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SoLAR
Solar Irrigation for Agricultural Resilience

IWMI
International Water Management Institute

Solar Irrigation for Agricultural Resilience in South Asia (SoLAR-SA)

Minutes of 5th Project Steering Committee (PSC) Meeting

02nd March 2022 | Time: 10:00 am - 12:30 PM (IST)
Venue: Online meeting on Zoom

A) Attendees

Name and designation	Designation	**Attended**
Corinne Demenge, Head of SDC, New Delhi	Chair, PSC	Yes
Mark Smith, Director General, IWMI	Co-Chair, PSC	Yes
Aditi Mukherji, Regional Project Leader, SoLAR-SA, IWMI	Member Secretary, PSC	Yes
Divya Kashyap, Senior Advisor and Project Manager, SoLAR-SA,	Regular Member, PSC	No
Alok Sikka, IWMI Country Representative, India	Regular Member, PSC	No
Tushaar Shah, Emeritus Fellow, IWMI (Special Advisor to the SoLAR-SA)	Regular Member, PSC	Yes
Rajeev Gyani, Additional Director, International Solar Alliance (ISA)	Co-opted Member, PSC	Yes
Akhilesh Magal, Head of Advisory and Consulting, GERMI, India	Co-opted Member, PSC	Yes
Laxman Prasad Ghimire, Senior Officer, Solar and Wind Energy, AEPC, Nepal	Co-opted Member, PSC	No
Kazi Ahsan Uddin, Manager, IDCOL, Bangladesh	Co-opted Member, PSC	No
Kifayat Zaman, Director General, FWMC, MNFS&R, Pakistan	Co-opted Member, PSC (Taken over from Dr. Tahir Anwar, who completed his tenure as DG, FWMC)	No
A representative from SAARC Energy Centre (SEC), Islamabad	Co-opted Member, PSC Dr. Shoaib Ahmed has completed his term; a new member is yet to be nominated by SEC	No
Mohsin Hafeez, IWMI, Country Representative, Pakistan	Special Attendee	No

Abbreviations: AEPC: Alternative Energy Promotion Centre, Nepal; FWMC: Federal Water Management Cell, Pakistan, GERMI: Gujarat Energy Research and Management Institute, India IDCOL: Infrastructure Development Company, Bangladesh; ISA: International Solar Alliance; IWMI: International Water

B) Agenda

1. Welcome Remarks

- Mark Smith, Director General, IWMI, and Co-Chair of SoLAR PSC, welcomed all
- members to the 5th PSC Meeting. He commended the work progress made by the different country teams despite the covid-related challenges. While he acknowledged the delays in pilots and groundwater studies, he appreciated the ongoing data collection efforts. With the project being halfway through its four-year timeline, he emphasized that it is crucial to start converging the evidence of the project's (desired) outcomes. He also highlighted that the key partnerships built and preserved through the project will be significant in sustaining the excellent work in 2022. Lastly, he promised all the help and support needed for the smooth execution of the project in 2022.
- Corrinne Demenge, Chair of PSC, also expressed her satisfaction with the project's progress - the extent of data collection and the results obtained - under challenging circumstances. She emphasized the importance of finalizing the different datasets and intensifying the discussions on policy-level recommendations. She also suggested that the SoLAR project starts communicating the results from its groundwater components in India & Bangladesh and GESI in Nepal. In this context, she suggested coordinating with ISA to disseminate the research findings. She noted that the PSC members and partners like AEPC are already applying the insights from the project results in Nepal in adapting their future work modalities.
- Rajeev Gyani, Additional Director, ISA, highlighted the coordinating role played by ISA in different countries and expressed keen interest in collaborating further with IWMI. He acknowledged the delays due to Covid and hoped that this project's impact would be visible soon. He especially highlighted the technology-centric nature of the learnings from the project, which make them easily applicable across countries. He was hopeful that the SoLAR project would help develop a complete package around solar irrigation (SI).
- Laxman Prasad Ghimire, Senior Officer, Solar and Wind Energy, AEPC, Nepal, emphasized improving the focus of SI for women and the marginalized sections of society. He informed the panel that, based on the research findings of SoLAR, AEPC is already revising the price of SIPs and the subsidy delivery mechanism in Nepal. He expressed his pleasure at the micro-grid pilot being undertaken in close collaboration with AEPC and pledged his full support to the project.
- For Akhilesh Magal, Head of Advisory and Consulting, GERMI, India, this was the last SoLAR PSC he attended since he would be moving on from GERMI. He highlighted that the results from the project are significant for the entire country. He appreciated the efforts of detailed documentation of SI undertaken under the project. These will be useful for India's key renewable energy and power agencies. It will also help remove silos within different states, facilitate learning, and minimize teething mistakes. He suggested that SoLAR should engage with MNRE and help in tailoring the PM-

KUSUM programmed to landscape variabilities for better adaptability and adoption. Lastly, he expressed gratitude towards IWMI and SED for their association and expressed his willingness to support the work in the future.

