Community Managed Micro Lift Irrigation Scheme (CMMLIS): A compilation of Best Practices

JHARKHAND STATE LIVELIHOOD PROMOTION SOCIETY
RURAL DEVELOPMENT DEPARTMENT, GOVT. OF JHARKHAND

Contents

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FOREWORD

I am delighted to share the remarkable achievements of our state-sponsored lift irrigation scheme, largely based on solar powered irrigation system. This innovative approach to irrigation has been a game changer for our farmers, who have seen significant increases in crop yields, cropping intensity and improvements in their livelihoods as a result. I draw immense pleasure in witnessing and promoting the success stories that have unfolded in the remote areas of the state.

The adoption of solar lift irrigation in Jharkhand has a positive impact on the environment. By reducing dependence on fossil fuels, we are contributing to the fight against climate change and promoting sustainable agriculture. The success of solar lift irrigation in Jharkhand is a result of the collective endeavors of farmers, project implementers, officials from JSLPS and technical support agency Transforming Rural India Foundation (TRIF). State Irrigation Execution Cell (SIEC) is continuously providing technical support to the farmers in designing layouts, DPR preparation through digital application, installation support, capacity building of Water User Groups and on-field execution of the schemes.

I extend my sincere thanks to all the stakeholders involved in the implementation of solar lift irrigation in Jharkhand. Your dedication and hard work have made a tangible difference in the lives of our farmers and in the overall development of our state's primary livelihood sector.

Looking ahead, I anticipate the continued growth and expansion of this initiative. Together, let us work towards mitigating climate change impacts, fostering climate-resistant and adaptive agriculture in our state through the power of green energy.

These stories will inspire many!
Best Wishes.

(Chandra Shekhar)

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Preface

The collaborative effort of Jharkhand State Livelihood Promotion Society (JSLPS) and Transforming Rural India (TRI) has made a significant transformation in the life of rural Jharkhand through appropriate implementation of State Funded Lift Irrigation scheme. The state of Jharkhand essentially necessitated assured irrigation to enhance the carrying capacity of land and cropping intensity. Crop diversifications is challenging as majority of lands are found non-arable. This scheme has established a large number of micro lift irrigation systems powered by renewable energy sources, benefitting substantial number of small and marginal farmers of Jharkhand state.

Utilization of surface water without spending much on water source creation is one of the highlights of this scheme. This approach reduced the cost of the scheme significantly resulting in benefitting a greater number of households in the state. Community institutions have played a great role from demand generation to optimum utilization of the scheme. The active involvement of community institutions enhances their ownership and self-assurance to manage the scheme while utilizing the irrigation system optimally.

The importance and role of knowledge sharing and cross learning across various stakeholders in enabling the state to address numerous development challenges can't be ignored. This compendium is an attempt to document and disseminate many such sustainable measures undertaken under the scheme and offers an opportunity to replicate these good practices in their local context.

I would like to appreciate the efforts of project staff, experts, community institutions, water user group members all of whom are involved directly and also to those who are putting positive influence on the scheme indirectly. The success stories are found insightful and will act as succor to all farmers to go ahead for shaping their life in a better way. This may serve as ready reckoned to other departments, agencies and non-government organizations while taking up similar schemes.

I am confident that these success stories will be energizers for the scheme and will act as a catalyst in achieving our long-term goals.

Best wishes,

(Sandeep Singh)

Abbreviations

RDD	Rural Development Department
JSLPS	Jharkhand State Livelihood Promotion Society
TRIF	Transforming Rural India Foundation
ATMA	Agricultural Technology Management Agency
CMMIS	Community Managed Micro Irrigation Scheme
DBI	Diversion-based Irrigation
IWMI	International Water Management institution
JSLPS	Jharkhand State Livelihood Promotion Society
JOHAR	Jharkhand's Opportunities for Harnessing Rural Growth
JREDA	Jharkhand Renewable Energy Development Agency
ASER	Annual Status of Education Report
MNRE	Ministry of New and Renewable Energy
VO	Village Organization
SIEC	State Irrigation Execution Cell
NABARD	National Bank for Agriculture and Rural Development
WUG	Water User Group
i-PFT	Irrigation Project Facilitation Team

Background and Rational

There are several studies and reports that provide evidence to support the benefits of solar lift irrigation. A study conducted by the International Water Management Institute (IWMI) found that the solar lift irrigation systems can provide irrigation water at a cost that is competitive with diesel-powered systems, and can also provide water during periods when grid-based electricity is not available.

Another study conducted by the United Nations Development Programme (UNDP) found that solar lift irrigation systems can increase crop yields by up to 50%, compared to traditional irrigation methods. A report by the National Bank for Agriculture and Rural Development (NABARD) states that solar lift irrigation systems can help in reducing the dependence of farmers on traditional energy sources, such as diesel and electricity, for irrigation. This can lead to significant cost savings for farmers and reduce carbon emissions.

According to the Ministry of New and Renewable Energy (MNRE), India has set a target of installing 30 GW of solar lift irrigation systems by 2022. This demonstrates the government's commitment towards promoting solar lift irrigation as a sustainable and cost-effective solution for agriculture and irrigation.

The World Bank has also invested in several solar lift irrigation projects in India, recognizing it as an effective solution to improve farmers' livelihoods and increase crop yields.

These studies and reports provide strong evidence to support the benefits of solar lift irrigation for increasing crop yields, improving farmers' livelihoods, reducing costs, and protecting the environment.

Brief Overview of Scheme

Jharkhand largely comprises of the forest tracks of Chhotanagpur plateau and Santhal Pargana having distinct cultural traditions. The state has 24 districts, 212 blocks and 32,260 revenue villages. Located on an elevation of 300 to 610 meter above sea level, the climate of the state ranges from dry semi humid to humid semi-arid types. The state comes under the 'Agro - Climatic Zone VII' i.e. Eastern Plateau and Hills Region. This region is further subdivided into three zones namely, central and north eastern plateau zone and western plateau. Agriculture is the primary source of income for Jharkhand's rural communities. The scheme aims to address the insufficient irrigation facilities for small and marginal farmers with 1-3 acre of land holding and envisages creating infrastructure to increase the total cultivated land. By 2021, irrigation facilities have been made available for 4.4 lakh hectares of land through major, medium and minor irrigation schemes initiated by the Department of Rural Development and Department of Minor Irrigation.

The state government has initiated comprehensive efforts to ensure greater emphasis on micro-irrigation to bring cultivable land under irrigation. The streamlined planning and implementation process covers all the steps, from application and installation to payment for micro-irrigation equipment. A sustained programme for micro-irrigation has been brought together financing support, operational support and technical assistance.

The main goal of the project is to increase the income of small and medium-sized farmers by providing more efficient irrigation through solar energy. The project aims at reducing extreme poverty and increase shared prosperity by augmenting agricultural revenue and strengthening the resilience of farmers.

Objectives of Intervention

The project's three core components include:

- Investments in solar based irrigation systems and techniques at micro level
- Handholding support and technical assistance to community institutions to manage solar lift irrigation sites
- Sustainable agricultural income for families in intervention areas to reduce poverty and food insecurity

The project is led by the Department of Rural Development, Jharkhand State Livelihood Promotion Society (JSLPS) in convergence with TRIF for planning, convergence of stakeholders and monitoring of implementation.

