

# **Progress Report**

**March 2014–February 2015**

## **Improving Rural Livelihoods through Farmer-centric Integrated Watershed Management: Vijayapura (Bijapur) Watershed, Karnataka**

Submitted to  
**POWERGRID Corporation of India Ltd**  
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## **Executive summary**

POWERGRID Corporation of India, Gurgaon, India, supported the ICRISAT-led consortium to improve rural livelihoods through farmer-centric integrated watershed management in Vijayapura district of Karnataka. During 2014, sites of action were identified in Basavana Bagewadi taluk in Karnataka considering the representativeness in terms of soils, landscape, rainfall, crops, socio-economic conditions and other parameters such as willingness of farmers and potential to develop. Through a series of awareness and capacity building meetings, community mobilization was undertaken for participation in watershed management. Watershed committees, with bank accounts in their name, are formed and registered with taluk/district level administration. Participatory Rural Appraisal (PRA) was conducted to identify demand-driven priority activities to be undertaken which comprised activities like soil and water conservation through nala plugs, rock-filled dams, sunken pits, farm ponds, masonry check dams, well recharge pits. Productivity enhancements through crop demonstrations, crop diversification with vegetable and flower crops and livelihood improvement activities like vermicomposting, avenue plantation were prioritized. In order to identify soil fertility related constraints and bring on board the farmers for participatory research for development through demonstrating the benefits of science-led interventions, soil sampling and soil test-based fertilizer management was undertaken as an entry point activity. Soil samples (200 nos.) were collected from the farmers' fields in Ukkali village and analyzed for macro and micro nutrient deficiencies. The results demonstrated the deficiencies of phosphorus (P), sulfur (S) and zinc (Zn) along with nitrogen (N) in 89% and 94% of the farmers' fields respectively. Other nutrients like potassium (K), boron (B) and iron (Fe) were adequate in most farmers' fields (16% deficient fields in K, 8% deficient fields in B). Based on soil analysis results, fertilizer recommendations were developed to target optimum yields by adopting the principle to recommend full dose of a nutrient in case of >50% farmers' fields are found deficient and half dose if <50% farmers' fields are found deficient. Participatory trials (49 nos.) were conducted to evaluate soil test-based recommendations. The results showed productivity improvement by 17% in maize, 15% in pigeonpea, 19% in groundnut and 22% in chickpea. Regarding other activities, four farm ponds, two check dams, two sunken pits and four well recharge pits have been constructed.

In order to make the initiative sustainable over the long run, capacity building is a focused activity in the watershed. During 2014, 19 formal capacity development programs and one farmers' day were conducted in which capacity of around 1658 farmers was strengthened.

## **Background**

The first major activity taken up was the selection of appropriate sites for the watershed project. Following major criteria were considered in the selection of sites for the model watersheds.

- Representativeness in terms of soils, landscape (slope and terrain), rainfall, crops, socio-economic conditions.
- Cooperative farmers who are willing to take active part in the watershed program.
- Good potential for increasing agricultural productivity, income and conservation of natural resources.

- Strong need for watershed program
- Major area under rainfed
- Good accessibility even during rainy season.

Considering the above key criteria, two potential sites for watershed project were identified in Vijayapura district in Karnataka. The ICRIAT team and officials from the Watershed Development department visited the proposed sites. At each site, farmers' meetings were conducted and interactions were held with local institutions and community members. Based on these discussions and observations collected, followed by a transect walk, final selection of sites for the watershed project was made.

## **Ukkali Watershed, Vijayapura, Karnataka**

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 in the country through capacity-building initiatives using the 'site of learning' model in low-rainfall agro-ecoregions. The specific goal of this initiative is to increase agricultural productivity and improve rural livelihoods sustainable in selected villages. The specific objectives of the project are:

1. To establish "Model Sites of Learning" in Karnataka for harnessing the potential of rainfed areas by adopting integrated water resource management approach;
2. 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; and
3. To build capacity of the farmers in the region for improving rural livelihoods through knowledge sharing and dissemination strategy.