- Tushaar Shah, Emeritus Fellow, IWMI (Special Advisor to the SoLAR-SA), recommended that the SoLAR project continues to involve Akhilesh Magal in its steering committee to make use of his rich experience in the sector. He commented on the mixed results seen in SKY-Gujarat and expressed concerns about the designs of different programs such as PM-KUSUM and IDCOL in influencing outcomes. He highlighted the importance of the learnings from SKY, especially for policy and deliberations at the state level, and highlighted the potential of SoLAR in formalizing the future of SI.
- IWMI Country Representative, India, Alok Sikka, thanked Corinne and Mark for their understanding, support, and guidance during and after the Covid situation. He assured the members that results would be forthcoming by the next meeting and agreed with the importance of engaging with MNRE and other state agencies. He also suggested engaging with Asian Development Bank and other global partners to share our experiences through the ISA platform.

2. Work plan for Year 3 (2022-23)

Aditi Mukherji, Project Lead, Solar-SA, presented the project's work plan for 2022-24. While answering the PSC's queries on outreach and dissemination, she informed the members that upcoming regional and national forums would be used to reach out to partners and other stakeholders like MNRE. The main emphasis of 2022 will be publishing research articles and policy briefs for outreach, apart from getting pilots and communication activities up and running.

Salient points from Year 3 work plan

- **Bangladesh**
  - Completing the remaining SIP surveys for the upcoming seasons; publications on mitigation, livelihoods, and equity impacts of SIPs.
  - Scaling up pilot surveys keeping in view the changes in the IDCOL model and its comparability with other models.
  - Implementation of the demonstrations of Micro-Grid connections. Tentative plans of conducting an exposure visit to Gujrat.
  - Concluding field data collections and developing a policy brief on the impact of SIP on groundwater.
- **Nepal**
  - Completing proposed journal articles and policy briefs.
  - There are ongoing efforts to study country-specific emission factors in agriculture for different crops in Nepal in partnership with NDC.
  - Proposed national dialogues around the World water week
- **India**
  - Groundwater component to focus on developing relationship between volumes extracted vis-a-vis energy used.

    - The blog series has been started and published in the SoLAR newsletter. PSC members are encouraged to contribute.
    - The regional forum planned to share the findings from the SKY study.
    - 8 IF grantees are in operation. One more grant may be issued.
- **Pakistan**
    - Constant coordination with PARC and other government agencies
    - Ongoing talks with World Bank for potential collaboration to assess solar irrigation in Pakistan
    - Focus on completing the pilots and groundwater data collection
- **Farmer Training** – Training plans have been provided. India team has an extensive training set of more than 2000 farmers.
- **Regional training** – The collaboration dialogues with IHE-Delft are in the process
- **Regional forums** – It has planned to be held in a couple of months.

Some Key Achievements in Year 2 (2021):

- **Bangladesh**
    - Impact Evaluation (IE) & GESI work is going well, focusing on writing and publications.
    - SoLAR baseline studies are helping IDCOL and AEPC write proposals to the World Bank & GCA.
    - Groundwater instrumentation is completed, and data collection is ongoing.
    - Scale and demonstration pilot works are very field-based and are picking up now.
    - The paperwork and permissions have been taken for the demonstration pilots and will be completed in a few months.
    - The National forum conducted for Bangladesh work saw the World bank approaching IWMI for a scoping study on SIP business models.
- **India**
    - Groundwater instrumentation is completed, and data collection is ongoing with the help of INREM.
    - We have access to the SKY portal data from DisComs, which is being used for understanding determinants of adoptions of SIPs.
    - Large-scale training of farmers (2000+) across 48 feeders is now under progress with support from GERMI and GUVNL.
    - We will do the national forum in a month after significant data is collected and analyzed. We plan to include other agencies like MNRE and state agencies for dissemination.
    - According to the contract with GUVNL, prior coordination will be necessary before disseminating research findings.
- **Nepal**
    - The first component of the SoLAR work is completed, and the excellent work of the Nepal team is highly appreciated.
    - In addition to the targets, we conducted phone surveys and household surveys

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    - The national forum was well attended, and AEPC is already adopt
    - ing research findings.
    - The demonstration pilot is in progress, and a 4-party MoU has been signed. A 10-member delegation will be visiting Gujrat for an exposure visit to Dhundhi and SKY in March 2022.
- **Pakistan**
    - The groundwater work is going well.
    - The demonstration pilot is in progress.
    - Training around farm-level water management was conducted with various stakeholders.
- **Regional forum and training**
    - This year, a regional forum is planned to facilitate sharing of findings with other agencies like MNRE and across different countries.
    - The discussions for conducting the regional training program are underway with IHE-Delft, with access to their portals and course certificates.