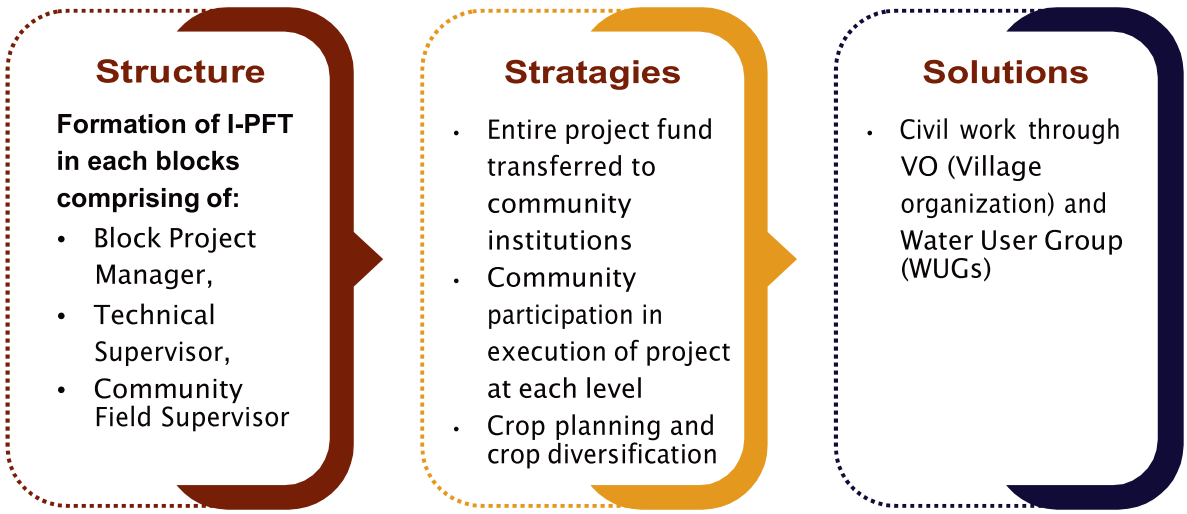
- The project will be carried out in six blocks across six districts
- 20000 acre area will be brought under irrigation.

Block Selection Criteria

The blocks are primarily selected on the basis of water availability and history of previous irrigation initiatives, technical feasibility is also assessed, besides the following criteria is kept for site selection for the scheme.

- Strong social mobilization-presence of large number of Village Organizations (VOs)
- Availability of perennial water sources like rivers, streams, lakes, large dams etc
- Readiness among farmers for scoping for demonstration of diversified and intensive agriculture practices
- Focus on tribal dominated block
- Equity: Absence of projects like Jharkhand's Opportunities for Harnessing Rural Growth (JOHAR)
- As this is a pilot project, the blocks are selected near to prosperous agri-market area.

Implementation Process



The implementation of a solar-based micro irrigation system encapsulates the following processes -

1. Site selection: Tapping surface/available water from perennial water sources:
   - Gravity based schemes
   - Solar lift irrigation
2. Community need assessment
3. Formation of Water User Group
4. Construction of Diversion-Based Irrigation (DBI) system
5. Formation of by-laws
6. Training community on operations and maintenance
7. Handing over the scheme to community

A sociological study was undertaken to understand the agricultural practices, crops cultivated, status and use of irrigation systems and area under traditional irrigation if any. In the survey, the community's willingness to manage and use a diversion-based irrigation system and, to form irrigation collective is understood. A project is initiated only if the community actively participates and elicits interest in the meetings.

Formation of Water User Group

A Water User Group (WUG) is formed by collectivizing farmers falling in the command area of the proposed site.

Civil work: Construction of a pump house, trench digging and filling after pipe fitting. The technical planning stage includes measuring the discharge of determined source point, determination of outlet point locations, head difference between source point and outlet points, and command area of each outlet. This is followed by digging trenches for laying pipelines. The civil work is done through VOs of women led SHGs.

Solar Powered Irrigation Scheme Installed by Women Led Water User Group at Raidih Block

Formation of by-laws: The WUG forms mutually agreeable by-laws regarding the distribution of water, maintenance of structure, fixation of water tariff, collection of water tariff, frequency of meetings, conflict resolution mechanisms, fines and penalties.

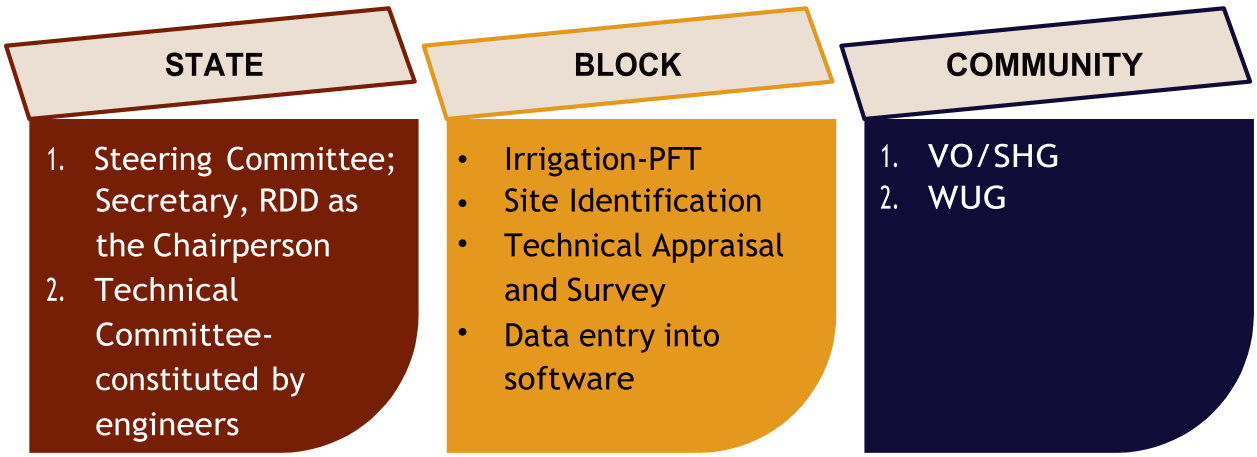
Water management: the use of water is managed through fixation of turns which is done to ensure equitable distribution of water. The rules are formulated upon completion of the construction on the basis of frequency of water usage, time limit, etc.

Training of WUG: The WUG members are trained on operations of the system, book keeping, and corrective measures in case of non-functioning of the system.

Handing over the scheme

After demonstration of the system, it will be handed over to the community for operations and overall management after submission of utilization certificates by the VO. The maintenance will be handed over to the vendor (supplier of solar plates, pumps and other machineries) for three years without charging anything to the farmers. The WUG will primarily be responsible for the continued functioning of the system and ensuring regular water supply.

Institutional mechanism for implementation



Role of SIEC (State Irrigation Execution Cell)

Embedded cell within JSLPS

Scoping and overall technical feasibility

Designing of Models, DPR, estimation, irrigation software,

Supporting on procurement and tendering

Project scrutiny and training of i-PFT staff

Summary of Outcomes

The project is led by Department of Rural Development, JSLPS in convergence with JREDA, with technical assistance from TRIF for planning, convergence of stakeholders and implementation.

- 9490 acres of barren and unproductive land brought under cultivation
- Cropping intensity increased to 200-250% across all irrigation sites
- 520 no of irrigation sites comprising of 9807 farmers in seven intervention blocks
- Migration reduced and renewed interest in farming especially of unemployed youth
- Women leading the way as progressive farmers
- Increased role and visibility of women farmers
- Crop diversification in favour of cash crops and crop intensification across all locations

- Food, nutrition security and increase in household cash income for 9000 farmers in six intervention block : food security throughout the year and surplus production
- Lakhpati kisans : 2-3 Farmers emerging as lakhpati kisan from each intervention site
- Linkage with market for inputs and farm produce
- Investment by farmers for purchase of small farm tools and accessories
- WUG emerged as an important stakeholder; in scheme commissioning, farming, linkage with other programmes and in COVID-19 response.
- Entire project fund is being routed through the WUG/ VOs, helps WUG/ VOs to learn financial management and vendor dealing.

Promising Technologies and Replicable Interventions

The use of solar power for lift irrigation at micro level is proving to be cost effective and sustainable solution for mono-crop and rain-fed agriculture in the region. The most critical issue of the tribal region is food insecurity arising out of unstable monsoon (kharif) paddy crop. Uncertainty of monsoons significantly reduces paddy yields and forces farmers to migrate. Creation of a **decentralized lift irrigation** enabled farmers to provide protective irrigation during critical periods of moisture stress for paddy.

