

# Information Brief



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## Securing Small Farmer Livelihoods through a Group Micro-Irrigation Approach: A Case study of Israipalli, Mahabubnagar district

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### ■ The context:

Indian agriculture can be characterized as a sector dominated by small and marginal producers, as 80% of the farmers own less than 2 ha of land in the country (Singh, 2012). These small patches of land are the main source of livelihood for 65 % of the population, contributing to the food security of over a billion people (Shiva, 2007). Field experiences reveal that despite the numerous schemes, technology inputs and new methods of productivity enhancement in agriculture, the production costs continue to increase while crop yields are on a steady decline for smallholder farmers. Access to government schemes is found to be low among smallholder producers, even where subsidies are as high as 90%, as in the case of micro-irrigation (MI). A study on MI adoption across 9 states in India by Palanisami et al. 2011, found that only about 9% of the MI potential in the country is achieved. The overall impression is that these systems are capital-intensive and mainly suited for water assured farm owners.

In this context, WOTR undertook an action research project to assess the possibility of enhancing agriculture productivity for a group of small holder farmers. The focus was on pooling of the water resources, sharing it through use of drip irrigation and supporting the farmers with improved agriculture practices. The unique feature is that, while the small patches of land are owned by individual households, they are managed as one large farmland using common water sources and a drip system. In this approach, while the assets at the individual farmer level are

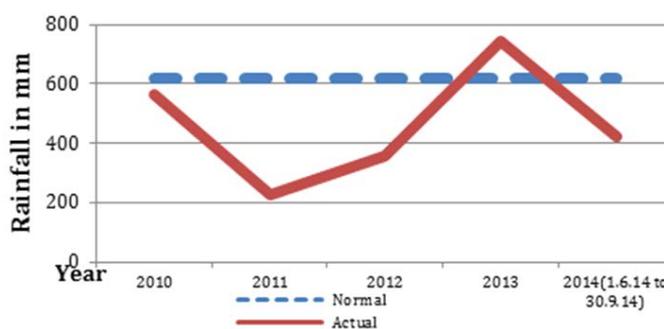
maintained, there are common assets which the group manages collectively.

The objective of this action research was to study the possibility of a collective approach to enhancing agriculture productivity to improve food and livelihood security for the small land holders.

The project is located in the Israipalli hamlet of Veljal village in Talakondapalli Mandal, of Mahabubnagar district, in the state of Telangana. The project site is a village where the Integrated Watershed Management Project (IWMP) is being implemented by WOTR.

Mahabubnagar is considered a backward district in the state where drought is frequent<sup>3</sup>. The climate is characterized by hot,

**Figure 1: Rainfall Pattern of Thalakondapalli Mandal/Block**



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3. <http://mahabubnagar.nic.in/index.php>



moist summers and mild, dry winters. While the average rainfall is 604 mm per annum, the rainfall received in the district is scanty and erratic, hence drought prone. Figure 1 shows the annual rainfall for the period 2010 to 2014 in the block where this IWMP project is located.

## ■ Study Methodology:

The year 2012 is considered the pre-intervention period and 2013-14 post intervention. Data for the pre-intervention period was collected on a recall basis. Post intervention, systematic data was collected during the course of this study through focused group discussions (FGDs), interviews (structured questionnaires) with the HHs for the weekly / monthly agriculture inputs and production. Season-wise crop data was collected for the 18 participating households during 2012 to 2014. The parameters imputed to arrive at the crop production costs include land preparation using tractor /bullocks; labour costs for weeding, transplanting and harvesting; input costs such as planting material, fertilizers/pesticides/micro-nutrients and costs for marketing. Data was rechecked during the Farmers Field School classes held each week. Gender disaggregated data was collected on their role, decision-making and extent of technology transfer in the context of agriculture and food security.

## Sample details:

### Hamlet profile:

There are 49 households (HH) in the Israipalli hamlet of Veljal village. All households of this hamlet belong to the schedule caste (SC) community. These HHs own agriculture land, yet barely cultivate it due to low financial capital, the deteriorated land quality and limited irrigation sources. Even today, the primary occupation of the majority of these HHs in the hamlet is agriculture wage labour, government schemes like MGNREGS, watershed projects and rainfed agriculture.

