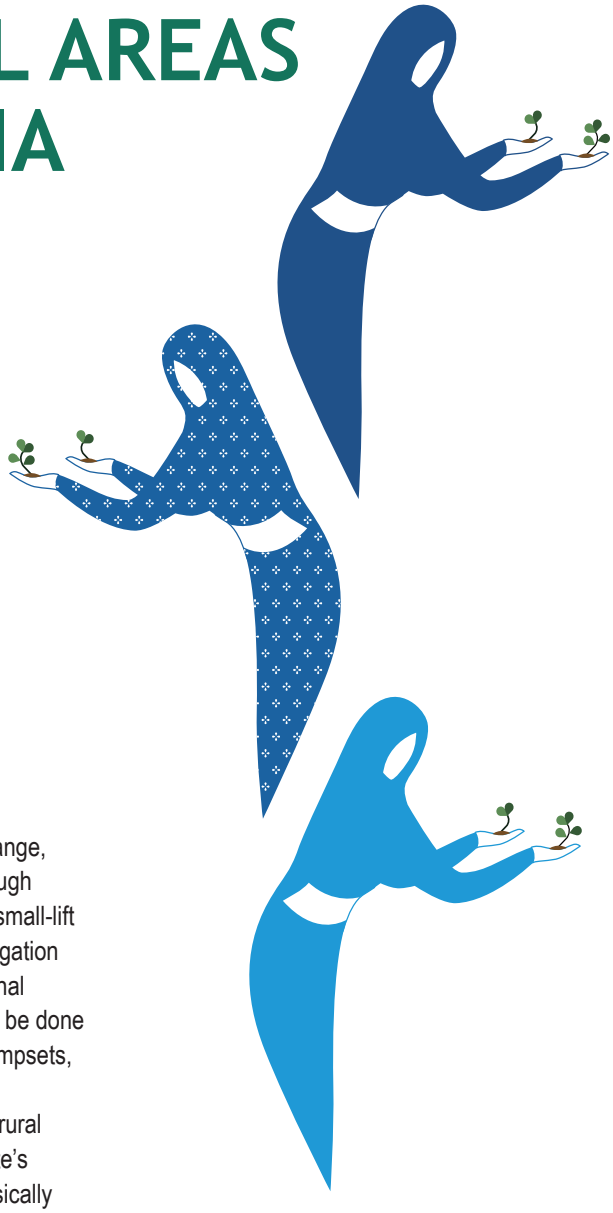
LEARNINGS FROM COMMUNITY-BASED SMALL SCALE IRRIGATION IN TRIBAL AREAS OF JHARKHAND, INDIA



Key achievements

1060 detailed project reports for community led irrigation developed through active women participation

450 local cadres developed to support project preparation, installation, operations and maintenance

Over 500 water user groups promoted for judicious use of water resources

Strengthened internal capacity building of staff and self driven innovation, ensuring sustainability

Context

The absence of robust irrigation infrastructures and water resource contraints resulting from climate change[1] would reduce Jharkhand's agricultural production over time. The state utilized only 12 percent of its irrigation potential (of the net sown area only 13.5 percent has access to irrigation) due to inadequate development and poor maintenance of irrigation infrastructures.

Being agro-climatically favorable[2] for high value crop cultivation, Jharkhand has the advantage of addressing issues of food insecurity, adversities of climate change, as well as subsistence farming through augmenting irrigation facilities with small-lift irrigation systems, gravity-based irrigation systems and check dams on seasonal streams. However, much needed to be done as irrigation equipment (such as pumpsets, sprinklers or drip irrigation systems) was owned by only 5.72 percent of rural households. Capitalizing on the state's potential, the JOHAR[3] project intrinsically focused to harness irrigation facilities for deprived households through lift irrigation systems.

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JOHAR supports 200,000 small and marginal farmers in primarily rainfed, backward, drought prone, upland and tribal areas of Jharkhand. It facilitates a unique approach, that of "community-led irrigation" which brings water directly to the fields, and fosters community ownership from the onset of project conception, to survey and implementation, right through to operations and maintenance.

