Progress Report
August 2014 – September 2015

Integrated Water Resource Management in Kolar District of Karnataka for Increasing Agricultural Productivity and Improved Livelihoods

Submitted to

Coca–Cola India Foundation
for Rural Water Infrastructure

ICRISAT
Science with a human face

International Crops Research Institute
for the Semi-Arid Tropics

This work is being undertaken as part of the CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

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Executive Summary

The Kolar district in Karnataka state of India is the hotspot of water scarcity. The Kolar watershed, comprising nine villages and covering nearly 1,333 ha, was selected for developing a benchmark site in Kolar district. From 2012 onwards, ICRISAT along with the district administration, MYRADA a non-governmental organization, and local community started implementing watershed interventions in this area.

As an entry point, community mobilization and rapport building has been achieved by forming watershed committee in collaboration with MYRADA under guidance and support of ICRISAT during the first year of project. The required information and knowledge sharing is achieved through regular meetings (formal and informal). Regular interactions with the community have built strong trust with each other resulting in effective planning and implementation of watershed activities in target villages.

Science-led interventions comprised soil and water conservations practices, productivity enhancement activities, crop diversification and intensification, integrated nutrient and pest management and other livelihood based activities. The village community and the watershed committee identified potential locations where different soil and water conservation practices such as farm ponds could be made. Twenty nine farm ponds and 75 stone checks were constructed to store excess runoff water generated from farmers' fields, which together created 13,500 m^3 of net storage capacity resulting in 33,750 m^3 rainwater being collected in a season depending on the rainfall during the year. One wastewater treatment unit was constructed, which is used by two farmers for vegetable and fodder cultivation in three acres.

In-situ soil and water conservation practices have been promoted. Improved variety of seeds of groundnut and ragi were introduced and this has improved their crop yield by 14-17% during kharif 2014-15. During kharif 2015-16, crop demonstration has been taken up involving 55 farmers in 25 ha. This year 2015 saw very poor and scanty rainfall, which has severely affected the sowings and crop stand in the district and in the watershed area. Water harvesting structures were helpful in sustaining the bore wells to provide at least one or two irrigations, in spite of sharp decline in water table in the wells. Due to increased water availability through watershed interventions, farmers are able to invest in drip system for vegetable crops, which has increased the productivity and income, with high value crops. Steps to enhance farmer's capacity by conducting training program, exposure visits and field days were are also undertaken.

There is also good convergence with on-going programs of line departments. For example: 10 farmers have been covered under K*rishi Bhagya*; and financial assistance to women SHGs from NABARD and bank linkage.

Background

The "Markandeya Samgra Jala Sampnmula Niravahane Samithi" supported by Coca-Cola India Foundation for Rural Water Infrastructure and ICRISAT led consortium along with MYRADA, farmers and Government of Karnataka identified a meso-watershed in Kolar taluk

of the district. This watershed is spread over 1,333 ha area with 1,411 households and covers eight villages. The eight villages of Vakkaleri Hobli are in vicinity of Kolar town at a distance between 6 and 16 km. The selected villages in the watershed have dry climate with an average rainfall of about 710 mm. This was a pilot site for improving water use efficiency and groundwater recharge and strengthening ecosystem services through community watershed management program.

Kolar district is situated in Eastern Dry Zone of Karnataka. Groundwater depletion is major concern for agriculture in Kolar district. Groundwater is being used for irrigating cash crops such as tomato, chili and mulberry. In addition, wide spread plantation of *Eucalyptus* has been the main reason for depletion of groundwater resources. Presently groundwater is available at a depth of more than 300 m.

During the period various activities undertaken are: soil and water conservation that include - farm ponds, gully check and sunken pits and *in-situ* moisture conservation system; productivity enhancement initiatives like – soil test based fertilizer application, improved crop varieties selection; crop diversification – floriculture and vegetable cultivation; afforestation with *silver oak, neem* and *gliricidia*; livelihood activities like supporting women SHGs for dairying, backyard garden, tailoring, petty shops, etc.

