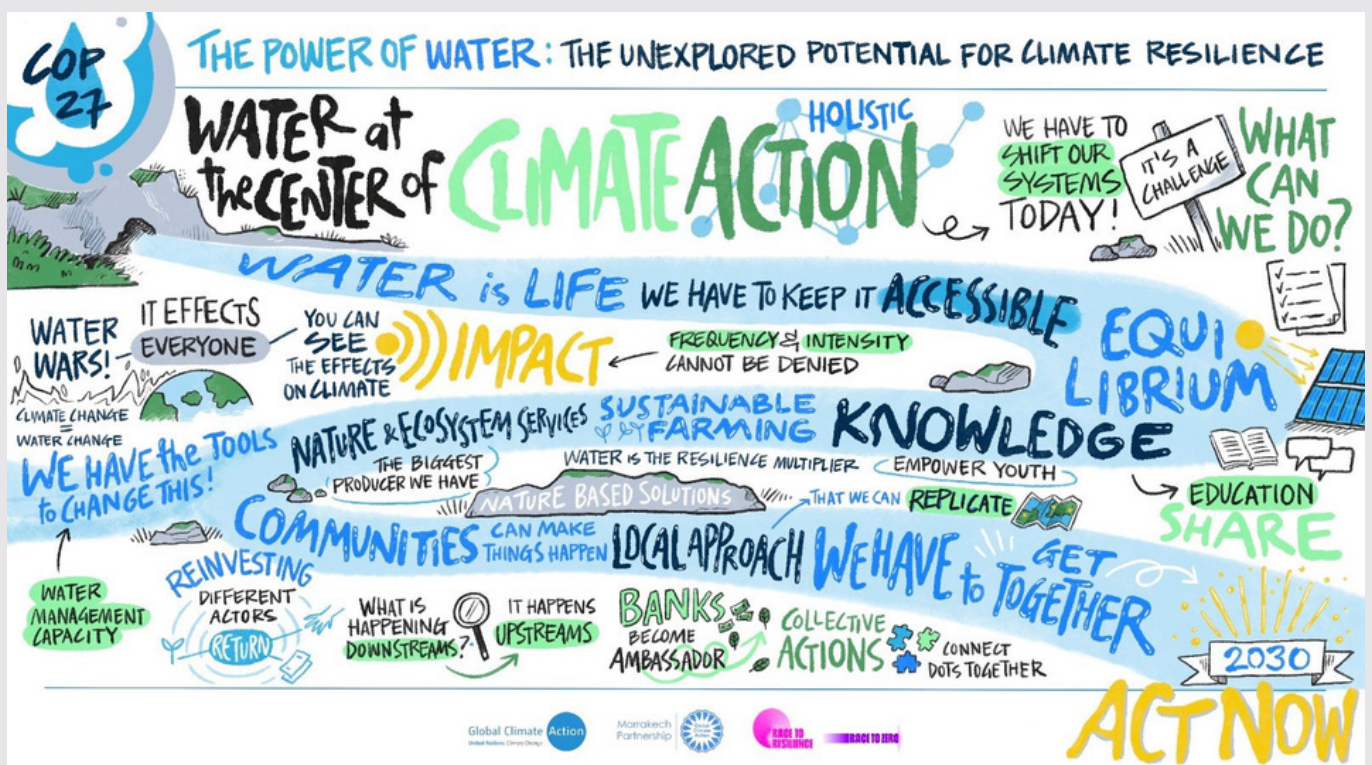


SoLAR
Solar Irrigation for Agricultural Resilience
Issue No. 10: October – December 2022

Dear Readers,

At the crucial Conference of Parties (COP27) conference held in November 2022, United Nations chief, António Guterres, pointed out that three times more people are displaced by climate disasters than by war today. While it is common knowledge that most climate-exposed populations experience climate shocks in the form of water impacts, it is only in the draft text of this COP that the critical role of water in delivering climate adaptation benefits and co-benefits finds mention for the first time. In 2022, South Asia grappled with perhaps one of its most devastating and long- drawn climate crises – the floods in Pakistan and its humanitarian aftershocks. The country's grim economic situation has further added to the steep challenge of (re)building a climate-resilient and food-, energy-, and water-secure future in the region.



