SoLAR
Solar Irrigation for Agricultural Resilience
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Dear Readers,

The United Nations (UN) held its 1st Water Conference in 46 years on 22-24 March, 2023 in New York. Coinciding with the World Water Day, this event, formally known as the 2023 Conference for the Midterm Comprehensive Review of Implementation of the UN Decade for Action on Water and Sanitation brought together decision-makers, experts, advocates, and members of water networks. This conference led to 713 diverse voluntary commitments by philanthropic donors, governments, corporations and NGOs. The International Water Management Institute (IWMI) delegation played an important role in shaping the ambitious and action-oriented commitments within the UN Water Action Agenda. The United Nations World Water Development Report 2023: Partnerships and Cooperation Chapter for Water (published on the sidelines of the conference) quoted the study done by theIWMI SDC SoLAR Project team, in Saptari district, Nepal. This study highlighted that all partnerships need to recognize and manage gender dynamics for outcomes to be effective and equitable. The IWMI delegation engaged actively, shedding light on the critical importance of the interconnected nature of water and global challenges.

The United Nations World Water Development Report 2023 *(p. 176)*

At the local level, on-the-ground research by the International Water Management Institute (IWMI) in the Saptari district of Nepal illustrates the effects of (the lack of) participation and inclusion on the distribution of resources. In this case, the deployment of government-subsidized solar-powered irrigation pumps ignored marginalized and women farmers, who consequently had lower access to subsidies (Shrestha and Uprety, 2021)

Visit to Nityanand SKY feeder, Ahmedabad district, Gujarat, India for interaction with farmers and utility officials as a part of the SoLAR Regional Forum (Photo: IWMI)

February 6-8, 2023, saw the SoLAR Regional Knowledge Forum 2023 being organized at IIT-Gandhinagar, Gujarat, India. Titled Energizing Agriculture and Enabling Just Energy Transitions in South Asia: A Regional Knowledge Forum, the forum saw participation from over 170+ regional researchers, policymakers and practitioners in the Renewables Energy (RE) sector, of which, 129 participated in person and the rest joined in virtually. The forum was organised as a two-day conference comprising plenary and parallel sessions in five thematic areas. There were 14 technical sessions spread over the first two days followed by a field visit to the Nityanand SKY feeder in Ahmedabad district where participants got a chance to interact with farmers. This event was part of IWMI's project titled Solar Irrigation for Agricultural Resilience in South Asia (SoLAR) South Asia (SA), funded by the Swiss Agency for Development and Cooperation (SDC).

Highlights from the Quarter

Regional Forum
Energizing Agriculture and Enabling Just Energy Transitions in South Asia

(Photo: IWMI)

The regional forum, Energizing Agriculture and Enabling Just Energy Transitions in South Asia, was organised at the Indian Institute of Technology (IIT), Gandhinagar, Gujarat on 6-8 February. The areas of discussion revolved around these themes - Solarizing Smallholder Irrigation: Policy Landscape and Empirical Evidence of the Impact of Solar Irrigation Pumps (SIPs) on Farmers' Incomes and Livelihoods, Conserving Groundwater Through Solar Irrigation: Empirical Evidence and Future Projections, Connecting Off-Grid to the Grid: Pilots and Lessons from Grid-connected Solar Irrigation projects, Renewable Energy in Agricultural Value Chains: Institutional Models, Policies and Case Studies on Livelihoods and Impacts and Making Energy Transitions Inclusive and Equitable: Is Renewable Energy Transition in South Asia Gender, Equity and Social Inclusiveness (GESI) compatible?

On the first day, the third session titled "Understanding the Suryashakti Kisan Yojana (SKY): How do the technical and financial models work on the ground?" was where Deepak Varshney, researcher, IWMI India, identified the factors that determine the enrolment in the SKY scheme, and he also, gave an overview of which farmers were more

likely to participate in the scheme. Varshney pointed out that larger pump sizes and large land ownerships are most likely to be the beneficiaries.

In the session titled "Impact of SIPs on agricultural outcomes and farmers' diesel use: Evidence from Nepal", Shisher Sreshtha, researcher, IWMI Nepal, pointed out that since 2016, SIPs have gained popularity, with the number of SIPs installations being close to 2,500. The session also assessed the impact of AEPC's SIP Program timeline from Jan-May 2020 to Aug-Dec 2021. The study highlighted that SIPs reduced diesel pump use by 64 and 33 percent for monsoon paddy and wheat, respectively.