### Selection of participating households:

Of the 49 HHs in the Israipalli hamlet, 18 HHs were purposively selected for participation in this action research project, because these HHs had adjoining land-holdings and used common water sources for agriculture. The key reason behind sharing the water was that the bore wells were commonly owned. These were earlier provided under a government scheme. However, water from the 2 bore wells was insufficient for irrigating all 18 acres. During any year, water was available for the land for only 3-4 households, hence was shared on a rotation basis. Those who had water would take up agriculture, while others sought income through wage labour. Over the years, seven HHs of the group attempted digging new private bore wells. Of these, all failed except one. In discussions people indicated that the groundwater table in the area had dropped from 200 ft to 500 ft, which was the cause of failure and the huge losses of up to Rs.35,000/- incurred per borewell, per farmer.

### The Process:

Building on an already existing practice of water sharing between the members, WOTR introduced drip irrigation as an incentive to pool the water for better outreach. This was implemented in 3 steps:

- (i) formation of a Common Interest Group (CIG);
- (ii) collectivization and sharing of water from the sources through a common drip irrigation system; and
- (iii) training farmers in sustainable agricultural practices through the farmer field school (FFS). The main objective of the project was to promote the concept of collective farm management integrated with water budgeting based crop planning, efficient water use systems, and improved agricultural practices<sup>4</sup>. In consultation with a company that has expertise in drip irrigation along with technical support from CRIDA, a customized drip irrigation layout was prepared and installed. The drip system was given to the group as a soft loan with an agreement of payback of the principle amount from the 3<sup>rd</sup> year onwards (specific to this case). The focus was more on getting these farmers to accept the new method of agriculture practices and testing the new mode of working as a group, rather than loan repayment, particularly as this experiment was with a group of small land holders. It was expected that the approach would help build the resilience /response capacity to manage agriculture related climate risks.

### Water Sharing Mechanism and Incentives:

Instead of just 3-4 HHs irrigating their crops each year, the drip system now connects the 3 functioning bore wells, providing irrigation to all 18 households. To assure that all 18 households access and use the drip effectively, WOTR facilitated the CIG to take a few decisions on creating a maintenance fund, setting rules on sharing water with private bore well owners within the group, and the extent of area to be taken each year under water-intensive crops. The rules assured that all households get water equally, while helping them to manage the drip system and the bore wells collectively. The cost of electricity is at the moment completely subsidized by the state.

## ■ Results and Discussion

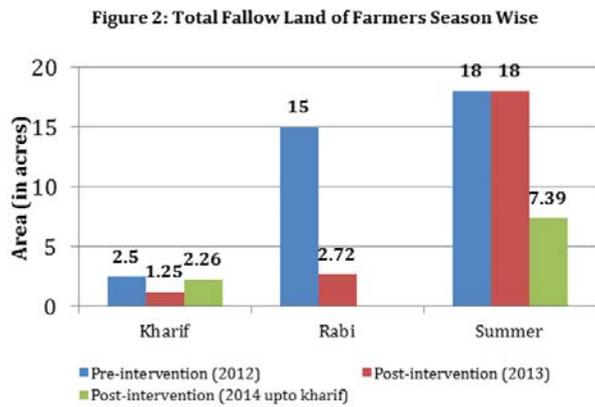
This collective effort coupled with improved practices in the project site have resulted in an increased area under crop production, diversified crops and better yields, low input cultivation practices, increased incomes and improved nutrition in the participating households.

### 1) Change in land use – decrease in private fallow lands:

Figure 2 indicates the season-wise change in total fallows of the participating households. The noticeable change is observed in the summer season. In the pre-intervention period (2012) and in year 2013 all the 18 households left the land fallow, whereas in the summer of 2014, the fallows were considerably reduced because of assured irrigation. The area left fallow in kharif 2014 is almost similar to that of 2012 which is due to the low rainfall

4. These include SCl a modification of the System of Rice Intensification (SRI) to other crops, non-chemical pesticide management etc.

during both years (figure 1 above). However, it is important to note that, despite the poor rainfall in the kharif of 2014, nearly all



18 households were able to cultivate some crop without incurring a loss in income from agriculture (refer to Kharif 2014 table 1 and figure 3 below); this implies that this method has helped build the response capacity of farmers to manage climate risks to some extent.