### **Site selection**

Three potential locations were suggested by the DWDO, Vijayapura. These were:

1. Ukkali
2. Ingleshwar, Basavana Bagewadi Lambadi tandas and
3. Nagur, Inanagi, Basavana Bagewadi

All the three locations were visited.

The first village Ukkali was identified for the watershed project. It is a big village, where the project target area of about 5000 ha can be covered as one cluster in one village. Moreover, farmers are very enthusiastic and presently investing in construction of field bunds and a small farm pond. The second proposed location constitutes more number of villages and *lambadi tandas*, which may involve complexity in formation of committees and execution/implementation of watershed interventions. Besides, response of the communities appears to be low. The third location includes a major part of Basavana Bagewadi taluka headquarters. With these reasons, the first location Ukkali was selected for the watershed

development project seeing that it has good potential to develop as a model watershed with integrated holistic development approach. Some of the features of the Ukkali village are shown in Table 1.

### Formation of watershed committee and consortium partners

A local NGO has been identified to execute the work with a participatory mode. A watershed committee has been formed consisting eleven members representing different section of farmers (Table 2). A detailed work plan with participatory approach has been developed. DWDO and the Department of Agriculture and other line department are involved as consortium partners for effective convergence and implementation of project.

<b>Table 1. Ukkali watershed features, Vijayapura district, Karnataka</b>	
Watershed features	Parameter
Rainfall (mm)	650
Soil type	Medium to deep black soil
No. of village(s) covered in watershed	One, Ukkali (Basavana Bagewadi taluk)
Distance from Dist HQ	20 km; 25 from Kudige Power Plant
Total area (ha)	8800 (1100 sy. Numbers)
Cropping system	40% area in Kharif; 60% in rabi season
Major crops grown	Pigeonpea (30% area); chickpea (25%); rabi sorghum (25%); wheat (10%); kharif sorghum (10%)
Rainfed & Irrigated area	75% rainfed; 25% irrigated with well water that includes orchards of lemon, grapes
Landscape/ topography	Flat rolling slope; <1.5 %
Water resources	About 200 open wells; 50'-60' deep, most of these are defunct, few are working during rainy season. Bore wells: about 700 with 500' depth. Tanks: two big rainwater storage tanks exist (minor irrigation dep); 2-3 small percolation tanks were constructed under MGNREG scheme, but these are meant for recharging the groundwater, not for irrigation by lift.
Population	12000
Households	Small - 25%; medium – 45%; big – 25% and landless 5%.

<b>Sl. No</b>	<b>Member Name</b>	<b>Designation</b>	<b>Age</b>	<b>Education</b>
1	Shri Subhas Malakappa Kalyani	President	56	B.Com
2	Shri Sanjeev Jakkappa Byakod	Vice President	41	BA
3	Shri Devaraj Pavamanrao Kulkarni	Secretary	62	SSLC
4	Shri Anand Irappa Hanamashetti	Member	40	SSLC
5	Shri Ningapp Kasappa Hundarad	Member	45	SSLC
6	Shri Amboji Ramachandra Shinde	Member	38	SSLC
7	Shri Shivanand Shasappa Sindagi	Member	28	BA
8	Shri Yallappa Siddappa Madabhavi	Member	65	2 <sup>nd</sup>
9	Smt. Saraswati Basappa Masali	Member	53	SSLC
10	Smt. Rustumbi Moulasab Nagaradinni	Member	42	7 <sup>th</sup>
11	Shri Pandu Kasanu Rathod	Member	55	2 <sup>nd</sup>

### **Participatory action plan preparation**

*Gram sabhas* were conducted with farmers and *gram panchayat* members to brief the farmers about the proposed project and awareness building (Figure 1). Action plan has been prepared by the team comprising ICRISAT scientists, farmers and NGO officials with a participatory approach (Figure 2). A transect walk was taken up to prepare the action plan. Suitable sites were selected based on technical feasibility taking into account farmers' opinion.