The shape-shifting spectre of water extremes, however, is manifesting in every corner of the world, from severe droughts in the western United States to chronic water scarcity in the Horn of Africa to never-ending drought emergencies in Venice in Italy, where the city's canals are running dry. The intensity and frequency of these crises are beyond historical precedents, which usually underlie our conventional understanding of climate disasters. To quote International Water Management Institute's (IWMI's) Director General, Mark Smith, "...the international community is at an inflexion point (now). Setting the trajectory from here on will determine whether we achieve the global goals of delivering climate action and sustainable management of water... by 2030 and beyond." On that note, we open this newsletter issue.

Highlights from the Quarter

SoLAR at CGIAR Gender Science Exchange in Nairobi



IWMI researchers, Manohara Khadka, Labisha Uprety, Gitta Shrestha, Aditi Mukherji, and Archisman Mitra made a presentation titled "Do Water, Energy and Food Policies in Support of Solar Irrigation Enable Gender Transformative Changes in South Asia? Evidence from Policy Analysis in Bangladesh and Nepal", at the Consultative Group on International Agricultural Research (CGIAR) Gender Science Exchange in Nairobi, held on October 12–14, 2022. The results show that water–energy–food (WEF) policies are aware of the need to include gender equality and social inclusion (GESI) and social equity in sectoral programming; however, the operational rules for the implementation of these policies often fail to challenge the structural barriers that prevent women and marginalised groups from participating in and benefiting from WEF policies, including from the deployment of solar irrigation pump (SIP) technologies.

National stakeholder workshop on the Groundwater Energy Nexus in Bangladesh



Bottom picture: L to R- Munira Sultana, NDC, Chairman (SREDA)_Mr. S.M.A. Rashid Executive Director (NGO Forum)_ Divya Kashyap Sharma, Deputy Head of Cooperation (SDC) and Dr. Alok Sikka, Country Representative (IWMI) India

As [Bangladesh](#) takes a gradual recourse to solar-powered irrigation from the expensive and polluting diesel irrigation under the government's commitment towards green energy, the need for understanding the implication of this transition and subsequent access to cheap irrigation for agricultural production, farmers' incomes and groundwater sustainability are being felt across policy-makers and practitioners. The SoLAR project, in collaboration with [CGIAR Transforming Agrifood Systems in South Asia \(TAFSSA\)](#) and MITIGATE+: Initiative for Low-Emission Food Systems Initiative and [the Infrastructure Development Company Limited \(IDCOL\)](#) and [NGO Forum](#), Bangladesh, organized a day-long stakeholder workshop on [December 21, 2022](#), at the Pan-Pacific Sonargaon hotel in Dhaka. The workshop on [Groundwater Irrigation in Bangladesh: Changing Modalities, Resultant Policies](#) focused on the scope and impact of replacing diesel with solar irrigation pumps, the consequences of rapid electrification on the groundwater market, and the ways to tackle the threat to groundwater sustainability posed by cheaper irrigation. Officials from [Sustainable And Renewable Energy Development Authority \(SREDA\)](#), [Bangladesh Water Development Board \(BWDB\)](#), [Bangladesh Agricultural Development Corporation \(BADC\)](#), [Bangladesh Agricultural University \(BAU\)](#), [Bangladesh Agricultural Research Council \(BARC\)](#), [Bangladesh Agricultural Research Institute \(BARI\)](#), and the [Barind Multipurpose Development Authority \(BMDA\)](#), among others, attended this meeting.

India Water Week 2022: Water Security for Sustainable Development with Equity



L to R- Dr. Giriraj Amarnath, Principal Researcher, IWMI_ Dr. Mark Smith, Director General, IWMI_ Dr. Alok Sikka, Country Representative- (IWMI) India, Dr. S Bhaskar, Assistant Director General (Agronomy, Agro-Forestry & Climate Change), ICAR

IWMI participated in the seventh India Water Week themed around “Water Security for sustainable development with equity”. The deliberations focused on equitable and sustainable development and the importance of secure water to achieve that. The South Asia Drought Monitoring System (SADMS) was introduced to the media at the workshop by IWMI. SADMS is funded by the [Indian Council of Agricultural Research \(ICAR\)](#), the [CGIAR Research Program on Water, Land and Ecosystems \(WLE\)](#), and the [Ministry of Agriculture, Forestry and Fisheries \(MAFF\)](#), Japan. Development of the beta-monitoring system was made possible through the Integrated Drought Management Programme (IDMP) supported by the World Meteorological Organization (WMO)/Global Water Partnership (GWP) and the [CGIAR Research Program on Climate Change, Agriculture and Food Security \(CCAFS\)](#).