This note highlights JOHAR's focus on promoting such an approach through engaging the community, particularly women in planning, implementation, monitoring and overall management of their irrigation infrastructure.

1. Jharkhand Action Plan on Climate Change, 2014.
2. Undulating land topography, runoff and geomorphological characteristics promotes sub-surface flow of water after the monsoon season.
3. Jharkhand Opportunities for Harnessing Rural Growth.

Interventions

Development of community-led irrigation systems resulted in the JOHAR team strategically engaging communities right from inception, planning, implementation, monitoring and overall management of the irrigation infrastructure. Details of the iterative activities and processes conceived for the irrigation scheme are outlined below.

Formation of high value agriculture producer group (PG):

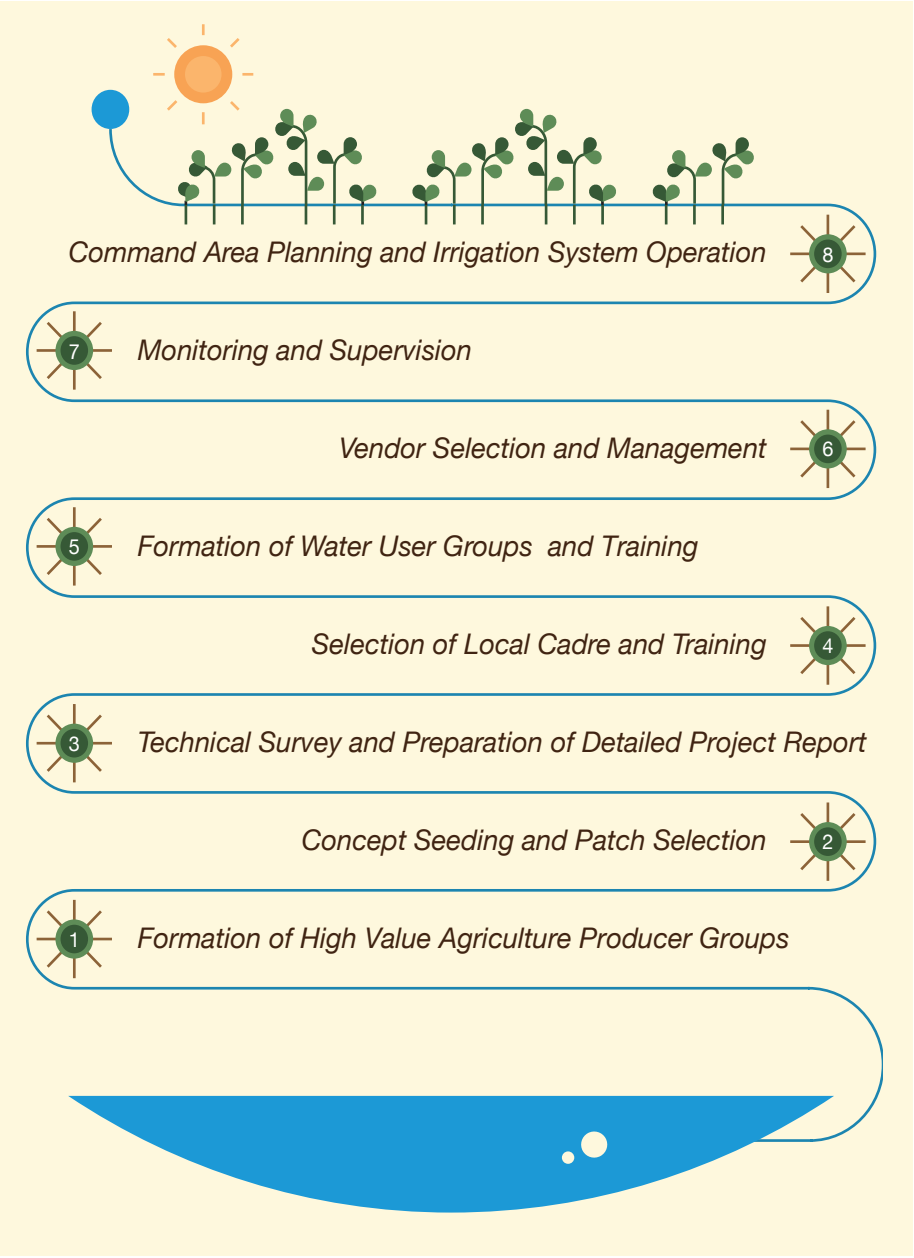
A high value agriculture PG of 25-50 members was formed by the JOHAR team at the initial stage with women farmers from a particular area (generally a village) to collectively plan for overall agriculture development and undertake collective actions for engaging with markets. Community members undertook small-scale irrigation work to ensure accessibility, availability and utilization of irrigation facilities to all members.