**Figure 1. Watershed awareness program in Ukkali, in which gram panchayat members and taluka level officials participated**

The proposed action plan in Ukkali Watershed, Vijayapura, includes soil and water conservation activities (like nala plugs/rock-filled dams (20 nos), sunken pits (10 nos.), farm ponds, masonry check dam, well recharge pits); productivity enhancement (crop demonstration); income generating activities (vermicompost); horticulture and afforestation/avenue plantation.



**Figure 2. Taluka Watershed Development Officer showing the proposed area on map; Farmers' meeting in Ukkali village**

### **Stratified soil sampling and soil test-based fertilizer recommendation**

**Baseline soil health assessment:** 220 soil samples have been collected using stratified randomized method that considers topo-sequence, farmer category, soil type, cropped area and horticulture etc. by farmer participatory approach. Farmers were given hands-on training on soil sample collection and soil samples were collected by farmers under the supervision of ICRISAT research technicians and farm facilitators (Figure 3). The soil sampled spots were geo referenced using GPS system that will help to map the nutrient status of the village. The soil analysis has been done (Table 3). The Ukkali soils reveal that they are deficient in organic carbon, available phosphorous, sulphur and zinc (Table 4). Based on the soil analysis results, fertilizer recommendations are developed and soil test-based fertilizer recommendation has been provided to farmers (Table 5).



**Figure 3. Hands-on training of participatory soil sampling to farmers in Ukkali village, Vijayapura district**

**Table 3. Soil health status in Ukkali watershed, Vijayapura, Karnataka**

Village (s)	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm	Avail-Fe ppm	Avail-Cu ppm	Avail-Mn ppm	Ca ppm	Mg ppm	Na ppm
Ukkali	8.2	0.27	0.60	3.3	223	17.5	0.34	1.24	4.04	1.61	7.06	9216	1167	423

**Table 4. Percent of farmers' fields deficient in nutrients, Ukkali watershed, Vijayapura, Karnataka**

Villages	OC	Av P	Av K	Av S	Av Zn	Av B	Avail-Fe	Avail-Cu	Avail-Mn	Ca	Mg
	% deficient										
Ukkali	49	89	0	71	94	16	8	0	0	0	0

**Table 5. Soil-test-based fertilizer recommendation, Ukkali watershed, Vijayapura, Karnataka**

Ukkali watershed Bijapur											
Soil test based fertilizer recommendations										When SSP used only Urea,DAP, Gypsum change others same	
Sl No	Crop	Urea	DAP	MOP	Gypsum kg ha-1	ZnSO <sub>4</sub> 7H <sub>2</sub> O	Agribor	Borax	Urea	SSP	Gypsum
1	Maize (Irrigated) Kharif	99	163	31	200	25	1.25	2.5	163	536	0
2	Maize (Rainfed)	66	109	21	200	25	1.25	2.5	163	268	0
3	Sorghum ( Rainfed)	31	87	33	200	25	1.25	2.5	163	268	0
4	RabiSorghum ( Rainfed)	33	54	0	200	25	1.25	2.5	326	536	0
5	Pearl Millet ( Rainfed )	33	54	0	200	25	1.25	2.5	326	536	0
6	Wheat (Irrigated)	45	163	42	200	25	1.25	2.5	163	536	0
7	Wheat (Rainfed)	33	54	0	200	25	1.25	2.5	326	536	0
8	Navane (Rainfed)	20	33	13	200	25	1.25	2.5	326	536	0
9	Pigeonpea	0	109	10	200	25	1.25	2.5	326	536	0
10	Greengram	0	109	0	200	25	1.25	2.5	326	536	0
11	Blackgram and Cowpea	0	109	0	200	25	1.25	2.5	163	536	0
12	Chickpea (Irrigated)	0	109	0	200	25	1.25	2.5	163	536	0
13	Chickpea (Rainfed)	0	54	0	200	25	1.25	2.5	163	268	0
14	Groundnut (Rainfed)	0	109	21	200	25	1.25	2.5	163	536	0
15	Safflower ( Rainfed )	9	87	10	200	25	1.25	2.5	163	536	0
16	Sunflower (Irrigated)	1	163	50	200	25	1.25	2.5	163	536	0
17	Sunflower (Rainfed)	0	109	29	200	25	1.25	2.5	163	536	0
18	Sesame / Til(Rainfed)	28	54	21	200	25	1.25	2.5	163	536	0
19	Castor (Rainfed)	9	87	17	200	25	1.25	2.5	163	536	0