While most of the state is under drought like condition, such simple water control mechanisms improve the food security of farmers in intervention area. The streams and rivulets are optimally utilized through small-scale lift irrigation projects. The Project helps in generating substantial economic and livelihood benefits for poor tribal communities.

Improved Socio-Economic Status of Farmers: Small and marginal farmers from the intervention area have achieved food security throughout the year, surplus production of paddy, vegetables, oil seeds and millets has ensured diet diversity for tribal households. The input cost for agriculture has reduced due to the use of solar energy for lifting water from available perennial sources.

Agricultural income is now sustainable because per season farmers earn net profit of more than 30 thousand rupees. Income from agriculture is strengthening subsidiary sources of income such as poultry, piggery and other livestock rearing activities. It is interesting to note that wheat

which was not part of diet five year ago has now become part of the tribal food platter. Mustard growing farmers reported that they do not buy mustard oil from market because the mustard grown in field completes the HH level oil consumption need and only surplus mustard is sold in the market.

Farmers in intervention area have seen upward movement of poverty profile i.e. the household poverty status has improved from multi dimensionally poor to better off and food secured. Overall, **88.7** percent households in the intervention block have reported overall improvement in well-being in the last three years. This is a significant number resulted from single intervention of installation of irrigation facilities.

Pleasure of barren to productive land in the face of women farmers of sahitoli, raidih block

The role of agriculture in lifting poor out of hunger and poverty has proven to be effective, given the fact that the uptake of technology in tribal areas was weak prior to the intervention. Agricultural extension is reaching tribal areas and therefore role of agriculture will continue to expand in addressing causes of poverty in tribal areas.

Improvements in Cropped Area, Crops and Cropping Pattern

The major direct outcome of the scheme has been an increase in crop yield, crop diversification and intensity. A majority of the farmers in the intervention area are growing three to four crops in a year, from only paddy and madua (Ragi) once a year to winter vegetables, monsoon vegetables, wheat and mustard. Some farmers have also experimented with high value crop like strawberry, capsicum, broccoli, fruit plants like guava, mango etc. A mixed and intensive cropping pattern is being adopted by the farmers.

Agriculture Infrastructures Have Improved

The net irrigated area has increased by 9480 acres along with the gross cultivable area has also increased over the last three-year period. Increase in the number of crops cultivated over the last five years has also been reported. There has also been an increase in fully irrigated area across intervention sites over the last three-year period which has resulted in increase in cropping intensity in tribal areas for tribal households significantly, the results are seen through uses of

Mechanization Improving - Replacing Country Plough to Power Tiller

agricultural inputs such as tractor, trellis, pesticide sprinklers, drip irrigation, establishment of rice processing units at cluster level, rice flour mills etc.

Social and Cultural Practices Makes Tribal Agriculture Unique

The tribal practice of preserving seed genome, subsistence agricultural practice, food habits, reciprocal co-operation in agriculture, non- patriarchal nature of the society, their fairs and festivals linked with agriculture, their practice of mixed cropping, sowing of seeds, storage of crop produce, less use of fertilizer and insecticide make tribal agriculture unique. The intervention has carefully considered these and has not interfered with tradition of tribal communities while enhancing agricultural productivity.

Increased Reach of Agriculture Interventions and Access of Agricultural Services in Tribal Areas

In terms of reach of the development programmes in the villages sampled, a large number of JSLPS supported enterprises are functional. Other agriculture interventions such as subsidies, drip irrigation subsidies and poly houses have reached the villages. However, most of the schemes are availed and accessed by progressive and self-motivated farmers. Moreover, the awareness on credit, subsidies, schemes of agriculture, horticulture, fisheries has increased. It is interesting to note that wherever the access to agricultural services was reported, a critical or catalytic role was played by women led SHGs and their federations and progressive farmers groups.

Community Based Institutional Mechanisms for Agriculture Development

Community based institutions such as farmers club, SHGs and federations are very active. SHGs or other community-based forum has evolved to the desired extent. This makes access to formal banking system approachable in tribal areas for agriculture credit. The outcome indicators in that intervention area show that small and marginal farmers are able to collectivize and part of community institutional mechanisms, which was not the case three years prior to the intervention. Overall, it becomes clear that the community-based mechanisms for agricultural development were utilized in the intervention areas.

Women role in agriculture fully recognized: Women and men play equal role in agriculture, Non-Timber Forest Produce (NTFP) collection and in other means of securing livelihood. Women take decisions on selecting which crops to be sown in which season, selling of produce, negotiating water usage for their field, managing conflict in WUG. They equally participate in agricultural work by being part of activities like threshing, weeding and harvesting.

Climate Change Awareness: Awareness on the climate and environmental issues is spreading among farmers. Steps are being taken to address environmental vulnerability amongst the tribal farmers. 2.5 MW solar energy is being used for irrigation purpose in the drought prone region of Jharkhand.

Credit: Informal credit is no longer the main source of credit; it has declined significantly as per farmers in the intervention areas. The proportion of households depending on moneylenders for their credit needs has changed over the last three years. Approaching the bank for credit is a marked difference in terms of access to institutional sources of credit among tribals and non-tribals.

Number of Best Practices and Programme Model Exist to learn from: It has become very clear that in order to improve the status of tribal agriculture, there needs to be multi-pronged strategies and initiatives in place. Bringing together complementary skills and building synergy through partnerships seems an important area. There is a clear learning that social mobilization and facilitation are essential for technological adoption and sustenance of practices. Models and initiatives are created within the state which could be scaled up for better outcomes.

Success Stories

The success stories are found from the intervention sites. These stories become a motivating factor for other farmers and next generation to involve in farming. Here are few stories of progressive lakhpati kishan to accelerate the forward steps of improve farming.

The Road Less Travelled

Life has turned 360 degrees for Sunita Samad, from finding it difficult to meet ends meet month after month and having to look after her toddlers and elderly in laws to having being appointed as a Sachiv of her Village Organization (VO) in Manhu. Like most of the households in the area, most men would migrate to other cities for almost 8-9 months at a stretch to find work in fishing boats. Therefore, the burden of raising and looking after the family would fall upon solely on the woman. Like Sunita, most women would mostly rely on their agricultural plots to earn some money. However, there wasn't much earning as mostly Kharif crops were grown due to scarcity of water. The problem wasn't that there was no water source available as there indeed was a river flowing close to their village; the problem was that there was no method in place to irrigate the agricultural land using the river water. Here the SHGs and VOs come into the picture as they were

Farmer Profile: Sunita Samad, Manhu - Birhu Panchayat Khunti

Total Landholding: 2 Acres

Income after intervention: 1, 50, 00 Annum

Major crops: Paddy, winter vegetables, mustard and wheat

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains, millet and mustard oil

Investment of farm Income: on her two children's education

Sunita Samad at her chilli field, ready to harvest.

Season	Crop	Food Security	Net income
Kharif	Paddy , Maize kaddu and cucumber	Paddy for year and surplus - seasonal vegetable for self-consumption	35,000
Rabbi	Wheat , pea ,chilly and Mustard	Wheat ,mustard oil throughout the year	85,000
Summer	Bhindi , Nenua (Ridge gourd) and bodi (Snake bean)	Season veggies for family	30,000

instrumental in success of community managed irrigation scheme. When Sunita was elected as the Sachiv, one of the first things she did was to plan out the construction for the community managed irrigation project along with her group members. And today as a result, Sunita's family along with 80 other households are now able to grow and harvest crops all year-long. Moreover, because of the increase in income, most of the men in the village haven't migrated since the lockdown. The families are able to grow high quality coriander and green chillies which bring them Rs. 4000 to Rs. 5000 every month. Seeing the successful outcome of the irrigation scheme, Sunita is now planning to start other ventures like a rice processing unit at the VO level along with her sakhi mandal she says, "I am not confident in doing this alone, however this year we are planning to start either rice processing unit or purchase tractor or power trolley and, we will share the profit as well as the risks as a group". Learning from her experience, Sunita emphasizes more on SHG run enterprises as it helps mitigate risks.