SoLAR National Forum Explores a Policy Roadmap for Sustainable Solar Irrigation in Pakistan



As Pakistan is gradually transitioning to solar pumping as an alternative to diesel and electric pumps, water professionals in Pakistan are concerned that such a transition may have adverse consequences for groundwater sustainability. There is an extant policy gap to support the solar irrigation transition in the country. While IWMI's studies to explore SIP users' behavioural changes and verify alleged indiscriminate pumping of groundwater provide evidence of the impact of solar irrigation on groundwater abstraction, efforts are needed to build up commensurate policies based on this evidence. The SoLAR Pakistan National Forum, held on October 24, 2022, brought together 26 participants, including sector experts from the government, NGOs, and international organisations, to identify the best possible future course of action for policies related to sustainable solar irrigation systems.

Water-Energy-Food Ecosystem Nexus for Climate Resilience



IWMI Pakistan and the CGIAR NEXUS Gains Initiative organised Pakistan Water Week on October 24–28, 2022, in association with the Ministry of Planning, Development and Special Initiatives (MoPD&SI) and Ministry of Water Resources (MoWR), through the Pakistan Council of Research in Water Resources

(PCRWR). The event comprised an international conference and a national exhibition. It deliberated on three key areas, that is, policy and evidence gaps for climate-resilient solutions in Pakistan, water governance strategies for the competing water requirements of multiple sectors, and key climate adaptation actions for sustainable water management in the Indus Basin. Read more about the event [here](#).

SoLAR wins the World Water Challenge at the Korea International Water Week 2022



IWMI Nepal researchers, Shisher Shreshtha and Manohara Khadhka, win an outstanding achievement award from Korea Water Forum on November 25, 2022, for their solution-oriented research on irrigation management in the Nepal Terai via the grid-connected SIP pilots supported by the IWMI–SDC SoLAR Project.

Country Highlights : From the Fields

Bangladesh

IWMI SDC team visits grid integration pilot sites in Dinajpur



In December, a team of SoLAR researchers from IWMI, accompanied Divya Sharma (SDC) to visit the location of a grid integration pilot in Dinajpur, Bangladesh, that was launched in 2022. The SoLAR project is financing through IDCOL a pilot for the integration of off-grid SIPs (Solar Irrigation Pumps) with the national grid. In Bangladesh, the irrigation demand is seasonal and hence SIPs go unused for long periods of time during the year. Through grid-integration, it will be possible to increase the capacity-utilization of SIPs, and also create an additional revenue source for the IDCOL sponsors by selling unused energy into the grid. These pilots are among the first of its kind in Bangladesh, and will provide important insights for the upscaling of SIP grid integration in the country. This, in turn, can help ensure the financial sustainability of the IDCOL SIP model. So far, six SIPs have been grid-connected under the solar project. During the visit, the team went to a site with a cluster of four SIPs (total installed capacity of 120 KW) in Dinajpur under IDCOL sponsor Gazi Renewable Energy Limited. The team interacted with farmers, sponsors, and IDCOL officials to gain a better understanding of the pilot experience.

India

SKY Farmers Training in Gujarat



On December 12–29, 2022, Gujarat Energy Research and Management Institute (GERMI) officials trained around 320 farmers across 12 SKY feeders in the Banaskantha, Mehsana, Patan, Kutch, and Bharuch districts of Gujarat, as a part of IWMI–SDC’s SoLAR Project. GERMI, in collaboration with IWMI and the Gujarat Urja Vikas Nigam Limited (GUVNL), is rolling out state-wide farmer training programmes on the financial modality of the state government’s SKY scheme. The training focuses on the SKY mobile application and the metering and billing systems under the scheme, among other things.

SoLAR IF Grantee URMUL Site Visit in Rajasthan



An IWMI team, consisting of Shisher Shrestha and Gurpreet Dhawan, visited Rajasthan, where Uttari Rajasthan Cooperative Milk Union Ltd (URMUL) Seemant is implementing a project titled “Solar Powered Climate Controlled Vertical Farming of Fodder & Mushrooms to Sustain Local Livelihood Enterprises” under the SoLAR Innovation Fund. The team visited the URMUL headquarter in Bajju Tejpura for meetings with URMUL senior officials and observe the demonstration of a grow house. The team also visited Ghantiyali village, where URMUL has erected a solar-powered, climate-controlled vertical farming grow houses. The team also interacted with the local women’s group operating the grow house.