Archisman Mitra, researcher, IWMI Bangladesh, in the session "State of solar irrigation in Bangladesh: learnings for solarization in off-grid areas of South Asia," spoke about how diesel-based groundwater irrigation was crucial for Boro cultivation and food-security in Bangladesh. The session discussed how imported diesel led to subsidy burdens and the rising prices of diesel in turn, burdened the forex reserves. Hence, the government of Bangladesh was actively promoting SIPs to replace diesel. This would help in energy security and provide protection from fuel price shocks and lead to reduction in emissions.

In the session "Perception Vs Reality: In-situ Instrumentation Analysis for Solar & Non-Solar Farmers", the work being done in Pakistan vis-a-vis India, Nepal and Bangladesh, was laid out by Azeem Shah, researcher, IWMI Pakistan. The presentation emphasised that farmers were being trained in Pakistan while local technicians were being trained in Bangladesh, Nepal and India. He also spoke about how demonstration pilots and simulation of grid-connected pumps were being done through heat sinks in Pakistan. Shah pointed out that the pumping and soil moisture data indicate that SIP farmers growing sugarcane in canal fed areas of Punjab were pumping more so a robust comparison could be done only when the data for the whole Kharif season 2023 came in.

Bangladesh

GOBESHONA 2023

Infrastructure Development Company Limited (IDCOL) conducted a joint session with IWMI during the recent Gobeshona conference held from 10-16 March, 2023, led by Dr. Saleemul Huq, Director of the International Centre for Climate Change and Development (ICCCAD). The session focused on two crucial topics that have significant implications for the future of agriculture and sustainable water management in Bangladesh. During the first session, the promise of Solar Irrigation Pumps (SIPs) in replacing diesel as a source of irrigation was discussed. The status of SIP grid integration in Bangladesh and the importance of setting the right incentives to promote adoption of this technology was also discussed. In the second session, the pressing issue of access to affordable irrigation and its potential threat to groundwater sustainability in the country was highlighted. The session also saw discussions on the challenges faced by smallholder farmers in accessing affordable irrigation and the need for innovative solutions to balance the competing demands of irrigation and groundwater management.

Bangladesh Officials Team Exposure Visit to SKY Feeders in Gujarat

(Photo: IWMI)

A 10-member delegation of government officials (including representatives from IDCOL, BARC, BADC, DAE, and BREB) from Bangladesh, were on an exposure visit to Gujarat, India from February 6-10, 2023. After attending the regional forum in Gujarat, the Bangladeshi team visited the SKY feeder sites and interacted with farmers and officials working on SKY. The main objective of this visit was to learn from the experience of grid-integrated SIPs for a better understanding of the institutional, financial and technical aspects of solar irrigation pumps in Gujarat. The team interacted with Gujarat Energy Research and Management Institute (GERMI) officials to learn about their innovations

India

Country Project Management Committee Meeting (CPMC) Updates

Alok Sikka (IWMI), presenting at the SoLAR Regional Forum (Photo: IWMI)

India-Country Project Management Committee Meeting (CPMC) was held on February 7 for India C-PMC members, which included Divya Kashyap, Swiss Agency for Development & Cooperation (SDC), Alok Sikka, Aditi Mukherji, Tushaar Shah and Deepak Varshney from IWMI. Divya Kashyap opened the meeting by stating that this CPMC meeting was the first to be held in-person since the beginning of the project. She also mentioned that Year 3 had picked up pace significantly in terms of the activities and expressed satisfaction at the project progress. Deepak Varshney, India lead for SoLAR-SA project presented the progress made in activities and outputs from India.
Based on the impact and findings, Dr. Tushar Shah and the committee suggested highlighting the positive aspects of the SKY scheme to change the mindset of the decision makers and policy makers. RJ Vala, DISCOM, appreciated the training program for SKY farmers conducted by IWMI in collaboration with GERMI and GUVNL benefiting the SKY farmers and can serve an instrumental role in improving energy related outcomes. Dr Sikka and Dr Mukherji pushed for modelling exercises across different geological terrains including hard rock areas, to estimate parameters, such as well depth, aquifer status, etc.

Project Steering Committee Meeting Updates

Aditi Mukherji (IWMI) presenting at the Plenary session at the SoLAR Regional Forum (Photo: IWMI)