Paving the Way for Farming

Salan Sanga is known to be a risk taker in Manhu villaget When the Lakhpati Kisan scheme was introduced to the villagers, many were apprehensive about it, it was only Salan who confidently when ahead with the scheme. Even more so, when he learnt about drip irrigation and mulching process and how it could maximize land utilization and could provide income all year round with minimal effort, he decided to try his luck and shifted from cultivating pea to strawberry and broccoli, even though the returns from pea were higher, he took risk. And as a result, the yield was very high. The strawberries he cultivated sold for Rs120 per kg in Khunti, with minimal cost in transporting. His profits from chillies, strawberries and broccoli were about Rs. 90,000 this season. Furthermore, he has sown around 2000 seeds of water melon for the summer, which is expected to bring Rs. 80,000 to Rs. 90,000.

Farmer Profile: Salan Sanga, Manhu - Birhu Panchayat Khunti

Total Landholding: 3 Acres

Income after intervention: 2,05,000 Annum

Major crops: Paddy, maize, strawberry, broccoli and chilly, cabbage and brinjal

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains and millet.

Investment of farm Income: on construction of House and children's education

Allied activity: Poultry and goats

Empowering Agriculture: Salan Sanga oversees the installation of micro irrigation system in his field at Manhu Village, ensuring sustainable water supply for his crops and increasing productivity for the local farming community.

Season	Crop	Food Security	Net income
Kharif	Paddy, Maize, bottle gourd, cucumber and bitter gourd	Paddy for year and surplus – seasonal vegetable for self-consumption	35,000
Rabbi	Strawberry, broccoli, chili, potato and cabbage.	diet diversity for family	1,10,000
Summer	Okra, Nenua (Ridge gourd) pumpkin and bodi (Snake bean), water melon	Season veggies for family	60,000

He is also an active member of the Water Users Group and ensures that people receive adequate amount of water as per the norm set by the group. And if any person has any grievances, he makes sure to resolve them during the Gram Sabhas which are organized every Thursday in the village.

He is now in process of building his own house with his own money and also through some contribution from the PM Awas Yojana scheme. He says, "I am adding my own money to make the concrete roof and adding two more rooms to it". Salan considers him to be very fortunate and is a proud Lakhpati Kisan as of today!

Harvesting Prosperity

Mahabir Munda is a young farmer from Manhu village who is known for his remarkable entrepreneurial skills as his one -acre portion of agricultural land is buzzing with multiple crops. Manohar lives with his family of four. He says that, "Agriculture is hard work, all inputs should be timely and one cannot delay things or take it easy. My wife and I equally work on the farm while my mother takes care of our child, we now have money to buy fruits and milk for our child."Mahabir recalls "The COVID-19 year was very stressful, in summer of 2020, I had

Farmer Profile: Mahabir Munda, Manhu - Birhu Panchayat, Khunti

Total Landholding: 3 Acres

Income after intervention: 1, 40, 000 Annum

Major crops: Paddy, winter vegetables, mustard and wheat

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains, millet and mustard oil

Investment of farm Income: poultry as allied livelihood

Season	Crop	Food Security	Net income
Kharif	Paddy , Maize kaddu and Karela	Paddy for year and surplus - seasonal vegetable for self-consumption	25,000
Rabbi	Wheat , winter vegetables and Mustard	Wheat is mostly sold - surplus mustard is sold family meets oil needs from home grown mustard throughout the year	75,000
Summer	Melon	Seasonal fruit for family	40,000

rich harvest of water melon, however it could not be transported to market and the fruits was consumed amongst the villagers and even then, there was a surplus. That year I could not earn any income. However, in summer of 2022 I again tried harvesting water melon again and this time it was profitable". Other farmers in the village are motivated by resilience shown by Mahabir.

The solar powered lift irrigation scheme has made water available to majority of people in Manhu village, where in 80 HHs have directly benefitted from it. The scheme has helped to lift 100 HHs out of poverty.

Mahabir is planning to grow strawberry in his one-acre land next year during the winter. Mahabir proudly says that, "Most of my friends work in Chennai and Goa as labourers in the fishing boats, because of which they have monthly assured income, I too was tempted to migrate as my family struggled with managing health expenses that occur as I have an infant and an elderly mother. Before the solar powered irrigation facility, I cultivated paddy and monsoon vegetables; moreover, the income was not perennial. However, the scheme has turned around my life. Now, not only we are food sufficient year around, I also have an assured income"

Nurturing Seed of Success

Farmer Profile: Prem Pradhan, Chikor – Bandra Panchayat, Khunti

Total Landholding: 4 acres Income after intervention: 2, 50,000 Annum

Major crops: Paddy, wheat, maize, Arhar, pea, cauliflower, methi, mustard, water melon

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains and vegetables.

Investment of farm Income: sister's B. Ed education

Prem Pradhan proudly displays his vibrant mustard crop, with a flourishing bed of chili peppers thriving below, showcasing the diverse crops.

As one entersthe Chokor village in Bhandra Panchayat during the winter season, the fields are green filled with bountiful seasonal vegetables and the yellow mustard fields, ready to be harvested. “This was impossible till two years back,” says Prem Pradhan. He adds on saying that, “There were no group, no well and no pond. We could not grow anything, apart from some paddy or maize during the monsoons...” Prem is a young and self-motivated farmer. He was preparing for competitive exams after college, however he shifted to farming as he had to support his family and could not afford to wait for a job.“Our family has for acres of land, but without water nothing was possible. Even though there is a river flowing nearby, we could not install the lift irrigation system because of cost was unimaginable for us” says Prem. However, after the scheme was introduced, there was no looking back for Prem. His fields are never barren now and to maintain the soil fertility, he timely practices crop rotation. Moreover, all his family members which includes, his parents, three sisters and grandmother help him with all the farm chores.

Season	Crop	Food Security	Net income
Kharif	Paddy, Maize, millets and tomato.	Paddy for year and surplus – seasonal vegetable for self-consumption	65,000
Rabbi	Mustard, chilly, potato, cabbage and pea	diet diversity for family	90,000
Summer	Bhindi and water melon	Seasonal veggies for family	60,000

Excited by the profit they made in the very first year, he now grows several crops throughout the year. As the crops are diversified, they have made more profit and there was no stopping them from becoming Lakhpati Kisan. Recently, Prem has bought a bike, 4 cows and goats with the profit.

Youth Accelerate Farming

As one enters the Bhandra Panchayat, Chikor village is one of the first villages which one comes across. Alcoholism is a major issue in the village and some of the families are also involved making and selling liquor. Even though there is a river flowing nearby, the local people are not able to utilize the water and cultivate the land. Because of which, many migrate to other cities in search of work. Moreover, the youth are getting addicted to substance abuse and other anti-social activities.

But, ever since the scheme was introduced, three sites are being developed from where the water can be lifted and can help to irrigate around 45 acres of farm land.

Ravi Kumar Mahto is 28-year-oldprogressive farmers. He shared that earlier his family used to cultivate maize and chick pea in kharif and rabi season. In the last three years, with the availability of water, he has opted for vegetable farming- chilli, tomato, brinjal, pea, mustard, methi, reddish, etc. in his five-acre land during the rabi season. During kharif season, he sticks to traditional grains like paddy, maize and pigeon pea and urad dal which are essential for their own household consumption. Ravi said that with the initiation of the scheme, water is now being lifted with the help of solar power system and is now reaching farms extensively, which has been a dream come true for them. Transforming rainfed farming into irrigated farming in all the three seasons is life changing for the village. “We never thought this can happen. Earning an assured income throughout the year has helping us to stay in village” says Ravi.

Farmer Profile: Ravi Kumar Mahto, Chikor – Bandra Panchayat, Khunti

Site Name: Nadi Kinar Ghagh

Total Landholding: 5 Acres

Income after intervention: 2, 50,000 Annum

Major crops: Paddy, wheat, methi, mustard, water melon

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains and vegetables.

