

SoLAR IRRIGATION FOR AGRICULTURAL RESILIENCE (SoLAR)

Why SoLAR in South Asia?

South Asia is the world's largest user of groundwater for agriculture, withdrawing approximately 250 km³ of groundwater annually for irrigation. It is estimated that there are roughly 22 million water extraction pumps in Bangladesh, India, Nepal and Pakistan, of which roughly 12 million are electric and 10 million are diesel pumps. Groundwater pumping, fueled by either electricity or diesel, has substantial carbon footprint.

With growing concerns about climate change and carbon emissions, this project will contribute to respective country governments' NDC commitment of reducing emissions from agriculture through promotion of solar irrigation. So far, more than 200,000 solar irrigation pumps (SIPs) have been installed in the region, but often without explicit consideration for groundwater sustainability and gender and equity concerns. The project will work closely with all relevant stakeholders to support development of gender and socially inclusive, and groundwater responsive solar irrigation policies through three inter-linked work packages (Fig. 1).

The project aims to work closely with national governments and help test solutions that promote triple wins – improved livelihood outcomes for women and men farmers; reduced emission of black carbon and other short lived climate pollutants from agriculture; and promote sustainable groundwater use – all leading to a more sustainable and climate resilient agrarian future in South Asia. Given that groundwater-energy typologies in the region are different, solutions tested will be regionally differentiated (Fig. 2).



Photo: Prashanth Vishwanathan/IWMI

A woman farmer using solar irrigation pump in Haryana, India

Goal

The main goal of the project is to contribute to climate-resilient, gender-equitable, and socially-inclusive agrarian livelihoods in Bangladesh, India, Nepal, and Pakistan by supporting government efforts to promote solar irrigation. This project aims to achieve three broad outcomes:

Outcomes

1. Generating improved empirical evidence to support the development of climate-resilient, gender-equitable, socially-inclusive, and groundwater-responsive solar irrigation policies;
2. Validating innovative actions and approaches for promoting gender-equitable, socially-inclusive, and groundwater-responsive solar irrigation; and
3. Increasing national and global knowledge and capacity for developing gender-equitable, socially inclusive, and groundwater-responsive solar irrigation policies and practices.



