IWMI International Water Management Institute

SoLAR Solar Energy for Agricultural Resilience

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Community-Based Solar Irrigation in Kevlari, Mandla, India

Context: Kevlari has approximately 200 households and its population is heavily reliant on agriculture, consisting primarily of marginal and small farmers with an avg. landholding of 0.72 Ha).

The self-help group (SHG) network in Kevlari is well-established and provides a strong foundation for mobilizing women farmers under this pilot intervention - 40% of households belong to 8 Self-help groups with a total of 77 women farmers.

There has been no SIP adoption prior to SoLAR due to high upfront costs and poor awareness levels. The baseline survey showed that only 26% women farmers were aware of SIPs.

Approach: A zero upfront cost model was introduced, with the project covering full installation costs. A Women-led Water User Association (WUAs) was formed with women self-help groups which were already registered under the State Rural Livelihoods Mission (SRLM).

Objectives:

- To demonstrate that a tailored financial model, designed in accordance with farmers' financial capacities can effectively address financial barriers to the adoption of Solar Irrigation Pumps (SIPs).
- To explore the potential use of surplus solar energy generated by SIPs for other productive activities—such as operating solar-powered rice mills integrated with SIP systems.

Intervention-1: Community-Based SIP Model

Location: Kevlari village, under Mandla in Madhya Pradesh
Model Type: Zero upfront cost
Upfront Cost: Fully covered by the project
Beneficiaries: 13 women farmers
Management: Women-led WUA manages pump operations, allocation, and revenue

Key Features

- Zero upfront cost — all implementation expenses covered by the project.
- Dedicated bank accounts established for the WUA to ensure transparent fund and revenue management.
- Water sold to member farmers at INR 50/hour (association-decided rate for cost recovery); non-members charged INR 60/hour.
- Repayments managed through a revolving fund to finance future agricultural technologies and track recovery periods.

[Top] Location of Kevlari, Mandla in Madhya Pradesh. Map Source: Wikipedia [Bottom] At Kevlari, newly installed solar panels are helping farmers access reliable irrigation. (*Photo*: Tanmoy Bhaduri/IWMI)

CGIAR MULTIFUNCTIONAL LANDSCAPES

Pradan

Intervention-2: Rice Milling Machine

Location: Kevlari village, under Mandla in Madhya Pradesh
Model Type: Community-operated semi-automatic rice mill linked to unused generated solar energy
Upfront Cost: The total cost was INR 90,000; INR 10,00 was the upfront cost paid by farmers. The project funded the remaining INR 55,000; a loan of INR 25,000 was taken through cash credit facility (CCL) of SRLM[1]
Beneficiaries: All SIP users; 13 women SHG members
Management: WUA

Key Features:

- Saves time for women who previously travelled 15–20 km and spent an entire day on paddy milling.
- Utilizes surplus solar energy (50–60%) efficiently.
- Reduces transportation costs for smallholder farmers.
- Generates additional income through rice milling and bran sales.

Lessons learned and Way forward

- These pilots demonstrate that community-based SIP models can enhance adoption among marginal and small farmers facing financial constraints.
- The existing SRLM infrastructure can be leveraged to improve women farmers' access to credit for SIP adoption.
- Women-led WUAs function as platforms for peer learning and community engagement, integrating locally relevant income-generating activities.
- Strengthen women's collectives to promote technology adoption and economic empowerment.

Early outcomes

- Reliable irrigation alongside expanded irrigation coverage.
- WUA led by women; enhanced decision-making skills.
- Crop diversification into pulses and vegetables.
- More than INR 10,000 earned via water sales since July, 2024 till February, 2025.
- Surplus energy used for paddy milling.

[1] The State Rural Livelihoods Mission (SRLM), under India's National Rural Livelihoods Mission (NRLM), operates across all states of India to organize millions of rural women into Self-Help Groups (SHGs) and link them with banks through a Cash Credit Limit (CCL) -a revolving loan facility that allows SHGs to repeatedly borrow and repay funds for small businesses and livelihood activities. It support women's collectives to drive technology adoption and economic empowerment.

Project

The Solar Energy for Agricultural Resilience (SoLAR) Phase 2 project builds upon learnings and experiences from Phase 1 of SoLAR (2019-2024) in South Asia while expanding its scope to East Africa through meaningful south-south collaborations. The program aims to strengthen the enabling environment and unlock investments for the sustainable scaling of socially inclusive and climate-resilient solar agri-tech solutions in South Asia (India and Bangladesh) and East Africa (Ethiopia and Kenya). Read more: www.solar.iwmi.org

Acknowledgements

We gratefully acknowledge the Swiss Agency for Development and Cooperation (SDC) for funding this project.

Disclaimer

This publication has not been independently peer reviewed. Responsibility for editing, proofreading, and layout, opinions expressed, and any possible errors lies with the authors and not the institutions involved. The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by IWMI, CGIAR, our partner institutions, or donors.

Copyright © 2025, by IWMI. All rights reserved. IWMI encourages the use of its material provided that the organization is acknowledged and kept informed in all such instances.

Contacts

Please send inquiries and comments to:

Deepak Varshney, India Lead of SoLAR and Regional Researcher, IWMI Delhi, India (D.Varshney@cgiar.org)
Darshini Ravindranath, Project Lead, SoLAR and Research Group Leader, Climate Policies, Finance and Processes, IWMI Delhi, India (D.Ravindranath@cgiar.org)

IWMI India office
2nd Floor, CG Block C, NASC Complex, DPS Marg, New Delhi 110 012, India. Tel: +91 11 25840811; Email: iwmi-delhi@cgiar.org

IWMI International Water Management Institute

CGIAR RESEARCH CENTER

The International Water Management Institute (IWMI) is an international, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center with offices in 15 countries and a global network of scientists operating in more than 55 countries.

International Water Management Institute (IWMI)

Headquarters
127 Sunil Mawatha,Pelawatta, Battaramulla, Sri Lanka

Mailing address:
P. O. Box 2075, Colombo, Sri Lanka
Tel: +94 11 2880000
Fax: +94 11 2786854
Email: iwmi@cgiar.org
www.iwmi.org