**Soil and water conservation:** Various SWC structures constructed included two check dams, four farm ponds (10 x 10 x 3m) and three bore well recharge pit, one open well recharge pit and two sunken pits (Figure 4). Other structures such as a few more farm ponds, well recharge pits, sunken pits and gully plugs are in progress.



**Farm pond**



**Borewell recharge pit**



**Masonry check dam**

**Figure 4. Soil and water conservation structures, Ukkali watershed, Vijayapura, Karnataka**

**Crop demonstration:** Basavana Bagewadi taluk experienced poor and delayed monsoon during the year (Figure 5). In spite of the situation, field demonstrations with improved cultivars, micronutrients application and balanced fertilizer management, moisture

conservation has been established in the watershed (Table 6 and 7; Figure 6). However late rains have given hope for a good rabi crop season.

<b>Table 6. Demonstration field details, Ukkali watershed, Vijayapura, 2014</b>		
<b>Crop</b>	<b>No. of demonstration fields</b>	<b>Remarks</b>
Pigeonpea (Asha and ICPH2740)	10	Soil-test based nutrient and pest management
Groundnut (ICGV 91114, K6, G2-52)	10	Soil-test based nutrient and pest management
Finger millet (HHB67)	15	Soil-test based nutrient and pest management
Sorghum (ICSV12014, 93046, 12019, 25314)	4	Dual purpose sweet sorghum
Maize (Bioseed-9780, PAC 745)	10	Soil-test based nutrient and pest management
Soil-test based nutrient management (Bhoochetana)	4000 ha	1600 farmers



**Figure 5. Poor crop stand due to poor rainfall in Ukkali watershed, Vijayapura**



**Figure 6. In-situ moisture conservation (Broad bed and furrow and compartmental bunding) practices in Ukkali watershed**

<b>Table 7. Landform for in-situ moisture conservation and other activities</b>		
<b>Intervention</b>	<b>No. of demonstration fields</b>	<b>Remarks</b>
Broadbed and furrow system	10	Pigeonpea, maize crops
Compartmental bunding	10	Groundnut, onion
Border strip	15	Maize, pigeonpea, pearl millet
Aerobic composting	3	
<i>Gliricidia</i> on field bunds	2000	
Avenue plantation	Neem: 1000 Pongamia: 1000	

**Table 8. Crop yields (t/ha) in improved practice, PowerGrid-ICRISAT watershed, Ukkali, Vijayapura, Karnataka, 2014-15**

<b>Crop</b>	<b>Improved practice (IP)</b>	<b>Farmers Practice (FP)</b>	<b>% increase in IP</b>
Maize	5.88	5.03	17
Groundnut	1.08	0.91	19
Pigeonpea	1.55	1.35	15
Chickpea	1.34	1.10	22

### ***Crop diversification with high value crops***

As a thrust towards crop diversity, farmers were encouraged to go for high value crops like vegetable, flower and fruit crops in the watershed, as there is good scope for these activities. Under this activity, micronutrients, vegetable seeds, bio-fertilizer were provided to farmers. (Figure 7).