The Project Steering Committee (PSC) Meeting was held on February 7, and it was a closed meeting for only the SoLAR-PSC members. The participants included Mark Smith, Alok Sikka, Vidisha Samasekaran, Aditi Mukherji from IWMI, Divya Kashyap, SDC, Md. Enamul Karim Pavel, IDCOL, PC Sharma, International Solar Alliance (ISA) and Corrine Demenge, SDC, who chaired the meeting. Mukherjee from IWMI presented the Annual Report for the SoLAR project. The report presented the completion of 15 activities under 7 outputs and 3 outcome categories except one on regional training. She explicitly stated the need for conversations around tariffs for grid-connected solar pumps for the next phase and highlighted the gradual shift to centralised systems such as the PM KUSUM. Mukherji then proceeded to present the key results from Bangladesh where she talked of CO2 mitigation being achieved under IDCOL SIPs without trade-offs for productivity. Other multiple co-benefits included more income, time saved for irrigation, less labour burden, etc. Key results from India were about the impact evaluation of the SKY scheme, training of farmers under SKY, and studies on groundwater sustainability. Training of farmers done through SDC support was found to be the most cost-effective intervention done in the RCT mode. It was observed that post this training, farmers started to perform better with their solar schemes. The key results from Nepal included a Gender-SIP study which revealed that while water and agriculture policies were more inclusive, the renewable energy policies have been technology centric and completely missing the gender components. The idea for micro-grids was pitched by the SoLAR team in Nepal at the Korea International Water Week, which won awards for innovation. The key results from Pakistan showed that financing was not available for the SIPs model. Also, grid connections were found to be more sustainable than standalone pumps in micro-grid format.

Alok Sikka, IWMI, and Divya Kashyap from SDC appreciated that the Regional Forum went beyond the project partners, thus, bringing in more experience exchanges beyond the geography and region, and looked at it as an opportunity for further south-south collaboration. Divya Kashyap stated the need for a review to identify the way forward for the project, and in line with this, a meeting with the key members was requested.

Mark Smith, IWMI, Corrine Demenge, SDC, Vidisha Samasekaran, Laxman Ghimire, AEPC Nepal, Md. Enamul Karim Pavel appreciated the progress of the SoLAR project and closed the meeting with endnotes on the importance of the project and l~~ooked forward to the next phase of the p~~roject to engage and foster policy, evidence driven dialogue, and policy and strategy development.

Nepal

Sixth SoLAR C-PMC Meeting Held in Nepal

On 13 March 2023, the sixth SoLAR Country level project management committee (C-PMC) was held in Nepal. The C-PMC, a key body in the project governance structure is critical for smooth project implementation by providing project-specific inputs and guidance. The C-PMC, Nepal, comprises members from AEPC, NEA, DWRI, DOA, NFIWUAN, NARMIN, SunFarmer and IWMI (organizations engaged in promoting solar irrigation in Nepal). In this regard, Shisher Shrestha, (national lead for the SoLAR Project, Nepal) gave a presentation on the 2022 project activities' progress and 2023 plan to C-PMC members for their feedback and suggestions.

Dissemination Workshop-Desk Assessment for GHG Emission from Diesel-powered Irrigation in Agriculture Sector

As part of the country request made by the Ministry of Forests and Environment (MoFE) to the NDC Partnership, IWMI, assisted the MoFE and NDC Partnership in conducting Desk assessment for the GHG emission from diesel-powered irrigation in the Agriculture sector of Nepal. The study will serve as a reference for creation of emission factors and activity data particular to each country to improve the accuracy of GHG inventories in Nepal. In coordination with MoFE, a stakeholder workshop was organized on 3rd March 2023, to share the findings of the assessments and gather comments from key stakeholders.

Knowledge Forum: Solar Irrigation as a Strategy for Addressing Food & Water Vulnerabilities and Inclusive Development

As part of the Nepal National World Water and Weather Week (NNWWW), IWMI Nepal, the Water and Energy Commission Secretariat (WECS) and the Alternative Energy Promotion Center (AEPC) in collaboration with other partners organized the Knowledge Forum on Accelerating Change in a Federal Nepal through Transformative Actions for Inclusive Water Management on 17 March, 2023, in Kathmandu.
The Nepal Renewable Energy Program (NREP), GIZ POSTED and IMWI gave three presentations as part of a technical session on Water Technology and Innovation: Solar Irrigation as a Strategy for Addressing Food and Water Vulnerabilities and Inclusive Development as part of the knowledge forum. A panel discussion on ways to expand solar irrigation in Nepal followed the presentation.

Country Highlights : From the Fields

Bangladesh

IWMI researcher, Mohammad Faiz Alam, visited eight locations in Northwest Bangladesh from 11th to 20th March, 2023 to assess the groundwater monitoring being conducted to understand groundwater usage among solar pump users as compared to diesel pump users. The monitoring in 2022-23 marks the second year of data collection under this project following the 2021-22 period, focusing on the flow rates and groundwater usage of solar and diesel pump users.

India

Deepak Varshney, India lead of SoLAR project visited the Nityanand SKY Feeder in Gujarat in early February 2023 to launch a primary survey to assess the impact of SKY.