Investment of farm Income: Saving for mustard processing and rice processing unit.

Ravi (in purple jacket) along with his mother at his field showing mixed crop of spinach and fenugreek

"I am not educated enough to land a 9-5 job, the solar powered lift irrigation is helping us not only survive but thrive" – Ravi Mahto, young farmer from Chikor , Khunti.

Season	Crop	Food Security	Net income
Kharif	Paddy, Maize, bottle gourd, cucumber, bitter gourd	Paddy for year and surplus - seasonal vegetable for self-consumption	35,000
Rabbi	Wheat, Mustard, chilly, potato and spinach	diet diversity for family	1,40,000
Summer	Bodi (Snake bean) and water melon	Season veggies for family	60,000

Prosperity through Water and Sun

Muni devi is progressive women farmer, who is also known to be the problem solver of the village. She is young and dynamic SHG leader for the community. Her family of 7 has four acres of land, out of which she farms vegetables in two acres of land. According to her, she says that she could not even think of growing rabi crops as there was no way of bringing water to the fields. The solar powered irrigation system changed the face of agriculture in the village and now ensures perennial income.

At present, she cultivates only vegetables throughout the year which has proved to be exceptionally profitable. She has also bought chickens and is planning to venture into poultry.

Farmer Profile: Muni devi, Village: Bariyatu, Gola

Site Name: Guritand Jal Upbhog Samiti

Total Landholding: 4 Acres

Income after intervention: 1,40,000 Annum

Major crops: Paddy, wheat, arhar, pea, cauliflower, methi, spinach, carrot, beans, mustard, water melon

Crop intensity: 3 crops in a year

Food Security: Throughout the year for grains and vegetables.

Investment of farm Income: two-wheeler

Muni Devi Irrigating Her Field

Her husband is involved in selling the produce at a market in Ranchi. He mostly takes all the produce on his bike and when the quantity is more, he takes it in an auto rickshaw. She further asserts that her role within the family as a decision maker has also been consolidated. She is happy that she is leading a dignified life with improved living conditions. Being part of a SHG has helped her gain her own independent identity and confidence.

"We buy nothing from market. We grow rice, pulse, mustard and get all vegetables from the farm. We have rebuilt our house also and have also bought a two-wheeler." says Muni Devi with a smile.

Season	Crop	Food Security	Net income
Kharif	Paddy , Maize and bitter gourd	Paddy for year and surplus - seasonal vegetable for self-consumption	40,000
Rabbi	Pea, potato, chilli and cabbage	diet diversity for family	55,000
Summer	Bhindi, Saag, Nenua (Ridge gourd) and bodi (Snake bean)	Season veggies for family	45,000

Wellness from River

Premlata devi was part of a SHG wherein she played an instrumental role in organizing farmers convincing them to be part of WUG and make them understand the importance of utilizing and

Farmer Profile: Premlata Devi, Heth Rangini, Jama

Site Name: Hethrangini sinchai Samuh

Total Landholding: 2 acres

Income after intervention: 1,60,000 Annum

Major crops: Paddy, wheat, maize, pea, mustard, cucumber, tomato

Crop intensity: 3 crops in a year

Food Security: Throughout the year for grains and vegetables.

sharing water as resource. With the Lakpati Kisan scheme, she now has an assured income at the end of every season. And as a result, within two years, Sumitra has bought a television, new almirah, two smart phones for both her children. She now aspires to enroll her children in a private English medium school. She has now become an inspiration for others in her family. Premlata Devi says “English medium education has become a necessity, I am working hard to enroll my children in a private school and I want to ensure good education to both my children. I am hoping to enroll them in the next academic year as the school accepts quarterly fees.

Season	Crop	Food Security	Net income
Kharif	Paddy , Maize, tomato, bitter gourd	Paddy for year and surplus - seasonal vegetable for self-consumption	35,000
Rabbi	Wheat, snake beans and Mustard	Diet diversity for family	85,000
Summer	Nenua (Ridge gourd) pumpkin and bodi (Snake bean)	Season veggies for family	40,000

Lakhpati Kisan in 1.5 Acre

Kande munda is a farmer with marginal land holdings. He has four members in his family and they struggle constantly to make ends meet. Rice produced from his field barely keeps them going for about three months and after which, they mostly eat maad bhat. Kande emphasizes that now because of this intervention, he has a steady income which wasn't the case before. Farmers in the siladon site have increased rice production by applying SRI techniques. They have also grown a variety of vegetables and now raise livestock either for family consumption or sale.

Farmer Profile: Kande Munda Siladon Khunti

Site Name: Bhaglata Kisan Samuh

Total Landholding: 1.5 acre

Income after intervention: 1,55,000 Annum

Major crops: Paddy, wheat,maize, arhar, pea, cauliflower, methi , mustard, water melon

Crop intensity: 3 Crops in a year

Food Security: Throughout the year for grains and vegetables.

The farmers who have now joined the scheme have assured income. They have more food, more variety of high-quality food, including pork, chicken, eggs and fresh vegetables and now have the capacity to buy fish and fruit.

Kande Munda said that his family now has a variety of food to eat now which is of high quality and is grown by them. Kande munda says "I was sure of the profit but not at this scale. *Iis sal hum 80,000 ka matar beche hai aur is bar matar ka accha rate mil gaya aur mera mattr suru mai hee nikal gaya to hum 100 Rs kilo beche*.

Season	Crop	Food Security	Net income
Kharif	Paddy, maize, bottle gourd	Paddy for year and surplus - seasonal vegetable for self-consumption	15,000
Rabbi	Pea, tomato, chilly and cabbage	Cash income	85,000
Summer	Okra, Ridge gourd, cucumber, Snake bean and water melon	Season veggies for family	60,000

From a Laborer to Lakhpati Kisan

Bahira Munda used to work as a farm labourer in Punjab in the fields of rich farmers who cultivated wheat and other high value crops. At times while working there, he used to wonder if Jharkhand will ever have such big water canals like that in Punjab. Bahira is if the opinion that even though the topography is different and the land holdings are nowhere near to Punjab, but he was sure that irrigation could change the face of agriculture in Jharkhand. For him, increased cultivation provided for production of a wider range of vegetables throughout the year, making micro nutrient rich food more available and accessible at the household level.

Vegetables rich in vitamin Aare now available in the household gardens like spinach, pumpkin and methi which are helping combating micro nutrient deficiencies in women and children in Khunti, which is one of districts with highest prevalence of anaemia among women and children under five.

“Earlier, it was seen that there was a decrease in the number of households who consumed chickens, ducks and eggs produced from their homestead poultry as it was raised for emergency

Farmer Profile: Bahira Munda Siladon Khunti

Site Name: Bhaglata Kisan Samuh

Total Landholding: 1.5 acre

Income after intervention: 1,75,000 Annum

Major crops: Paddy, pea, cauliflower, kochhu, spinach, radish, carrot and ginger

Crop intensity: 3-4 crops in a year

Nutrition Security: Throughout the year for grains and vegetables.

From tilling the land others to becoming a farmer, Bahira Munda's life took a transformative turn with the help of solar irrigation scheme.

Season	Crop	Food Security	Net income
Kharif	Paddy and Karela	Paddy for year and surplus – seasonal vegetable for self-consumption	15,000
Rabbi	Pea, kochhu and cabbage	diet diversity for family	1,10,000
Summer	Bhindi, Nenua (Ridge gourd) pumpkin and bodi (Snake bean)	Season veggies for family	60,000

expenses like medicine. But now, chicken and eggs are consumed on a weekly basis," says Bahira.

Bahira has also started raising broiler chicken which he regularly sells in weekly haats, hotels and dhabas sprinkled around Khunti in the last three years.

It is worth noting that the households did not only increase their production and consumption of micronutrient-rich foods from 2018onwards but were also able to generate income from both farm and poultry produce as well. The surplus of the vegetables and fruit as well as eggs and chickens from homestead production could be sold in the local market to supplement household income.