Concept seeding, identification and selection of irrigation patch:

PG members were trained by community service providers of high value agriculture to identify possible sites for installation of lift irrigation and gravity-based irrigation systems through community consultation processes. The technical team of JOHAR, along with community members, later conducted a technical feasibility study of plausible sites and selected the most suitable sites based on local biophysical and social criteria. Any discordance between the community consultation and the technical feasibility study were reconciled at village meetings and concurrence was arrived at by community consultation processes.

Technical survey and preparation of detailed project report:

The designs of pumpset, pumphouse, seepage wells and positioning of outlets were calculated from technical survey data. Detailed cost estimates and drawings of pumphouses, seepage wells, trench excavations, pumpset installations and solar panels installations were prepared with due diligence to environmental and social aspects. A final detailed project report (DPR) entailing geographic, demographic, technical, environment and social aspects



Process map for implementing the irrigation scheme

was prepared by a technical team in consultation with community members. JOHAR's para irrigation engineers (PIEs) and district irrigation consultants used an innovative automated system of DPR preparation through an application-based software specifically designed for the project.

Selection of PIEs and technical service providers:

JOHAR prioritized capacity building processes and identified and trained a local cadre of PIEs for timely technical support at each site. Community members selected a person from within the village as a technical service provider (TSP) who received customized training on overall operational procedures and management of irrigation infrastructure. After installation of the irrigation infrastructure, TSPs were entrusted to manage day-to-day operations of the irrigation infrastructure and collect irrigation fees at the village level for its services.

Formation of water user group and training:

A water user group[4] (WUG) with 15-20 farmer members for a command area of 5-8 hectares shared common responsibilities of judicious and efficient use of irrigation

4. A sub-group of agricultural producer group.

Image Credits: Rohit Jain

water. WUG members were trained by the technical cadre on institutional aspects, common property sharing, efficient utilization of water resources, conflict management, as well as overall management and maintenance of irrigation infrastructure. WUGs collectively participate in crop planning, procurements of crop inputs, and marketing activities along with the other PG members.

Vendor selection and management:

Community members were oriented and trained by the JOHAR team and technical cadre on community procurement processes, vendor selection and vendor management. Vendors for installation of pumpsets (solar/diesel), solar panels and underground pipes were selected by community members from the state's empanelled list of vendors. Local vendors were selected for installation of the pumphouse and construction of seepage wells. Community members followed due diligence procurement processes and sequentially managed the implementation of various crucial timebound tasks with the respective vendors.

Monitoring and supervision during implementation:

The technical team of JOHAR (consisting of PIEs, district irrigation consultants and engineers of the technical support agency) provided backstopping support to community members during the overall implementation of irrigation schemes.

Highlights of JOHAR's irrigation project

The JOHAR's irrigation project till date has prepared 700 DPRs of irrigation projects and commissioned 106 projects at the village level.

80% of irrigation schemes operate through solar power, and 20% through either electricity or diesel-based power sources.

70% of the water source for irrigation is through seepage wells that replenish their yield through sub-surface recharge.

30% of the irrigation water source is developed through construction of small check dams and other embankments across the seasonal streams.