Soil and Water Conservation

The soil and water conservation and groundwater recharge structures constructed were: farm ponds (13 nos. size 15m x 10m x 3m and 10m x 10m x 3m), field bunding (9,000 m^3 covering 65 ha) and gully plugs (75 nos.), ponds "*go katte*" for cattle (2 nos.) have been constructed (Figure 1). As the watershed has low potential of runoff in waterways, major focus has been given for farm ponds construction to harvest the runoff from individual fields of farmers. These farm ponds have been very beneficial in terms of storage of water after percolation. All the water harvesting structures constructed so far, total 29 farm ponds and 75 stone checks were constructed to store excess runoff water from farmers' fields, which all together created to harvest 13,500 m^3 of net storage capacity resulting in total rainwater harvested is 33,750 m^3 depending on the rainfall during the year. One wastewater treatment unit constructed, which is used by two farmers for vegetable cultivation in three acres of land.

Productivity Enhancement

The crop yield data of productivity enhancement through improved verities and balanced fertilizer application participatory trials (45 nos.) were conducted during 2014-15. The results showed productivity improvement by 14% in groundnut, 17% in ragi (Table 1 and Fig. 2). The crop demonstration during 2015-16 involved 55 farmers in 25 ha (Table 2). Year 2015 had very poor and scanty rainfall, which has severely affected the sowings and crop stand in the district and also in the watershed area. Water harvesting structures were helpful in sustaining the bore wells to provide at least one or two irrigations, inspite of sharp decline in water table in the wells those are located away from farm ponds.

Farm pond, Mudavatti

Farm pond, Shattiganahalli

Trench cum bund, Mudavatti

Gully checks with a sunken pond in drain

Figure 1. Water harvesting and groundwater recharge structures in Coco Cola-ICRISAT watershed, Kolar

Table 1. Impact of balanced micronutrient application with improved variety on groundnut and ragi during *kharif* – 2014.

Crop	Treatment	Pod yield (kg/ha)
Groundnut (ICGS 91114 and local var)	Improved Practice (IP) (RDF* + Agribor + Zinc Sulphate)	1,776 (14)
	Farmers Practice (FP) (RDF)	1,560
Ragi (GPU 28) with two irrigations	Improved Practice (IP) (RDF* + Agribor + Zinc Sulphate)	2,650 (17)
	Farmers Practice (FP) (RDF)	2,260

* RDF: Recommended Dose of Fertilizers; crop variety: local; * figures in parenthesis are percentage increase over control.

Figure 2. Farmer Mr Gopal s/o Narayanappa, Janganahalli showing his ragi crop grown with improved Practice, 2014-15.

Table 2. Crop demonstration during 2015.		
Crop	**Area (ha)**	**No of Farmers**
Groundnut	6	15
Finger millet	12	25
Pigeonpea	6	12
Castor	1	3

Crop Diversification and Intensification

The increased water availability due to watershed intervention with rainwater harvesting structures with the support from the project and convergence of department schemes that complements farmers to diversify to high value crops like floriculture and vegetable crops (Figure 3). With the convergence of horticulture department farmers are going for drip irrigation system this year.

Figure 3. Farmers show interest to diversify to horticultural crops in Kolar watershed.

Other Activities

Bund plantation with horticultural plants with 3,812 plants covering 15 ha benefitting 68 farmers and forestry species about 4,000 plants of silver oak, *Gliricidia* and neem covering 20 ha benefitting 30 farmers has been done. Vermicomposting has been done with 10 farmers with vermi bed size of 3m x 1m x 1m, which can prepare 10-12 tons of manure in 8-10 weeks. In addition to this, with the convergence of department schemes, vermi beds have been provided to farmers. Two Animal Health camps were conducted in Dandiganahalli and Jangalahalli, where more than 138 farmers benefitted. Domestic wastewater treatment and safe reuse system was introduced last year is benefitted two farmers to grow vegetable even during extended dry spells this year. Figure 4 shows the various livelihood activities in watershed.

Figure 4. Various livelihood activities in Coco Cola-ICRISAT watershed, Kolar

Several SHGs have taken up activities to improve the livelihoods with convergence and linkage of banks to SHG members for financial support. Watershed project coordinated to train 13 SHG members on tailoring by Community Management Resource Center (CMRC) of MYRADA and linked SHGs to banks for financial support to buy sewing machines to improve their livelihood. Similarly Watershed project has facilitated farmers (11 groups consisting 15

members in each group) to avail loan from NABARD for the purchase of mulching animals. To encourage women farmers to improve home nutrition and additional income, 300 fruit plants (sapota, jamun and lemon) were distributed on the occasion of International Women's Day celebration.