Inclusion of the Most Marginalised

Mangra Munda was among the most vulnerable families in the Silda village who were trained on the integrated farming systems as a response to mono culture approaches.

Farmer Profile: Mangra Munda, Silda, Fudi, Khunti

Site Name: Hundinglyong Kisan Samuh

Total Landholding: 1.5 acre

Income after intervention: 1,49,000 Annum

Major crops: Paddy and madua, okra, pea, cauliflower, chilli and Guava

Crop intensity: 3-4 crops in a year

Integrated farming combines activities such as home gardening, composting, chicken raising, fruit tree cultivation, and SRI techniques to increase rice yields on the farmland. Almost seventy percent of the most resource-poor population in the village were included in the scheme. The quality of life is better than before for the most vulnerable.

Season	Crop	Food Security	Net income
Kharif	Paddy and Mazie	Paddy for year and surplus – seasonal vegetable for self-consumption	24,000
Rabbi	Brinjal , Tomato, Cauliflower	diet diversity for family	75,000
Summer	Bhindi , Nenua (Ridge gourd) pumpkin and bodi (Snake bean) coriander	Season veggies for family	50,000

Mangra munda was leading the process after confirmation of site selection wherein he organised the farmers and conducted training for them. The training included how to prepare a vegetable garden, how to compost and make compost liquid, and how to prepare rows and plant and care for the vegetables.

After the intervention, all the families in the area have fresh vegetables to eat every day and are earning an average of Rs 30,000 per season form their one acre of farmland. The families are also raising livestock as a mode of alternate livelihood and it is being done in a scientific manner with risk mitigation in the village.

"We have the advantage of being close to Ranchi and hence we transport vegetables to Ranchi. This year we got a good price for the vegetables, also we benefitted from the inflated price of coriander. The farm income has doubled and even more as earlier we had no farm work after monsoons", says Mangra and other farmers from Silda village.

All for One and One for All!

After becoming a part of a SHG, Indravati Devi feels that it has helped widen her horizon over years as it has helped her acquire new skills, gain self-confidence as she now visits banks and attends federation meetings all on her own. She actively took part in the site selection and ensured community participation in her village. Not only her but other SHG members also ensure conflict resolution, formation of by-laws for WUG and make social mobilization process smooth.

Farmer Profile: Indravati Devi, Mokra Raidih

Site Name: Anand Sinchai Samiti

Total Landholding: 1.5 acre

Income after intervention: 1,30,000 Annum

Major crops: Ginger, pumpkin, chili, mustard and pea in winter and mango plantation.

Crop intensity: 3-4 crops in a year

Indravati is an active member in gram sabha, along with income generation she takes lead for raising social issue; she actively works on awareness generation among villagers on witch
- Hunting practice and isolation of women on the suspicion of being associated with witch craft.

"As a SHG member it is my duty to voice the concerns that make women vulnerable, though there is risk of getting targeted while I raise awareness on social evils. My family sometimes asks me not to be so vocal but my morality does not allow me to do so. I stand with women who are labeled as witches and I put all my effort in convincing villagers to drift away from myths", says Indravati.

Season	Crop	Food Security	Net income
Kharif	Paddy, bottle gourd and cucumber	Paddy for year and surplus – seasonal vegetable for self-consumption	20,000
Rabbi	Mustard and pea	diet diversity for family	50,000
Summer	Mango, pumpkin and Ginger	Season veggies for family	60,000

Story of Resilience and Courage

Surendra was a migrant worker in Surat when the lockdown was announced. It must have been perhaps the most traumatic time of his life because he has a family of seven, including five children who were dependent on him.

Farmer Profile: Surendra Saw Lohra Pokri, Satbarwa

Site Name: Hulumad water user group

Total Landholding: 1.5 acre

Income after intervention: 1,20,000 Annum

Major crops: Maize, kochhu, chili, mustard, green bean and pea in winter

Crop intensity: 3-4 crops in a year

Surendra Saw stands tall amidst the flourishing fields of vegetables and maize, a testament to his unwavering dedication and hard work as a farmer.

With the commencement of the lockdown, all the factories were closed in Surat. And he and his family returned home the way lakhs of migrant returned. They walked, travelled in trucks, small vans and somehow reached their village. Surendra swore to never go back to Surat.

"I had no option and was at the verge of losing hope", says Surendra.

Even though the site selection was done in the village but the work was incomplete for two years and finally the site was handed over to community in June, 2021.

“I have 1.5. acre land on which I cultivate paddy once a year which was insufficient to sustain all our needs. However, after intervention, me and my wife decided to cultivate what we already knew which was monsoon vegetables. To our disbelief, we sold bitter gourd and earned 40,000 rupees as our net profit. This was an amount which I could never earn at once in Surat.” says Surendra with a smile.

Surendra too sifted to SRI technique of rice cultivation. “This year in summer I will grow musk melon it is a high value fruit and has high demand in summers”, says Surendra. He is eager to acquire new skills and keep up with agriculture innovation. He is always on a lookout for opportunities to diversify his crops and maximize benefit from the available land.

“To be able to live with my family is blessing, I still try to cope with the entire trauma I went through during the lockdown. I now cherish each moment of my life and being with my family helps me to get through difficult situation. Now we are together in every milestone of life” says Surendra

Season	Crop	Food Security	Net income
Kharif	Paddy, kochhu and bitter gourd	Paddy for year and surplus - seasonal vegetable for self-consumption	35,000
Rabbi	Pea and carrot	Cash crop and household consumption	40,000
Summer	Pumpkin and bodi (Snake bean) , sem fali (Green bean)	Season veggies for family	45,000

Sisterhood Paving the Way

The state funded community managed micro irrigation scheme is proving to be effective for improving the carrying capacity of land in Belwadag village in Khunti.

Farmers Profile: Belwadag Mariyam Tudu and her group

Site Name: Belwadag sinchai samuh

Total Landholding: average 2 per family

Income after intervention: 1,80,000 Annum

Major crops: Ginger, pumpkin, chili, mustard and pea in winter

Crop intensity: 3-4 crops in a year

Amidst caring for her toddlers, Mariyam Tudu's unwavering commitment to farming shines through as she inspects her bountiful pea crop in the final stage of harvest.

Mariyam is often seen working in fields with her two children by her side of age six and two who would be seen playing near a pump house shed. Mariyam is known to be amongst the most hardworking people in her village. She has five family members who are dependent on her.

When she got to know of the scheme from the i-PFT members in the block, she decided to give it a go and earned around Rs 1, 80,000/- from farming in her two acres of land. Mariyam also mobilized the farmers into a WUG comprising of 12 members. The group jointly makes a plan for the irrigation scheme and submits the application to the State Irrigation Executive Cell (SIEC) for the scheme. Mariyam shared that she gained confidence over a period of time. She remembers an instance wherein she was worried about the electricity bill after using the lift irrigation method but much to her surprise she did not get any bill. "I can't begin to explain how wonderful is that" smiles Mariyam remembering that time.

Her 12 member WUG group is among the most active groups in Belwadag. Mariyam and the group now cultivate vegetables all throughout the year and owing to tall their efforts they have become a "Lakhpati Kishan" and an inspiration to others.

The households, which only had "Maad bhat" and "kathal" as their meals earlier, now have fresh vegetables from their farm and have the capacity to buy fish. And even though the village was not water scarce, it is painful to see then not being able to utilize it. The solar lift irrigation system has surely become an oasis of hope for the villagers. Improved women's participation in community meetings and increased livelihood. During the FGD in village it emerged that women's participation has increase of up to 85% in community meetings and decision-making. Additionally, 70% of women leaders were very active and influential with the local authorities (village sarpanch, Panchayat sachiv, ANM teachers). Women are no longer ready to accept their work being 'invisible' in the farm and they are longer entirely dependent on their husbands. They have jobs as merchants (selling vegetables and poultry) and farmers (raising pigs, chickens and goat), as well as planting vegetables and other crops also being part of the SHGs they travel for work . Women always had a role to play in the local economy, which is now recognised as well.