Command area planning and irrigation system operation:

Community members participated in crop selection and irrigation scheduling to plan irrigation infrastructure use during each cropping season to efficiently use the water resources.

Key Learnings

Prior to JOHAR's interventions, Jharkhand lacked projects that focused exclusively on multi-season irrigation. Instituting systems, processes and building capacity resulted in a huge change from the conventional system of planning, design and implementation that was often susceptible to 'elite capture[5].

1) Technology and innovation:

included resilient technologies for improving productivity and reducing climate risk, such as:

I. improved planning where engineers used modern tools and skills of project management to build replicable and scalable systems, and procedures for monitoring scheme implementation. The activities and sub-activities of the scheme were mapped with stipulated timeframes to connect sequential activities with outcomes. Through this process, the project was able to foster the creation of a skilled cadre of local irrigation managers.

II. increased transparency by conducting geo-tagged surveys to collect GPS locations of water sources and pumphouses through geo-fencing of the command area of each irrigation site to promote Geographic Information System based planning. The innovative online DPR preparation and approval system allowed automatic real time calculations, online updation and transfer of data to facilitate real time informed decision making in the management of water. The approach focused on technology adoption and innovation for all those engaged in implementation processes for improved management, development and uptake of solar solutions.

III. introduced solar solutions, such as the innovative cycle mounted solar pump (of 0.5 HP) to help small and marginal farmers to irrigate up to 0.5 acres with a discharge of 2-3 liters per second (lps). Currently, 100 PGs have received the cycle mounted solar pump-set and JOHAR targets to scale this model to additional 2000 PGs.

5. Elite capture is a form of corruption whereby public resources are biased for the benefit of a few individuals of superior social status in detriment to the welfare of the larger population.

Geo-fencing is a location-based service in which an app or other software uses GPS/ RFID/Wi-Fi/cellular data to trigger a pre-programmed action when a mobile device or RFID tag enters or exits a virtual boundary set up around a geographical location, known as a geo-fence.

The geo-fence allows for remote monitoring of MIS of community-based micro irrigation such as when a PG member visits locations or uploads geo-tagged photographs of installations through the app/software.

Geo-fencing uses GIS based technology for field inspection and aids third party verification by eliminating the need for manual third party verification process and periodic inspection by field staff.

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Advantages of the cycle mounted solar pump

(i) it can be moved to any field location that needs immediate irrigation;
(ii) farmers unaddressed by lift irrigation schemes can use the cycle mounted solar pump to irrigate their field from a nearby farm pond or seepage well, and
(iii) the cost of operating a cycle mounted solar pump is minimal enabling economically deprived household to access the irrigation facility at the local level.

2) Sustainability: was ensured by

I. institutionalizing systems, processes, tools and guidelines developed within the state architecture; and

II. knowledge and capacity building across all levels and stakeholders.

Guidelines, specifications and design parameters for engineering structures, water user association (WUA) mobilization manuals and training materials, and agricultural extension materials developed were embedded as standard operational procedures and made available to farmers within and outside the project through meetings and website. Knowledge exchange between the project team and other government officials helped reduce structural overdesign[6] and associated capital costs.

3) Women's participation: is at the centre of all JOHAR promoted irrigation projects. Women played an integral and decisive role in patch selection, prioritization of schemes, vendor selection and management, installation of irrigation works, monitoring and command area development as well as during construction of irrigation infrastructure. As a group, they were "empowered" because they had access to irrigation, and "ownership" as they contributed as labor during the installation phase and were at the center in all decision making processes.

4) Convergence with other schemes and departments: such as with the agriculture department for micro-irrigation system in the command area of the lift irrigation system under the Pradhan Mantri Krishi Sinchai Yojana (PMKSY), and for solar pumps with the Jharkhand Renewable Energy Development Agency (JREDA) further facilitated water utilization efficiency of irrigation projects promoted under JOHAR as well as extended the coverage of irrigation to deprived households.