Watch Video here:



Nepal

Technician Training in Chitwan



On December 10–11, 2022, IWMI, in coordination with Educational Resource and Development Center Nepal (ERDCN), conducted training of technicians for the general operation and maintenance of components of SIPs at Bharatpur, Chitwan. This was a two-day training programme, where the first day focused on the fundamentals of SIPs through classroom presentations. The following day, the participants were taken to the field for a practical demonstration of the operation and maintenance of a SIP. Twenty participants were residents of Chitwan and nearby districts. The female participants made up 50% of the total. IWMI and the Alternative Energy Promotion Centre (AEPCC) team participated in the training programme to oversee the implementation.

Pakistan

IWMI-CEWRI Collaborates to Train Technicians on High Efficiency Solar Irrigation Pumping Systems



On December 27–28, 2022, the Climate Energy Water Research Institute (CEWRI), supported by IWMI Pakistan, trained 22 technicians / solar irrigation professionals on the installation, operation and maintenance, and promotion of solar PV and pumps. The training method was diverse, with lectures, presentations, group discussions, demonstrations at the CEWRI field station, and practical solar system performance evaluation exercises. Participants were from government organisations and mostly with technical/engineering backgrounds.

Choice Experiment Survey in Punjab, Pakistan



A multi-part survey as a part of a choice experiment was conducted on October 7–23, 2022. This survey was conducted with a total of 208 farmers in three districts of Punjab, namely, Chakwal, Jhang, and Rahim Yar Khan. The sample of farmers was made up of two equal groups i.e., SIP using farmers and

diesel/electric pump (non-SIP) farmers. The sample was uniformly divided among selected districts, and within each district, two tehsils (sub-districts) were randomly selected for the survey. At least 70 farmers were interviewed in each of the districts, and it took approximately four days per district to complete the survey. The objectives of the choice experiment were three-pronged:

1. How might the introduction of feed-in-tariffs for electricity sale affect the farmer behaviour regarding the groundwater use keeping all the other variables constant?
2. How might the introduction of feed-in-tariffs for electricity sales encourage new investment in SIP farming?
3. How well can individual choices to sell electricity or to invest in SIP farming be explained by community-level (e.g., the availability of groundwater trading) and individual (e.g., risk and time preferences, farm size, age, etc.) covariates?

Meet Our SoLAR Champions



Dr Hippy Salk Kristle Nathan

Associate Professor

Institute of Rural Management, Anand Gujarat

Which key policy-relevant research questions are you looking at in this project?

Solarisation of agriculture is aimed at not only providing reliable daytime electricity to farmers but also saving distribution companies the costs associated with procuring costly power to supply to agriculture at a subsidised tariff and helping reduce T&D loss. Among the different options for solarisation of agriculture, feeder (substation) level systems, which are neither large-scale like utility level plants nor small like individual household-based or farmer-level systems, offer great promise. These plants use existing substation infrastructure, insulate farmers from the costs associated with the maintenance of the systems, and help in inducing private investment and deploying solar in a decentralised way. The study I focused on concerns with one such solar initiative, the Maharashtra State Government's Mukhyamantri Saur Krishi Vahini Yojana (MSKVY), launched in June 2017 to install typically 2 to 10 MW solar plants at the feeder level.

The key policy-relevant research questions we are looking at in this study are as follows:

Has MSKVY helped improve the quantity and quality of power to farmers?

Are there benefits in terms of improved cropping patterns, cropping intensity, and crop yields? Are there benefits in terms of the availability of energy for non-farm uses?

How successful has MSKVY been in attracting private investment in establishing feeder-level solar plants?

What have been the constraints and bottlenecks?

How difficult has it been to find/lease land near sub-stations to build solar plants?

What kind of management models has evolved for O&M of tail-end solar plants?

Have these plants helped distribution companies achieve renewable purchase obligation (RPO) targets?

Have distribution losses on solar feeders decreased?

How far has MSKVY benefitted the government in reducing its subsidy burden as well as promoting the deployment of solar?