**II) Change in cropping pattern – Shift towards vegetable crops:**

Table 1 shows a gradual shift from cotton and maize to vegetable crops in the kharif season post-intervention (2013 and 2014). It is also observed that farmers continued to grow vegetables during the rabi and summer seasons. Tomato and chillies are valued by farmers as is observed from the higher average area and number of plots in the post-intervention period. Other vegetable crops grown are brinjal, ladyfinger and small cucumber.

**Table 1: Average area cultivated during a season per farmer for major crops (in acres)**

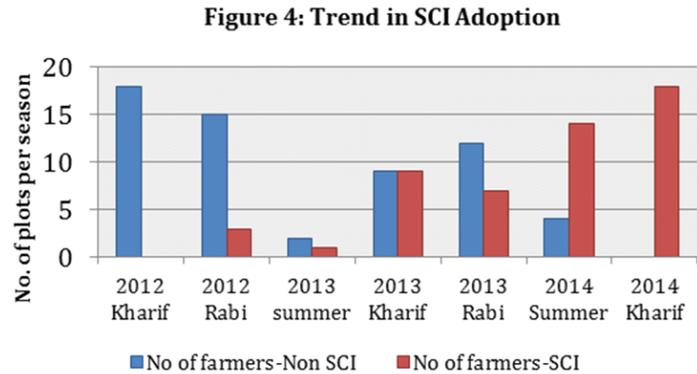
Season & Year	Kharif			Rabi		Summer		
	2012	2013	2014	2012	2013	2012	2013	2014
Cotton	0.85 (9)	0.90 (10)	0	0	1.0 (8)	0	0	0
Maize	0.83 (3)	1.0 (2)	2.5*(2)	0	0	0	0	0
Tomato	0	0.46 (6)	0.45 (15)	0	0.31 (6)	0	0	0.32 (14)
Chillies	0	0.30 (5)	0.29 (12)	1.0 (1)	0.25 (6)	0	0	0.40 (14)
Other Vegetables	0	0.33 (3)	0.16 (3)	0	0.22 (4)	0	0	0.31 (6)

**Note:** Figures in parenthesis indicate the number of plots of major crops grown per farmer. Hence do not add up to 18 acres. \* Two farmers have cultivated land of neighbouring farmers taken on lease, hence the increase in area per farmer.

**III) Improved Management Practices:**

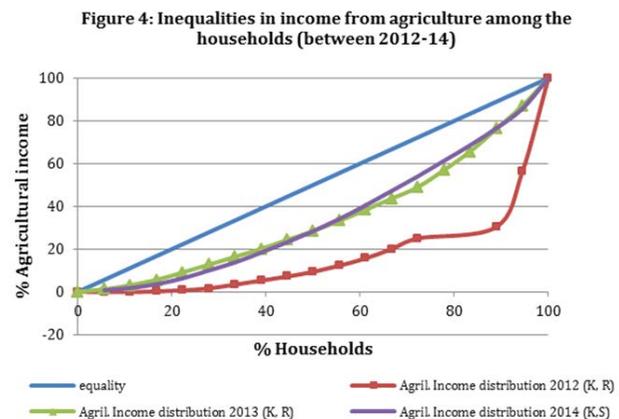
Prior to the intervention, crop productivity and income from agriculture was low for all 18 HHs. They had limited finances to invest in agricultural operations, lacked knowledge on sustainable agriculture practices and the soil was of poor quality.

Introduction to the system for crop intensification (SCI) helped farmers improve their crop productivity. The focus was on soil management, crop spacing based on plant type and variety, the systematic application of locally prepared organic inputs like Amruth Khad and Amruth paani<sup>5</sup>; and the application of micro-nutrients to manage loss due to crop specific physiological conditions. While the SCI method was demonstrated both on commercial and food crops, the adoption of the method was visible only in vegetable crops from 2013 onwards ( Figure 4)



**IV) Reduced inequalities in agricultural income:**

Figure 4 shows the inequality in distribution of agricultural income across the households over the three time periods 2012, 2013 and 2014. The straight line assumes equal distribution of agricultural income. The distance of other curves from the straight line indicates the inequalities. The curve representing year 2012 (pre-intervention) is the farthest from the equality line. It shows that about 72% of the households earned about 25% of the agricultural income generated that year. Very few HHs could avail of irrigation, therefore could cultivate crops, while others left their land fallow. In the post-intervention period, the curves gradually shift towards the equality line. In 2014, 72% of households received 54% of the total agricultural income generated during the year. This can be attributed to increased access to irrigation by more farmers resulting in increased cultivated area and reduced fallows<sup>6</sup>.