3. Discussion Highlights:

Corinne encouraged participation from the other PSC members interested in helping with the project's next phase. She suggested coordination with ISA through regional forums and the possibility of involving IRENA for knowledge management and dissemination. She thanked Akhilesh for his contributions to the PSC and extended best wishes on behalf of all the PSC members.

Mark raised a query on the potential bottlenecks that SoLAR may face while balancing the twin tracks of completing field pilots and policy outreach. Aditi highlighted that the project would be strengthening its management and communication staff to ensure the smooth execution of the activities. The country leads and research teams will provide policy outreach, while the partners will ensure the completion of the pilot-related activities.

LP Ghimire expressed enthusiasm about the ongoing collaborations. Akhilesh expressed gratitude and extended support to help with any work in the southern states of India. He also suggested initiating dialogues with other development agencies like GIZ, promoting KUSUM to ensure cross-learnings and better advocacy.

Finally, Mark and Aditi thanked the PSC members and SDC for their support and flexibility in implementing the second part of the project.

Meeting notes prepared by Dr. Manish Kumar, Consultant, IWMI.

Annexure 1: Activity wise progress

Table 1. Progress in planned activities in Bangladesh in 2021

Activity No.	Deliverables that were due in 2021	Status of deliverables at the end of 2021	Plan for 2022
1.1.1 Impact evaluation and GESI case studies of existing and new SIP programs in Bangladesh	SIP level survey data for three seasons in 2021	Completed: Data collected for 2nd (rabi), 3rd (Kharif 1), and 4th (Kharif 2) rounds and baseline household surveys with ~900 households completed	SIP level database for three seasons in 2022 (i.e., Rabi, Kharif 2, Kharif 1).
		Compilation and analysis of Household-level and SIP level data in the process.	Journal article analyzing the impact of SIP on farmers' irrigation practices (time, cost, yields) and the heterogeneity of the effects)
	Baseline report + Blog Post	Completed: One opinion piece was published, and the results were presented at one international conference.	Three Policy Briefs (Mitigation potential of SIPs in Bangladesh, Impacts of IDCOL SIP model on farmers' incomes and livelihoods, and Equity impacts of SIPs—who has access and who doesn't)
	Research article based on analysis of policy documents through GESI lens	In progress: Analysis of policy documents through a GESI lens completed an article in draft stages.	Part of a regional research paper to be completed by October 2022
2.1.1 Scale pilot for testing different SIP promotion models in Bangladesh	Research article on the modified topic: Comparative case study of other SIP promotion models in Bangladesh	• KIIs with officials of various organizations conducted • Field visits and FGDs were conducted to understand how different SIP modalities work. • The case study on *the Upazila* permit dropped as the	• Analysis of qualitative and quantitative data from KII and FGD's • Journal article on the effect of SIP on the groundwater market • Journal article on the different SIP modalities
	The case study report on the implementation Upazila permit policy and its implications for SIPs		

		permit system is not yet implemented widely by the government due to COVID delays.	
1.2.1 Groundwater-related studies embedded in demonstration pilot in Bangladesh	Database on farmers' pumps, wells, groundwater, and water management practices in selected SIPs and diesel plots in NW and SW Bangladesh.	• Survey of SIPs (collecting design plans, field, and farmer mapping) conducted in Northwest and Southwest Bangladesh. • Selection of 320 plots serving 235 farmers for monitoring	Initial report on groundwater use comparison of solar and non-solar farmers and different SIPs (same will be expanded in 2023 with another season data for final publication)
	Report on instrumentation installation and data collection protocol.	• Methodology and monitoring protocol for GW sustainability studies developed. • Carried out instrumentation in selected SIPs • Completed training of data operators	Report/publication on calibrated groundwater model for the region with SIP upscaling scenarios
	Brief report on data analysis of Kharif II season.	In progress	Report/publication on calibrated vadose-zone flow model estimating irrigation return flows
	Report on conceptual soil and groundwater model for the study area	Completed: Conceptual model for groundwater modeling in the project areas was developed.	Blog posts and regular contributions to the SDC-SoLAR newsletter – throughout the year
2.2.1 Demonstration pilots for grid connection of SIPs	Detailed report on each of the five grid integration projects with technical parameters and socio-institutional features (IDCOL)	• Technical design and site selection criteria for the grid-integration pilot were finalized, and three sponsors (Gazi, Wave, and KHM) were selected for the pilot grid connection	• Compilation of SIP survey data and field notes from the qualitative interviews • Detailed report on each of the five grid integration projects with