How has MSKVY affected the groundwater situation in the area?

Is energisation through one natural resource (solar) depleting another (groundwater)?

Which aspects of the study interest you the most?

The most interesting aspect of this study for me is the study's comprehensiveness. The interactions with different stakeholders: farmers, officials of distribution and generation utilities, collaborating agencies, solar developers and tail-end operators, and managers of sub-stations, provide different perspectives on the project as well as the strategies employed by these stakeholders to meet their objectives through the scheme. The holistic assessment in the study offers insights into a host of issues in the project, starting from land procurement, the architecture of engagement of private players, sharing of financial benefits, management at the substation level, and how to change the behaviour of farmers to adapt to new interventions. The other interesting aspect of the study is that the plants under MSKVY, being meso-level, overcome in principle the lacunae of both macro-level (large land requirement, idle infrastructure for two-thirds of the day, high T&D losses) and micro-level (sustainability burden passed to the farmers, risk of systems being stolen or damaged) systems, making it worthwhile to assess the MSKVY scheme. Given that in the solar sector, one of the critical decisions relates to the size of plants, I find the analysis of meso-level plants stimulating



Labisha Uprety

Senior Research Officer– Policy and Water Governance
International Water Management Institute, Nepal

What is your role in the project?

I study and analyse governance mechanisms in relation to solar irrigation in Nepal. This includes studying policies and the policy environment for the deployment of solar irrigation subsidies by the Government of Nepal. I also work alongside my team on the gender and inclusion-related dimensions of solar technology, looking at what factors support the successful adoption of technologies such as solar and who is able to do so.

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

We are working actively with government renewable energy counterparts to identify who is getting access to solar irrigation subsidies and who is being left behind. Moreover, we are also looking at water–energy–food related laws and policies in Nepal and other project countries to examine if they consider inclusion-related dimensions because this determines who the policy will ultimately benefit. At the core, we are looking at how we can enable solar irrigation for women and smallholder farmers in Nepal.

Which aspect of the project keeps you motivated?

The aim of the SoLAR project is clear – that we want to support smallholders and marginal farmers in accessing and benefiting from clean technologies. It is a well-thought-out and structured project inbuilt with technology and sociocultural dimensions. Whenever I introduce my work to someone, I often cite my work in SoLAR, which is easy to understand and communicate and is geared towards impact. This keeps me motivated.



SoLAR in News

THE EXPRESS
TRIBUNE

‘Solar pumps to water Barani land’ - The Express Tribune published an article that the Punjab chief minister has approved a plan to install 500 solar water pumps in 13 districts of the province that are dependent on rainwater for irrigation.

‘Subsidized solar irrigation pumps: Not benefitting needy farmers’

The Himalayan

– Kashi Kafle and Aditi Mukherji’s opinion piece in The Himalayan explains why despite the Nepal government’s objective to provide subsidized solar irrigation pumps to the needy farmers and encourage more affluent farmers to make the switch independently, majority of the solar pumps went to farmers who are better off both socially and economically.

On the Reading List

Deepak Varshney, Ashok K. Mishra, Pramod K. Joshi, Devesh Roy. 2022. Social networks, heterogeneity, and adoption of technologies: Evidence from India, Elsevier, Food Policy Volume 112, October 2022. DOI: <https://doi.org/10.1016/j.foodpol.2022.102360>.

Archisman Mitra, Soumya Balasubramanya, Roy Brouwer. 2022. Can cash incentives modify groundwater pumping behaviors? Evidence from an experiment in Punjab, American Journal of Agricultural Economics, 14 August 2022. DOI: <https://doi.org/10.1111/ajae.12340>.

Arshad Ashraf, Khalid Jamil. 2022. Solar-powered irrigation system as a nature-based solution for sustaining agricultural water management in the Upper Indus Basin, Elsevier, Nature-Based Solutions Volume 2, December 2022. DOI: <https://doi.org/10.1016/j.nbsj.2022.100026>.

In partnership with



We thank Aditi Mukherji, Alok Sikka, Archisman Mitra, Azeem Ali Shah, Deepak Varshney, Labisha Uprety, Shisher Shrestha and Hippu Salk Kristle Nathan for contributing to this newsletter.

We thank Aariz Raza and Tanmoy Bhaduri, IWMI India, for providing overall technical support in bringing this newsletter out.

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