According to the participating farmers, the reasons for the increased incomes were: (i) the shift to vegetable cultivation from

5. These are organic fertilizers and growth promoters prepared using cow dung, cow urine and other locally available ingredients. Application of this increases the soil's water holding capacity, promotes plant growth and acts as an insect repellent. Results are noted in improved soil health; plants having higher tolerance to heat, pest attacks and better growth thus contributing to higher crop yields.

6. In this study, due to lack of funds, the equipment to assess the ground (bore-well) water levels could not be installed.

other commercial crops such as cotton, maize, sunflower; (ii) the lowered input costs, and (iii) the increase in crop yields. The incentive for the shift to vegetables was that weekly cash that came in. Some of the farmers in the CIG claim that while the selling price of tomato was as low as Rs.2 /kg in the rabi 2013 and kharif 2014, they did not incur any loss. This was primarily due to the low cost of production per acre (lower crop density, no chemical fertilizer and pesticide used) and increased yields by the adoption of the SCI method. The SCI method demonstrated that organic agriculture does not reduce yields, and increased spacing between crops is essential, infact it enhances yields.

Additionally, the benefits obtained through the initiative triggered the 18 HHs to sell the produce collectively in 3 different weekly markets in the nearby towns of *Velijal, Talakondapalli and Midgil*, by engaging a common vehicle to transport the produce. The interview with women farmers revealed that the value and importance of chemical pesticide free vegetables is recognised by the rural consumers as their produce is sold quickly, assuring them income. Most of the farmers shared that through this project they have been able to repay debts. It provided them with two livelihood sources - through cultivation of their land and the MGNREGS / IWMP wage work. Village elders remarked that for the first time these 18 HHs are cultivating their own fields during the rabi and summer seasons. They would otherwise go for wage labour, migrate or just sit idle having limited or no income opportunities.

#### V) Improved nutrition:

Focus group discussions with women farmers surfaced some interesting observations. The shift in cropping pattern caused a major change in their diet and nutrition status. The earlier diet of rice or sorghum with red chilli powder now included vegetable and pulses. Women farmers shared that this change in diet has improved the children's health as they now consume from a range of vegetables, pulses and millets along with eggs and chicken from the backyard poultry<sup>7</sup>. The villagers claim that the project has brought in surplus cash to spend on children's education as well as agriculture investment for the next season – indicating an improvement in quality of life.

7. An initiative of WOTR as part of SDC-CCA project

#### VI) Active participation of women:

Having the CIG composed of 50 per cent women has greatly enhanced women's knowledge of crop production technologies; the setting and maintainance of drip irrigation systems; decision making in the CIG meetings and marketing of the produce. The daily income flow from sale of vegetables has given them a huge relief, as the risk of repayment of loans taken from SHGs and mangaing other HHs responsibilities are usually theirs. It was observed that some women farmers further modified the crop plan. A small section of their plot was set aside within which 5-6 plants of different vegetable varieties (similar to a kitchen garden) were grown. This was exclusively for home consumption. From being mere wage labours with limited opportunities, the women now handle many more aspects in agriculture, from crop selection, harvesting, to marketing of the produce.



## Impacts of the Group Micro-Irrigation Approach in Israipalli

1. In the pre-intervention period, only 3-4 households were able to irrigate crops each year. Post-intervention, the method of collectivizing water and distributing it through the drip system provides irrigation to all 18 households.
2. Increased availability of water for irrigation has resulted in farmers being able to take crops during 3 seasons (Kharif, Rabi & Summer). It also introduced crop diversification.
3. Pre-intervention showed that about 72% of the households earned only about 25% of the agricultural income generated.. However, in the post-intervention period, 72% of households received 54% of the total agricultural income generated which can be attributed to increased access to irrigation.
4. Improvement in the food intake of the family, because of the availability of fresh nutritious food, was observed by the women farmers.
5. Higher yields from SCI farming reduced losses in agriculture despite drop in crop prices.

## ■ Lessons Learnt

The implementation of the GMI in Israipalli, during the period from summer 2012 to kharif 2014 surfaced useful lessons.