Women Leading the Way

The project has immensely contributed to the empowerment of women in terms of women's involvement in food production. The women had more control over household resources from the income generated from their food production activities. And as a result, the household

Farmers Profile:Village Chikor, Khunti block

Site Name: Nadi Kinar ghar kisan samuh
Purnima Devi
Achni Devi
Bilasi Devi
Sohri Pradhan
Ranthi Devi
Bhudhan Devi

Achani Devi with her onion harvest, ready to be sold and provide sustenance for her family

income increased from Rs 10,000 per year to Rs 50,000 per year on an average. Women also reported an improvement in their circumstance over the period of the project, from abject poverty to becoming at par with salaried people in the village in terms of economic growth and improvement of social conditions.

Ratni Devi Planted Mango in the Command Area

Rice security improved with 82% of the households reporting no shortage compared to the situation before the intervention. The average rice shortage period was reduced from 8 months to self-sufficiency throughout the year. Almost 67% of the women reported that they have not purchased mustard oil from market during the year.

“We did not have any aspirations at all. Access to water brought us hope. We started to aspire to be like city people – confident, well to do and smart,” says Purnima Devi

“We have learnt a lot during the trainings. We learnt about the different crops; we have learnt how to negotiate with the buyers. Moreover, we have learnt a lot through experience. We are now able to run the house on our own says Manju Devi, Jal Sahiya. Her husband Arvind who is also a progressive farmer was in agreement with her and adds on saying that “I was not ready for cultivating wheat as we have never grown it before she was persistent so I had to give up and allowed her to take the decision.”

“Being a lakhpati kisan is not just about money, it is about finding my identity and a purpose for life. This would not have been possible if we hadn't come together and reaped the benefits of the sichai,” says Achani Devi

“The bank officials also know us now and show us respect whenever we go for loans for the SHG,” says Ranti Devi proudly.

Women Leading the Way

As part of the efforts under the project to motivate the farmers to diversify into high value crops,

Farmers Profile: Village - Chikor, Khunti block

Site Name: Bada beda Kisan Samuh Chikor
Bindu Devi
Jaleshwari Devi
Manju Devi
Babli devi
Laita Devi
Rekha Devi

the women cultivated improved mustard crop in the rabi season in their two acres land in each of their farm. Since they already had access to water supply (total 20 acres) the farmers could understand the benefits and the assurance of good returns as compared to the other crops. Women took the additional step and planted fenugreek in a small portion (about 1200 sq.ft) of land next to the mustard. While mustard was growing, fenugreek provided quick returns and they harvested fenugreek on alternative days which would sell in the market at Rs.1000/1200. It's a three-month crop and they estimated its worth to Rs. 35,000 as additional income apart from that of the mustard. Farmers in Chikor are early sellers who are getting reasonable price for vegetables. The late entrants to market do not get such a price. At the beginning of season, methi was priced at Rs 80 per kg this winter. Currently, under the project a total of 83 families are cultivating mustard crop and have been able to make a substantial profit.

Embracing the Entrepreneurship Spirit!

In Belwadag, Sankar Lohra is known for his entrepreneurship spirit. His four-member family has around 10 acres of land. 2.5 acre of land is in the command area. Spotting the opportunity,

Farmers Profile: Sankar Lohra, village Belwadag

Site Name:

Land owning in command area: 2.5 acres

Major Crops: Pea, Vegetables and Guava

Income Last Year: Rs 160000/-

Sankar Lohra with his pea crop and the lift irrigation scheme

he realized that high value crops should be adopted for sustainable living. Shifting from maize and chickpea, he has adopted guava fruit cultivation. He bought the plant for 100 rupees each and has planted about 200 plants. He and his wife both explored the potential for hybrid guava through YouTube videos and also connected with the district horticulture department. Last Year he earned Rs 80, 000/- from his pea crop on 1.2 acre land in the command area.

“We have recently imported plants from Kolkata and will be now going ahead with it, let's see how it turns out.” Says Shankar.

He has also learned about the improved practices of crop mulching and drip irrigation during one exposure visits. He is pursuing the agriculture department for support in setting up the drip system. When asked what they would do with the profits, they said that they will go for fruit plantation which could fetch good price. Sankar is now a 'Lakpati Kisan'.

Bitiya Besra: Woman farmer from Jama, with a newly installed lift irrigation system says, "This is the first time that I have access to water in my farmland. Earlier, I use to grow either finger millet or black gram during the monsoon season or sometimes leave it fallow. But this year I planted high value crops like mustard, tomato, cabbage, brinjal, watermelon and cucumber in the summer season". She generated an income of INR 1, 10,000 from growing tomatoes in her 0.2 hectares of land she cultivated in the last cropping season. She is a now a prominent woman in her village and has plans for establishing mustard and rice processing unit in her village by 2023. She has earned Rs 2, 50,000 incomes from her field in the 2021-22.

Bitiya Besra Jama at her farm showing wheat crop

Effective Role of SHGs in Community Participation and Project Ownership

The newly installed lift irrigation system in Angara block across 58 sites has benefited a total of 870 farmers. The villages had primarily cultivated rain fed crop and were entirely

dependent on rainfall for crop production.

Community members of different WUGs collectively manage the farm site and have also formed PGs for overall management and farming operations in their village. Their WUG is for water sharing and grievance redresses.

The community members also received customized training sessions on patch selection, crop planning, cost estimates, package and practices of high value crops and management of irrigation infrastructure. They have developed plans for planting selected crops keeping in mind the lift irrigation system. The lift irrigation facility takes minimal operational charge on an hourly basis from each member to meet any maintenance costs. The technical service provider at the village level is responsible for operating the pump for first three years.

Sakhodi Murmu of Jama block cultivates vegetables in her 1.5 acre land, paving her way towards becoming Lakhpati Kisan. She has even bought a motor cycle from her income which helps the family to sell vegetables directly in the market without the interference of any middle men. Her husband sells vegetable in the nearby haats. Sakhodi Murmu's family is now food secures having sustainable income from her farm.

Sakhodi Murmu in Her Tomato Field

Gita Oraon, Raidih cultivates green seasonal leafy vegetables in 1.5 acres, and other vegetables in one acre of farmland. She is a member of Harit kranti sichai samiti tetartoli. Earlier she was cultivating vegetable with her electric pump. Now the solar irrigation reduce cost of cultivation and give them assure irrigation. She has been able to buy two smart phones this year for her family and had a net profit of around Rs 1, 20,000 in the year 2021-22.

Gita Oraon with her vegetable farm

Vegetable Cultivation Is Remunerative

Sunita Oraon is an inhabitant of Dhurleta village in Angara block. She cultivates multiple vegetables in 1.5 acres of land. She has been cultivating pointed gourd and bitter gourd for the last three years during the monsoon season. By adopting the integrated nutrient management and improved method of cultivation, she has earned Rs 60,000 from only cultivating the pointed gourd. She is considered a successful farmer in Dhurleta. The solar power lift irrigation scheme assures her crop mortality and enhances the productivity. In rabi season she cultivate wheat, chilli, saak and tomato.

Sunita Oraon in her vegetable farm with mulching

Stories of Food Access and Food Availability for the Most Marginalized Farmers

One of the prominent impacts of the state funded community managed solar powered micro irrigation scheme is food security and nutrition with positive outcomes

The intervention addresses the physical availability of food: The sustained, increased crop yield has reduced the food shortage period. At the same time, it has increased the number of farmers applying to new agricultural techniques e.g. mulching, machan kheti etc which has resulted in increased amount of food for household consumption.