***Figure 7. Crop diversification activities in Ukkali watershed, Karnataka***

#### ***Farmers' opinion***

Ms Kasturi Masali and Mr Jayappa Masali, farmers who took financial support from the SHG's revolving fund, engaged in the cultivation of *mogra* (jasmine) flower in their one acre of land for the first time. Earlier Jayappa used to grow pigeonpea, green gram and maize. Inputs such as bio fertilizer, micronutrients and manure watershed were used as per the advice given by the watershed staff. He reports that after four months of planting, he is getting an average flower yield of 15 kg/ day for the past seven months. He spent about Rs 30,000 as cost of cultivation and has so far earned Rs 2.30 lakh. He expressed his happiness and support for the project.

**Use of multi-purpose farm machinery (Tropicultor):** A multi-purpose wheel tool carrier “Tropicultor” has been provided to farmers in the watershed for land preparation, bed formation and sowing with fertilizer application. Hands-on training sessions were organized. Farmers are finding it very useful in proper sowing, as well as being labor- and time-saving.

**Avenue and Gliricidia on bund plantation:** Avenue plantation with neem and *pongamia* was taken up and N-rich species Gliricidia was planted on field bunds (Figure 8 and Table 7).

#### **Decentralized wastewater system**

A decentralized wastewater collection system from domestic waste has been planned and safe reuse of water will be implemented. An appropriate site has been identified through participatory approach wherein villagers, the watershed committee and members of the panchayat are involved. Construction will be taken up soon.



**Figure 8. N-rich Gliricidia planting on field bund and avenue plantation in Ukkali watershed, Vijayapura**

### ***Vermicomposting***

Ten vermicompost pits were constructed (Figure 9). As the farmers showed keen interest to diversify the cropping system towards high value crops such as vegetables and flowers, this initiative is popular and observed widely. Along with this, aerobic composting will be promoted as well.

***Capacity building/awareness creating activities:*** Several capacity building programs were conducted to create awareness about the watershed project on various aspects; these included community formation, participatory soil sampling, booking keeping for WC members, soil health and action plan preparation, use and application of improved crop productivity initiatives and use of Tropicultor for field operations (Figure 10 & 11; Table 9). Ten wall writings were displayed in prominent locations of the project area for publicity awareness (Figure 12).



***Figure 9. Vermicompost pits, Ukkali watershed, Karnataka***



***Figure 10. Tropicultor attachments; Sowing with Tropicultor; Farmers checking seed depth and spacing***



**Figure 11. Hands-on training on the use of Tropicultor and women SHGs training**

Table 9. Capacity building activities in Ukkali watershed, Vijayapura				
Sl No.	Details of training	No of trainings	Participants	
			Men	Women
1	SHG formation training	2	50	200
2	Book keeping training SHG Leaders	3	10	50
3	Capacity building training to SHG leaders	2	35	68
4	Watershed implementation meeting	5	350	120
5	W/s committee formation meeting	2	160	85
6	Soil sampling collecting training	2	320	35
7	Tropicultor training	3	170	5



**Figure 12. Wall writings were displayed in prominent locations in the project area**

## **POWERGRID – ICRISAT Watershed, Ukkali, Vijayapura Farmers' Day – 9 January 2015**

A Farmers'/Field Day for chickpea was organized in the PowerGrid–ICRISAT watershed in Ukkali, Vijayapura on 9 January 2015. Mr M Thanveer Manger (Human Resources/Corporate Social Responsibility (HR/CSR)) and Mr Sanju Kishan Senior Officer (Environment and Health) from PowerGrid Regional Office in Bangalore participated. The program was attended by about 350 enthusiastic men and women farmers that included also Mr N S Khed, former MLA and former board member, University of Agricultural Sciences, Dharwad; Mr Chandra Shekhar Patil, former Zilla Parishad Chairman and presently member; other progressive farmers and local leaders/entrepreneurs including AM Patil, KN Sindagi, KG Patil and AB Indi. Several line departments were invited and were well represented: Dr William Rajashekhar from the Agriculture Department (Dy. Director of Agriculture, representing the Joint Director of Agriculture), Mr Santosh Sampangi (Dy. Director of Horticulture) from the Horticulture Department, Mr Sadashiv Patil, Technical Officer (Hort.), Mr R Sudi from ICRISAT-Patancheru as well as district staff attended.