Photo: Hamish John Appleby

A farm using drip irrigation

Fig - 1: Work packages (WP) of SoLAR project at a glance

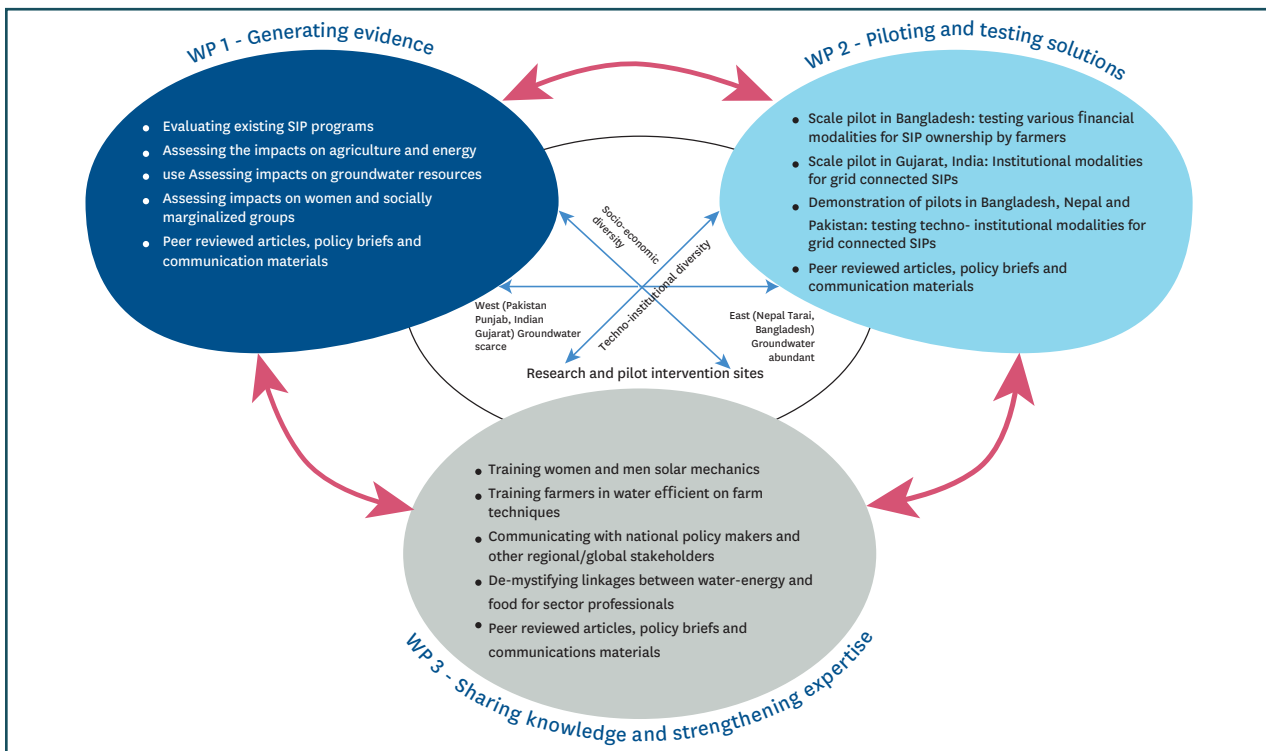
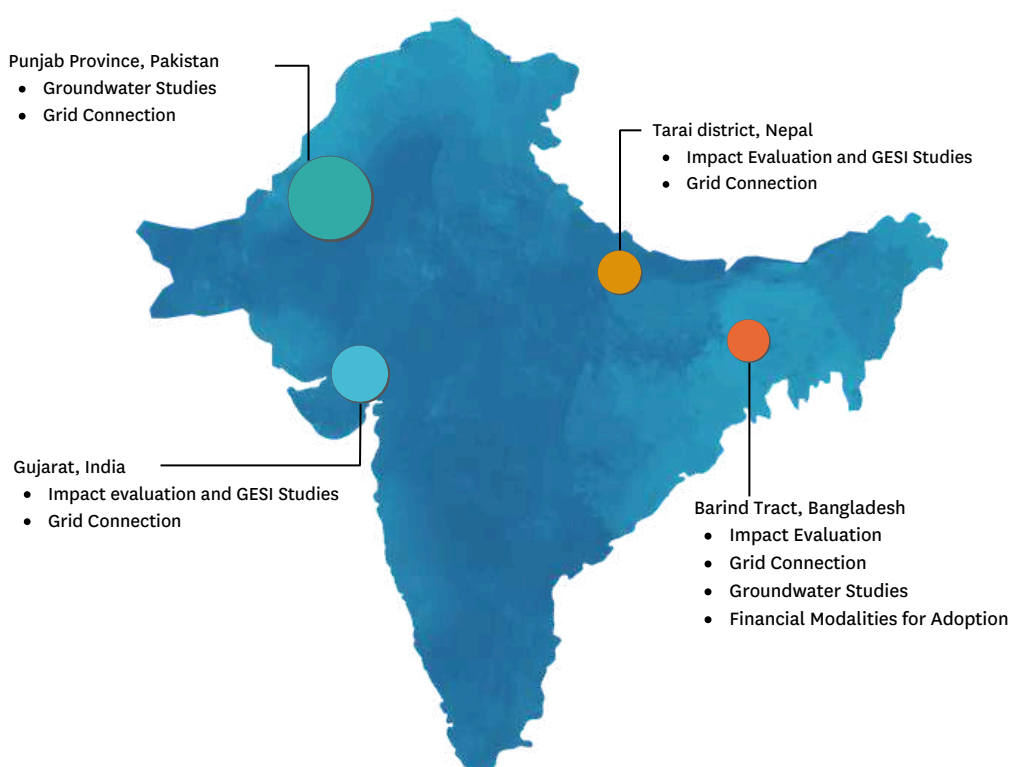


Fig - 2: SoLAR project locations in South Asia



Partners

Infrastructure Development Company Limited (IDCOL), Bangladesh

Infrastructure Development Company Limited (IDCOL) is a Government owned financial institution set up in 1997. IDCOL's aim is to encourage private sector participation in infrastructure and energy projects and they are currently the largest financier for renewable energy projects in Bangladesh.

