kg per ha of each crop. He would sell the produce depending on the market rate and gain a net income in the range of ₹25, 000 – ₹30,000 from these two crops.

After initiation of the watershed project, the farmer decided to try and test the use of micronutrients in his land. With the help of ICRISAT staff and the local NGO staff, he applied 250 kg of gypsum per ha, 25 kg of zinc sulphate per ha and 2.5 kg agribor (boron) per ha. He also used improved varieties such as Asha in pigeonpea and Suryanandi in foxtail millet.





Pigeonpea in Ayyaswamy's field

With these 2 crops, the farmer received a yield of 1500 kg per ha for each crop. He is extremely happy with the yield and has stored the produce and is waiting for the market prices to increase so that he can reap a higher net income and earn close to ₹90,000 – ₹1,00,000 from these two crops.

Rejuvenation of percolation tank provided great respite for farmers from two watershed villages

In Veeraipalle village, rejuvenation of a percolation tank having a 58700 m³ capacity by creating bunds of 144 m length has resulted in 5.8 ha water spread area with an average depth of 1 m. As many as 1200 *Gliricidia* plants have also been planted in the periphery to help protect the bunds.

Water is retained in the percolation tank after construction of bunds





This intervention has brought great respite to farmers from the villages of Veeraiapalli and Repalli especially in times of drought. Now the water is retained in the area and provides drinking water for cattle in the two villages and the large livestock population of over 1000 animals in these villages.

Also, before the bunds and stone pitching works, water retention was minimal and surface runoff was high. Ever since the intervention, farmers from these two villages are able to use the water from the tank for spraying on their mango saplings during critical stages and also for other rainfed crops such as pigeonpea.

Increased benefits for SHGs after watershed activities

Padmavathamma, a SHG beneficiary and watershed committee member from Muddavaram village has been handling 21 SHGs in her village.

After observing her dedicated efforts, the watershed committee decided to enroll her as a member and provided ₹30,000 as a revolving fund to the Madhuri group, a group that is run by Padmavathamma.

Under the revolving fund, the group was supported to buy ram lambs to improve the livelihoods in addition to agricultural income. Each member purchased a ram lamb at ₹2500 – ₹3000 and sold them at a rate of ₹7000 per lamb.

**SHG beneficiaries
posing with the
ram lambs they
purchased**



The project also supported Padmavathamma to buy a photocopy machine at ₹14,000. Now she is earning an average of ₹900 – 1000 per month. She has repaid half the loan amount at 12% interest. This interest amount goes back to the revolving fund of the SHG.

After her husband's death, she has also managed to raise her two daughters successfully and the watershed project has proved extremely beneficial for Padmavathamma.

Padmavathamma displays the photo copying machine she purchased as a part of the watershed project



SUMMARY

The POWERGRID Corporation of India Limited, Gurgaon, India and the ICRISAT-led consortium collaboratively initiated farmer-centric integrated watershed management to improve rural livelihoods in Kurnool district of Andhra Pradesh. More than 5000 farmers including men and women were directly benefited through this farmer-centric watershed management program in the ten villages having a total geographic area of 6852 ha.

Various soil and water conservation structures have created a net storage capacity of 81200 m³ resulting in total conservation of 203000 m³ in 2-3 fillings. A total of 275 soil samples were collected from selected villages and analyzed at ICRISAT laboratory. Soil analysis results revealed severe deficiency for organic carbon (17-85% deficiency), sulphur (36-100%), zinc (58-100%) and boron (0-75%).

Also, 267 demonstration plots were established with improved technologies such as improved cultivar seeds, seed treatment, soil test based fertilizer application that included micro and secondary nutrient application and integrated pest management practices. The results showed productivity improvement by 19-24% in maize, 27% in pigeonpea, 8% in groundnut and 9% in paddy.

Other activities such as vegetable seed distribution, avenue and bund plantation, distribution of horticulture plants, vermicomposting, capacity building of SHGs and animal health camps have periodically been conducted in the watershed villages.

For further details :

Dr Suhas P Wani
Research Program Director, Asia and
Director, ICRISAT Development Center (IDC)
ICRISAT, Patancheru
Tel: +91 40 30713466
Email: s.wani@cgiar.org

Mr Dr Murthy
Asst. General Manager (HR)
Power Grid Corporation of India Limited
Southern Region Transmission System, Secunderabad
Tel: 9490611077
Email: drmpowergrid@gmail.com