Watershed committee chairman Mr SM Kalyani introduced the Chief Guest Messrs M Thanveer and Sanju Kishan of PowerGrid, Bengaluru. The ICRISAT representative explained the objective of the project, its activities, benefit and spoke of PowerGrid's support and ICRISAT's role. PowerGrid delegates spoke about the welfare schemes under Corporate Social Responsibility activities undertaken to help farmers and rural areas. The local political leaders and progressive farmers urged farmers to make use of the project and seek the help of ICRISAT for any technical issue; they shared their earlier experiences of interactions with ICRISAT.

During the event, delegates visited various interventions undertaken in the watershed such as improved crop management, avenue plantation, water conservation, publicity/awareness building through wall writings, etc. and performed Bhoomi Pooja of a check dam location. Mr Sudi explained the activities taken up and works planned for this summer months to PowerGrid delegates. During the day, PowerGrid delegates and ICRISAT officials interacted with farmers and urged them to make use of the project to improve livelihoods while protecting the environment. Farmers expressed their happiness for the novel project with financial and technical support provided by the PowerGrid, ICRISAT and the effort of NGO to implement. Farmers assured the visitors of their active involvement and cooperation in the project. The PowerGrid officials also expressed their satisfaction at the works undertaken, specially the motivation and community mobilization activities in watershed. The program concluded with a vote of thanks by watershed committee chairman and the NGO.





Mr Thanveer addressing the famers; A Progressive Farmer being felicitated for his proactive support; and enthusiastic farmers during the Farmers' Day listen to addresses delivered by various delegates.

## Annexure 1

### PowerGrid – ICRISAT watershed activities in Vijayapura, Karnataka, 2014-15.

Sl. No	Activities	2014-15	Total achievements	No. of farmers benefitted
<b>A</b>	1	Baseline survey	75	75
	2	Total soil samples drawn	220	220
<b>B</b>		<b>Soil and Water conservation structures</b>		
	1	Nala plugs	20	0
	2	Sunken pits and other small structures	10	0
	3	Farm pond (FP)	05	03
	6	Bore well recharge pit	05	01
	9	Check dam (CD)	02	02
	10	Wastewater treatment	01	In progress
<b>C</b>		<b>Income generating activities</b>		
	1	Vermicomposting	10	10
	2	Vegetable seed distribution to SHG women for kitchen gardening		
	3	Horticultural plants provided to SHG women	500	0
<b>D</b>		<b>Afforestation, horticulture and livestock Improvement</b>		
	1	Bund planting forest trees	500	500
	2	Avenue plantation forest trees	1600	2000
	3	Plantation in waste land, temple and graveyard		1000
	4	Horticulture plants planted in farmers land	10 ha	10 ha
<b>E</b>		<b>Productivity enhancement trials conducted</b>		
	1	Balanced nutrient management (NPK + Zn + S + B)		16 ha
	2	Bio fertilizers		10 ha
	3	Varietal trails	200 ha	15 ha
	4	Organic manures		10 ha
<b>G</b>		<b>Capacity building /training/awareness conducted</b>		
	1	Farmers trainings	10	10
	2	Women trainings		03
	3	SHG's capacity building trainings	06	06
	4	International women farmers day	01	0
	5	Farmers day	01	01
	6	Field day	01	01
	7	World environmental day (Gandhi jayanti/ Clean India)	01	01
	8	User group trainings		
	9	Wall writing (W/s objectives & fertility status)	10	10
<b>H</b>		<b>Exposure visits</b>		
	1	Vijayapur Krishi mela	01	01
	2	Exposure visit to ICRISAT	01	0