Economic and physical access to food includes:

- Increased household income (especially for small land owning households)
- Intervention well adapted to local context, local market accessibility created and/or increased

Purchasing capacity of diversified food sources (Fish, Fruits and milk)

Food use and utilization:

- Improved nutritional status of family members
- Increased understanding of nutrition (food safety, diversified and balanced food sources and food storage)
- Positive behavioral change observed at household level (use of available natural and nutritious foods, cooking practices, food handling and storage, hygiene and hand washing,

Stability

- Safety net for vulnerable households
- Increased community and household capacity to adapt and cope with impact from climate change
- Reduced risk of falling below the poverty line due to enhance cash income

The project's assessment indicated an improvement in household food security levels among the resource-poor in the village. Significant changes in the livelihood status of the resource- poor and very resource-poor families were noted during the field visits by the project team. Additionally, a larger improvement was noted in terms of food security, household living and more resource-poor households than that of better-off families. These results indicate effective targeting and planning of the project.

Table 1

Indicator	Before intervention	After intervention
Percentage of HHs with Rice shortage	60-80 %	Less than 10% HHs
Average month of rice shortage	8 months	2-3 month for small land holders
Availability of vegetable	Seasonal from forest eg : Rugda and Mushroom , Kathal etc	Throughout the year
Average period of availability for HH consumption	-	Varity of seasonal vegetables are available and grown by farmers in intervention area
Number of off farm work for HHs	6-8 months	Field are cultivated throughout the year along with allied non- farm activities
Availability of edible oil	Absent	6-12 month for mustard cultivators
Availability of pulses	2-3 month	6-8 month for pulses growers

Also, families who previously did not have sufficient rice throughout the year could now have chickens, eggs and vegetables for household consumption. One does not have to stress about buying rice for home consumption. When asked which food security and nutrition-related interventions that had most impact their lives, the beneficiary most appreciated the knowledge of the SRI techniques, integrated farming along with raising livestock also being mentioned frequently due to the small amounts of land.

Increased cultivation provided for production of a wider range of vegetables throughout the year, making micronutrient- rich food more available and accessible on a household level. Vegetables rich in vitamin A were now available in the household gardens. Leafy vegetables like spinach, pumpkin and methi help combat micro nutrient deficiencies in women and children.

Additional income from raising goats Anjali Devi had a small land holding therefore she had to invest in non-farm activities. Therefore, she started goat rearing at a small scale. In the coming year, she plans to scale it up with hybrid and resilient breeds of goat.

Food and nutrition security for households throughout the year, the farm income has enabled Anjali Devi to not just sustain her family, but she is proud to assert that she has overcome hunger faced by her family.

Purchasing capacity for fruit, milk	Absent	Fruit Weekly, milk occasionally
Consumption of protein and micro-nutrient food	Occasionally	Regularly as eggs, chicken , pork is consumed as agricultural income is sustainable, earlier livestock was used for sell at occurrence of emergency expense

Fulmani Murmu is a member of Chiharbani bastitola WUA of Chiharbani village in Jama block. According to Fulmani Murmu, positive impact was reflected at the household level with key gains achieved in terms of increase in household income. She says that now she does not need to work in NREGA and her husband does not need to migrate for work. Their dependency on the PDS has also reduced. She has also adopted intensive mixed pattern of cropping which has led to improvement in household living conditions. She also attributes increased school attendances to improved household consumption and expenditure on food for her children. She cultivates 1 acre land for vegetable and 2 acre for paddy. Last year her family earned Rs 1, 02,000/- from cash crop.

Hemlati Devi cultivates seasonal vegetable in her farm along with kharif crops like paddy and maize. She shared that the yield of rice and vegetable increased with multiple cropping and proper management practices. This has fetched her higher net return of Rs. 34,778 per season depending on the vegetable. Earning through small landholdings besides being food secure is nothing less than an achievement for Hemanti Devi.

Farmers Profile: Hemanti Devi Kendugarha

Site Name: Belatoli jal Upbhog Samuh

Land owning: 1.5 acre

Major Crops: Maize, bitter gourd, tomato and kochhu

Family size: 12 members

Income after intervention: Rs 85, 000/-

Hemanti Devi Irrigating Her Field

Jainarain is a middle aged farmer who earned Rs 1, 10,000 as net profit in 2021-22. This income has significantly helped sustain his family of 10 members, with only a small land holding. He is been using the 1.5 acres of land at the optimum level. Jai Narain says "My fields are now never barren ever since the solar lift irrigation facility has been in place."

Farmers Profile

Jai Narain Mahto – Kendugarha Bengabad

Site Name: Parsania jal Upbhog Samuh

Land owning: 1.5 acre
10-member family

Jai Narain in his wheat field

Jai Narain says *"Yojna se pahle kheti mai karcha zyada hota tha aur amdani nahi hota thi, khane bhar ka sabzi bhi sirf barish mai hota tha, ab sinchai ki suvidha hai to kharcha nahi ho raha hai, Patvan ke liye pani samiti mai paisa dete hai , amdani bhi badhi hai"*

Rameshwar is a self-motivated farmer and has become an inspiration for youths who are shying away from agriculture. He is member of Tariya Khet WUG.

He has been cultivating vegetables for the last 3 years and has made farming his main income source for his family. He started his cultivation with pointed gourd (potal) and cabbage in about 1.5 acres of land. But before he ventured into farming, his father solely concentrated on paddy cultivation as water could not be lifted to the farm.

Farmers Profile

Rameshwar Yadav village Gamtaria

Site Name: Tariya Khet sinchai Samuh

Land owning: 1.5 acre
11 member family

Income after intervention:
Rs 98, 000/-

He now grows bitter gourd, pointed gourd, french beans and potato. Altogether, he cultivates vegetables throughout the year and earns around Rs 1, 70,000 lakh per year from just 1.5 acre land.

Kunti Devi earns around Rs 50,000 annually from bitter gourd cultivation over half an acre and another Rs 1 lakh by growing pointed gourd over 1 acre. Similarly, she cultivates french beans and earns a profit of about Rs 70,000. She also gets around Rs 1 lakh from potato and bottle gourd cultivation over 0.75 acres during the summer season.

Farmers Profile

Kunti Devi, Mahuyar village Bengabad

Site Name: Panchkada sinchai Samuh

Land owning: 1.5 acre
13 member family

Income after intervention:
Rs 98, 000/-

Kunti Devi in Her Chili Field

"I have planned to replace cultivation of potato with pumpkin due to distress sale and lack of cold storage," said Kunti Devi. She also expects to earn around Rs 1.5 lakhs from pumpkin cultivation. Her success has only been possible because of availability of proper irrigation. "We are family of 13member thus we do not have any kind of savings or other investment. This income has lifted us from poverty and hunger."

Summary and Way Forward

With only 12% area of Jharkhand having irrigation facilities, the solar energy has a great potential of providing it. State government launched renewable energy based (Solar, Gravity) community managed irrigation systems in 2017 in 7 blocks of 7 districts in Jharkhand. 543 number of 5 HP solar powered irrigation system generates 9148 acre command area without destroying underground water. Total 9492 household were benefitted from the program till. Women led village organization are the main implementing body. Large tract of barren and unproductive land put under farming with enhanced cropping intensity (above 200%-250%).

The solar energy used for irrigation is nearly 120-130 days in a year. Rest of the energy can be used for running small solar powered machinery like – oil extractor, rice mill, wheat flour machine, small dryer etc. It also opens up the scope for new entrepreneur (solar shop, processing unit) in the village. WUG can also earned carbon credit through the use of solar energy in future. Jharkhand Government has allocated another 5 blocks for extension of the project in 2nd phase.

Utilization of Surface Runoff to Enhance Cropping Intensity in Jharkhand

Community managed solar irrigation scheme is a green step for Jharkhand to enhance the irrigation coverage from 12%. Total approve site is 751 in phase-I. In phase-I 2.5 Mega watts, 552 numbers of 5 Hp solar based irrigation schemes helped the women farmers of village organization to enhance farm income and nutrition security. The project aims to create 20000 acre of command area with renewable energy based irrigation in Jharkhand. This green livelihood enhancement approach will reduce migration, enhanced crop diversification, motivate farmer to go ahead with new technology and increased multi-sectored investment in rural Jharkhand.

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