Awareness and Capacity Building Activities

Capacity building activities play a very critical role in effective participation and implementation of watershed program. Several awareness and capacity building activities have been taken up in the watershed for effective dissemination and wider implementation of watershed interventions. Various activities in this direction include need-based trainings on different tropics, field day, information through display of wall writings and video screenings using pico projectors (Table 4 and Figure 5). An innovative digital extension system was introduced to reach large number of farmers using a hand-held pico projector to show videos of improved practices to farmers as an effective tool. Nine video screenings have been done covering 96 farmers.

Table 4.Capacity building activities in watershed, Kolar.

Sl No.	Details of Training	No. of Trainings	Participants (nos.)	
			Men	Women
1	Training on improved agricultural practices, soil and water conservation, livestock management, etc. for farmers	28	165	55
2	Training for SHGs activities, and watershed committee members	3	25	110
3	Digital extension for watershed staff and lead farmers	1	10	4
4	Exposure visits to farmers (Krishi mela, Kamasamudra watershed, milk federation)	5	30	12
5	Jatha program with farmers and school children	1	75	35
6	International Women Day	1	25	210

Digital extension system; During field day, officials address farmers after the field visit

International women day celebration

Fruit plants distributed to women farmers; exhibit displaying improved seeds and posters

Figure 5. Various capacity building activities conducted in Coco Cola-ICRISAT watershed, Kolar.

International Women's Day Celebration at Coco Cola-ICRISAT Watershed, Kolar, Karnataka.

"International Women's Day" was celebrated at Mudavatti village in Coco Cola-ICRISAT watershed, Kolar on 11 March 2015. About 200 women farmers representing 30 SHGs participated in the program. The invitees/resource persons included women officers and gram panchayat members like: Ms Bhagya Lakshmi Agriculture officer, Ms Savitha Panchayat Development officer, Dr Sharada Medical officer, Ms Ashwathamma, Gram panchayat president and Ms Arpita and Ms Rupa Soukhya Samriddhi Samsthe. Assistant Director of Agriculture of Kolar taluk also present on occasion. The event was organized by ICRISAT and MYRADA.

Women officers highlighted the role of women in the bringing up the family and society. The speakers also inspired the women participants by sharing the achievements and success in their respective role as employee or gram panchayat members. They all gave a clear message that there are several initiatives from government and civil societies for the upliftment and empowerment; but it is the responsibility of women folks to make use of such scheme also briefs the hurdles and difficulties of women to overcome to achieve the goal. Medical Officer Dr Sharada highlighted the issues and deficiencies of food nutrition faced by women and children and importance of balanced for good health and wellbeing. A stall exhibiting the ragi products and improved cultivars of seeds were setup for participants.

ICRISAT officials briefed various watershed initiatives for the poor farmers and women self-help group initiatives. Women farmers' representatives also spoke the benefits of Coco Cola-ICRISAT watershed project and their visit to ICRISAT. As part of nutri-kitchen garden initiative of watershed to encourage women farmers to improve home nutrition, fruit plants were distributed. Farmers were appreciative of the project which has provided good livelihoods through various initiatives and more so to bringing in the awareness to women farmers for development (Figure 6 to 9).

Figure 6. Dr Sharada welcomed by watershed committee member Sujathamma

Figure 7. Women farmers sharing her views

Figure 8. Fruit plants were distributed to SHG women for kitchen garden

Figure 9. Ragi food products were displayed as nutritious food

ANNEXURE I

Coco Cola-ICRISAT Watershed, Kolar

Progress of Activities from August 2014 to September 2015

Sl. No		Activities	Total Achieved	Beneficiaries (nos.)
A		**Soil and Water conservation structures**		
	1	Farm pond (FP)	13	13
	2	Gully checks	75	150
	3	Water pond for cattle ("*Go Katte*")	2	150
	4	Water used from wastewater treatment unit	2	2
B		**Income generating activities**		
	1	Vermi composting	10	10
	2	Fruit plants distribution to SHG women for kitchen gardening	300	300
	3	Bund plantation with horticultural plants provided to farmers	3,812 (15 ha)	120
	4	Forestry species to plant on bunds	4,000 (10 ha)	30
C	1	**Livestock Improvement**		
	2	Animal health camp	2	138
D		**Productivity Enhancement conducted trails**		
	1	Crop demonstration (variety and balanced fertilization)	25 ha	55
	2	Integrated nutrient management (Bhoo Chetana)	600 ha	450
E		**Capacity building /training/awareness**		
	1	Farmers trainings	11	366
	2	International Women's day	01	350
	3	Field day	01	22
F		**Exposure visits**		
	1	Krishi mela, Kamasamudra watershed, milk federation	05	42