Gujarat Energy Research and Management Institute (GERMI), India

Gujarat Energy Research & Management Institute (GERMI) is a centre of excellence in the energy sector, promoted by Gujarat State Petroleum Corporation Limited (GSPC), a Government of Gujarat Undertaking

Alternative Energy Promotion Centre (AEPIC), Nepal

Alternative Energy Promotion Centre (AEPIC) is a Government institution established in 1996 with the objective of developing and promoting renewable energy technologies in Nepal. It is under the Ministry of Energy, Water Resources, and irrigation. It functions independently and has a board with representatives from the government, industry and non-governmental organizations.

Nepal Electricity Authority (NEA), Nepal

Nepal Electricity Authority (NEA) was created in 1985 under the NEA Act (1984) through the merger of the Department of Electricity of Ministry of Water Resources, Nepal Electricity Corporation, and related Development Boards. The primary objective of NEA is to generate, transmit, and distribute adequate, reliable, and affordable power by planning, constructing, operating, and maintaining all generation, transmission, and distribution facilities in Nepal's power system both interconnected and isolated.

Federal Water Management Cell (FWMC), Pakistan

Federal Water Management Cell (FWMC) was established in 1979. It provides strategic support and helps the Ministry of National Food Security and Research in formulation of policies at the federal level in consultation with the respective provinces. It deals with irrigation water sector problems, solutions, formulation of water resources development projects, agricultural mechanization policies & strategies and land development projects prepared in consultation with the stakeholders for ensured food security on sustainable basis.

Pakistan Agricultural Research Council (PARC), Pakistan

Pakistan Agricultural Research Council (PARC) is the apex national organization working in close collaboration with other federal and provincial institutions in the country to provide science based solutions to agriculture of Pakistan through its statutory functions.

Development Partner

Swiss Development Cooperation (SDC)

The Swiss Agency for Development and Cooperation (SDC) is the agency for international cooperation of the Federal Department of Foreign Affairs (FDFA). Swiss international cooperation, which is an integral part of the Federal Council's foreign policy, aims to contribute to a world without poverty and in peace, for sustainable development. SDC, through its Global Programme Climate Change and Environment (GPCCE), helps find solutions to global challenges linked to climate change. It engages in global political dialogue and manages specific projects in the fields of energy, climate change adaptation, sustainable development of mountainous regions and prevention of natural hazards that are likely to influence regional and international policy.

Key Results

- **Rigorous evidence generation has supported formulation of SIP policy and programs** in project countries, including improvements in GESI outcomes. For instance, in Nepal, AEPC modified its selection criteria, requiring that women farmers receive one out of every three subsidy allocations made at the local municipality level.
- **The project has launched and commissioned first of its kind pilots on grid integration** in Nepal and Bangladesh using learnings from India. Existing financial models have been monitored and innovative finance models assessed.
- **SoLAR's capacity-building interventions have been critical** in improving awareness and effectiveness of ongoing SIP programs. This demonstrates the need for well-designed interventions to support government programs on solar irrigation (e.g. SKY and PM-KUSUM in India).
- **Impact assessment studies of Solar Irrigation Pumps (SIPs) demonstrated critical adaptation co-benefits** including crop diversification, farmers income, lower cost of irrigation, reduced drudgery for women, among others. This provides a robust evidence base for scalability in regions where solar irrigation is suitable.
- **Strong impact driven first of its kind early research findings on the impacts of solar irrigation on groundwater** that contribute to global discourses on solar irrigation. These findings demonstrate the context-specific nature of SIPs and groundwater extraction.
- **Cross-country learning from the project has been instrumental** and the project is fostering regional knowledge integration effectively. This has been done through knowledge forums and facilitating exchange visits between countries.
- **Fostered strong regional connections with key partners** (including ISA, MNRE, GUVNL/GERMI, IDCOL, NEA, APEC, PARC), to co-create knowledge, react to policy demand and create spaces for discussions around solar irrigation.

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