1. Small holder producers can manage drip systems as well as all other technologies; however these technologies need to be implemented in an integrated manner with sufficient capacity building support.
2. The formation of a common interest group plays a critical role in facilitating the agriculture extension services to both women and men farmers. Systematic capacity building on new agriculture technologies, regular and timely farmers' field schools with on-site assistance is logistically easier.
3. Up-scaling of this initiative lies in identifying sites where groups of farmers have adjoining lands with individual bore wells and are willing to pool their water sources to do agriculture collectively. This is one of the key points for success of the GMI.
4. The approach of designing the drip system such that small land fragments are effectively operated as “one large farm” although owned by many has proven effective. It enhances group confidence, while reducing the risk of individual farmers abandoning the technology, should problems arise in maintenance and operation. As some farmers are proactive and fast learners, it further increases the confidence among group members, resulting in adoption of practices by the more cautious farmers in the group.
5. The maintenance fund generated by the group (monthly contribution), helps them repair and maintain the system at the earliest. It is also an incentive for private bore well owners within the group to continue providing the needed water to other members.
6. An important factor is that the drip system is not considered a stand-alone input but is complemented by other supporting interventions such as improved cultivation practices, higher powered submersible pump-sets, bore well repair /flushing and regular maintenance, *amruth khad* and *paani* preparation pits etc. that makes GMI a workable option. Provision for these supporting components through a “single source” makes such initiatives easily scalable and far more effective.
7. Sufficient rainfall is required for the GMI approach to be successful.
8. The approach may be considered climate smart. It pools groundwater resources; uses water efficient systems; crops are planned based on water availability. It promotes organic farming to improve soil health and follows the system of crop intensification. The combination has resulted in multiple benefits to small holder producers: increased incomes, reduced risks through crop diversification, building response capacity to manage climate risks and food and nutritional security as discussed above. **This will be further enhanced by providing locale specific crop weather advisories.**
9. It is recognized that the project, as well as its extension to other groups, would need to be studied for a longer duration in order to draw more robust conclusions.





**Israipalli hamlet,  
Veljal village,  
Mahabubnagar**



## ■ Towards Up-scaling:

Observing the successful implementation of the Israipalli pilot with 18 farmer households, four other groups in neighbouring Jangareddipalli and Rampoor villages (total of 33 farmer HHHs) within the same IWMP project have been motivated to take up the GMI approach. As of now, of the 4 groups, one GMI project having 11 farmer households and covering 17.5 acres is installed, while the other 3 groups are awaiting sanction from the Telangana State Micro-Irrigation Project (TSMIP) - a key programme of the state that provides drip systems to farmers with subsidies. When implemented, these five GMI projects will reach a total of 51 farmer households and will cover approximately 90.5 acres that will be brought under sustainable agriculture cultivation by the end of 2015.

The success of this pilot initiative could result in it being up-scaled, mainstreamed and adopted in the TSIMP, the IWMP and other state programmes.

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## About Watershed Organisation Trust, (WOTR)

Established in 1993, WOTR is a non-profit that engages at the intersection of practice, knowledge and policy across scales and in collaboration with stakeholders from across sectors. Headquartered in Pune, WOTR has supported and carried out developmental work in over 3500 villages across 7 states of India.

WOTR assists rural communities to assess their vulnerabilities to climate and non-climatic risks. It organizes them in a socially and gender inclusive manner to help themselves out of poverty by regenerating their ecosystems in a holistic and integrated manner, conserving and optimising resource use, especially water, and undertaking climate smart sustainable livelihoods.

Being a Learning Organisation, WOTR undertakes applied research and closely engages with institutions and governance actors so that insights and good practices derived from ground experience contribute to shaping enabling policies and effective programs. With a view to up-scale successful interventions, WOTR develops pedagogies for implementation and organises a variety of knowledge sharing and capacity building events for stakeholders across the civil society, developmental and governance spaces, from India and other countries.

## About SUGAP

The Scaling Up Good Adaptation Practices (SUGAP) project is a partnership between the Swiss Agency for Development and Cooperation (SDC), the Watershed Organisation Trust (WOTR) and the World Resources Institute (WRI) to further the development of climate resilience in semi-arid regions of India. The partnership conducts research, convening, and outreach to promote climate change adaptation policies and funding programs at national and international levels.

The lessons drawn in this Information Brief are from the Integrated Watershed Management Project (IWMP), implemented by WOTR in the Thalakondapalli Mandal, Mehboobnagar District. Innovative activities in this project were supported by the IWMP, SDC and WOTR. The study of the Group Micro-Irrigation Approach was funded by the SDC.

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