Challenges

Implementation of the community-led small scale lift irrigation scheme in scattered remote areas had certain challenges. These included:

Overcoming the knowledge gap and building capacity at all levels (farmers, engineers and project staff). One of the major challenges in implementation of small-scale lift irrigation in the remote areas was the existing knowledge gap in selection, implementation and management of the irrigation systems.

6. Designs of irrigation systems were site specific considering the local hydrological conditions, contrary to a one size standard project design.

Customized regular training programs for farmers, local engineers and project staff are needed to bridge the knowledge gap.

Sensitization on the importance of solar irrigation versus conventional uses. Farmers and local engineers were primarily aware of diesel or electric based irrigation systems. Installation of solar based irrigation systems created apprehensions regarding duration of operational hours, safety of solar panels, and care and maintenance of solar pumps, which were addressed through village level sensitization workshops.

Overcoming construction issues in some topographies due to the presence of underground rock or hard strata. Community members had to dig out large heavy stones by hands which was time and energy consuming.

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Management of different vendors (pumphouse, solar panel, solar pump, pipes and excavation) had to be done in a sequential timebound manner by the community members. The members mapped the tasks of different vendors, and allocated sequential time for completion of different tasks for each of their irrigation sites.

CASE STUDY : Community led irrigation scheme under JOHAR project

Image Credits: JSLPS

Indrawati Devi, a middle-aged tribal woman with a newly installed lift irrigation system in 0.8 hectares says: “This is the first time that I have access to water in my cropland. 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 tomato, cabbage and brinjal and have plans to plant crops like green peas and watermelon in the summer season”. She generated an income of INR 40,000 from 0.2 hectares of tomato crop that she cultivated in the last cropping season.

The newly installed lift irrigation system in remote Unchidih village (located at higher elevation) in Basia sub-district of Jharkhand state currently benefits 15 households with irrigation facilities for 8 hectares of cropland. The village has 25 households that primarily cultivated rainfed crop and were entirely depended on rainfall for crop production. The JOHAR project constructed a seepage well of 90 m3 of water volume that provided sub-surface recharge from the adjacent perineal stream. A 8 HP diesel pumpset was installed to convey irrigation water to a distance of 500 m through underground pipes and four outlet points. The community plans to retrofit the system to solar power to reduce operational costs.

Community members of Unchidih village collectively constructed the seepage well, pumphouse, underground main line installation and configured the outlet points under the guidance of the technical team. Community members have collectively formed an informal producer group, called Rani Mahila Kisan Utpadak Samuh, for overall management and farming operations in their village. There is also a water user group for water sharing and grievance redressal.

Community members 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 in the command area of the lift irrigation system to judiciously use the irrigation facility. They take minimal operational charges on an hourly basis from each member serviced from the lift irrigation system to meet any maintenance costs. The technical service provider at the village level is responsible for operating the pump on a daily basis.

Way Forward

JOHAR project plans to undertake more than 2000 similar small-scale lift irrigation schemes covering more than 18,000 hectares of land with irrigation facilities in the next two years. Due to bio-physically suitable locations and endowment of a dense network of small seasonal streams, the small-scale lift irrigation system is emerging as a model to ensure accessibility and availability of irrigation facilities in remote water-deprived areas.

For effective monitoring, risk mitigation and allocation of responsibilities, JOHAR is developing a management information system (MIS) to track location-specific work progress on a real-time basis. JOHAR is planning to introduce an Android application for improving the irrigation monitoring system to regulate pump operations from any remote location. The application will also enable the identification of major issues and faults of the irrigation pump. An irrigation monitoring application will help local community members to efficiently schedule irrigation and create a database for efficient planning and management of irrigation. In response to requests from other departments outside the project, the project team is training state engineering cadres to provide technical support.

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This note is part of the South Asia Agriculture and Rural Growth Discussion Note Series, that seeks to disseminate operational learnings and implementation experiences from World Bank financed rural, agriculture and food systems programs in South Asia.

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We are grateful for the generous support from DFID.

WORLD BANK GROUP Agriculture

JSLPS Jharkhand State Livelihood Promotion Society

UK Government