Pakistan

A Presentation titled, “Perception Vs Reality: Behavioral Survey & In-situ Instrumentation Analysis for Solar & Non-Solar Farmers” was given by Zain Akbar (Research Officer-Policy & Water Governance) on 17 Feb 2023 at the “Precision and Sustainable Agriculture under Climate Change” conference. This conference was organized by the Department of Agricultural Engineering, Khwaja Fareed University of Engineering & Information Technology (KFUEIT), Rahim Yar Khan.The presentation highlighted the results from two studies conducted under SoLAR Pakistan. Results from Behavioral survey and preliminary results from in-situ instrumentation were compared and the survey results showed that the main motivation of adopting SIP was to minimize operational costs associated with diesel/electric pumps.

Nepal

The IWMI team (Shisher Shrestha and Labisha Uprety) visited Birendranagar (Karnali Province) and Dhalkebar (Madesh Province) to orient the provincial and local government and other local stakeholders about the water- energy-food nexus approach and share findings from the SoLAR Impact Evaluation work. The LG Orientation took place in Janakpur on March 26, 2023 and in Surkhet on March 30.

The IWMI team in Nepal visited the SoLAR grid connected solar irrigation pilot site in Chhipaharmai rural municipality, Parsa, to oversee the system Commissioning on 4-7 January 2023.

Meet Our SoLAR Champions

Mohammad Faiz Alam

Researcher - Water Resources-Agricultural Water Management, IWMI

What is your role in the project?

I am looking after groundwater sustainability studies in India and Bangladesh. In this, we are assessing the impact of the introduction of solar irrigation on farmers pumping behaviour and its impact on groundwater sustainability. I coordinate with our country field partners in India and Bangladesh for field instrumentation and continuous monitoring.

What are the critical questions that your country team is trying to answer?

There are concerns that the anticipated rise in the use of solar irrigation pumps may lead to overexploitation of groundwater. This concern arises from past experiences in regions where highly subsidized electricity for groundwater pumping has encouraged unsustainable abstraction rates. However, changes in farmers' irrigation behaviour depend on a range of factors, including the type of solar irrigation model used (on or off-grid solar irrigation pumps), existing crop patterns, developed value chain markets, and biophysical factors such as water availability (which depends on climate, aquifer type and groundwater tables). Thus, in this project, we are trying to understand how farmers' pumping behaviour has changed with the introduction of solar irrigation and its impact on groundwater systems.

Which aspect of the project keeps you motivated?

Our research project is the first-of-its-kind study on the impact of solar irrigation on groundwater. While previous research has been limited to theoretical models or perception analysis, we are collecting rigorous field data to answer this question. Our findings will inform policy decisions and best practices for practitioners and contribute to the ongoing conversation around solar irrigation and groundwater.

SoLAR in News

'IPCC author Aditi Mukherji on energy transition in agriculture and water security' - Mongabay India interviewed Aditi Mukherji, Regional Project Leader, SoLAR-SA, IWMI, on a reportage on just energy transitions in the agriculture sector to address water insecurity and the carbon footprint of agriculture in India.

'Solar will turn the vicious water-energy-climate cycle into a virtuous loop' - PV Magazine quoted Aditi Mukherji, Regional Project Leader, SoLAR- SA, IWMI, in a piece on how proponents of solar irrigation pumps can significantly influence groundwater.

'Harnessing the Sun to Power India's Agri Sector' - Energizing Agriculture and Enabling Just Energy Transitions in South Asia, held during February 6–8, at IIT Gandhinagar, Gujarat, was featured in Gaon Connection.The article highlighted the potential of solarization in the agriculture sector which will contribute towards India's target of achieving net zero emissions by 2070.

'Building gender-responsive policies' - Labisha Uprety's opinion piece in The Kathmandu Post, highlighted that women and small-scale farmers in Nepal have limited access to solar irrigation pumps (SIPs). The article underlined the need for inclusive policies and initiatives that are tailored for these populations, while small farmers (backbone of the nation) and farm labour are becoming more and more feminised. She is a senior research officer at the International Water Management Institute, Nepal.

On the Reading List

Impact assessment of Solar Irrigation Pumps (SIPs) in Bangladesh [doi: https://doi.org/10.5337/2022.230]

Current status of running renewable energy in Bangladesh and future prospect: A global comparison [doi: https://doi.org/10.1016/j.heliyon.2023.e14308]

Climate Change Impact on Groundwater-Based Livelihood in Soan River Basin of Pakistan (South Asia) Based on the Perception of Local Farmers [doi: https://doi.org/10.3390/w15071287]

In partnership with

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For further information, please get in touch with our Communications Team, SoLAR Project, IWMI at iwmi-solar@cgiar.org

Images courtesy: IWMI -SDC-SoLAR Project

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