		• Includes 2 cluster locations (with 4 and 3 sites in each cluster) and two sites for net metering • Contract signed with selected sponsors for the pilot and NOC received from respective utilities	technical parameters and socio-institutional features
3.1.1 Training of local technicians and farmers	Country-specific farmer training modules development, training, and reports	Bangladesh: Two training completed	• Training modules to be developed and disseminated, training completed. • Training reports to be submitted with details of attendees
3.2.2 National forums	National Forums	Online National Forum webinars conducted in Bangladesh	

Table 2. Progress in planned activities in India in 2021

Activity No.	**Deliverables that were due in 2021**	**Status**	**Plan for 2022**
1.2.2 GW studies in India	Preliminary report on groundwater levels and trends in SKY and non-SKY areas	Partially Completed: Ongoing monitoring and collection of data (groundwater abstraction, crops, groundwater levels)	• To be completed in 2022 in partnership with INREM. • Data from another season to be collected for final publication by October 2022
	Census database on farmers' pumps, wells, groundwater, and water management practices in selected feeders.	Partially Completed: Instrumentation was done to monitor groundwater abstraction with four feeders (2 SKY and 2 Non-SKY) in Anand and Botad, Gujrat.	• To be completed in 2022-2023 in partnership with INREM. • Journal article reviewing and comparing methodological approaches to measure groundwater abstraction (30-07-2022)
	Report on instrumentation installation and data collection protocol	Completed	No further instrumentation is planned.
	Report on conceptual groundwater model (31-08-2021)	Secondary data collection and primary fieldwork were done with Indian Agriculture Research Institute (IARI), Delhi	Methodological note for upscaling developed groundwater abstraction-energy relationship to other feeders to estimate groundwater use by November 2022
	Brief report on data analysis with draft GW abstraction-energy relationship (31-12-2021)	Not completed	Journal article on developed groundwater-abstraction energy relationships by June 2022
	Blog posts and regular contributions to the SDC-SoLAR newsletter – throughout the year	Completed	Blog posts and regular contributions to the SDC-SoLAR newsletter are to be done
2.2.2 Scale pilot on institutional aspects of grid-connected SIPs in Gujarat,	Compilation of secondary data from SKY web-portal and GUVNL	MOU with GUVNL signed. Completed. Database cleaned and prepared.	The research report on the impact of SKY based on household surveys by September 2022
	Compilation of primary and secondary data	Data is being downloaded and analyzed.	Planned journal articles on:

India			• Determinants of solar generation submitted to a journal • Determinants of electricity use, groundwater pumping, and electricity evacuation to a journal
	Technical report/paper/blog piece on SKY feeder data	Data analysis for two journal articles – one on determinants of solar generation and another on determinants of electricity use and evacuation started.	• An overview article on SKY: Lessons Learnt • 2-3 policy briefs based on completed/published research reports • Case study on the impact of SKY project on informal water markets in Central Gujarat
	Preliminary report on the impact of the SKY program.	Completed	
3.1.1 Training of Lead Farmers	Development of Training Curricula, including training modules	Partially complete MoU signed with GUVNL to train 2000+ Farmers in 45 sky feeders. Training plan in RCT mode completed and included as a part of MOU with GUVNL.	• Training in coming months under modified MOU with GUVNL. • Signing MOU with GERMI • Training modules to be developed and disseminated with GERMI
	Training report including details of personnel trained	Not completed due to delay in signing MOU with GUVNL	Training reports to be submitted with further information about attendees
3.2.2 National forums	National Forums	We were delayed due to COVID 19 because we were planning a F2F event in January 2022 when the third wave broke out.	We will do a National Forum webinar in India in April 2022.

Table 3. Progress in planned activities in Nepal in 2021

Activity No.	**Deliverables that were due in 2021**	**Status**	**Plan for 2022**
1.1.2 [IE & GESI Studies in Nepal)	Journal article based on the Situational analysis report submitted in 2020	Completed. Articles based on AEPC data and the Situation Analysis Report were submitted to journals. There are currently	NA

		under review	
	Research article/paper – Impacts of SIP from GESI lens in Nepal using field data (31/12/2021)	Partially completed – Internal draft ready, finalizing it for journal submission.	Journal article based on comparisons of AEPC, IWMI-ACIAR, and ICIMOD SIP models from a GESI lens
	Impact Evaluation Report (Draft and Final versions) based on phone surveys and IE survey (31-12-2021)	Completed: Detailed report based on Phone and Household Surveys is complete. An internal review is ongoing.	Journal article based on quantitative surveys (phone surveys and household surveys) IWMI Research Report summarizing impact evaluation of SIPs (quantitative – phone and household surveys and qualitative – GESI work)
	Draft Journal article note based on analysis of policy documents through GESI lens (31/08/2021 – a combined paper with data from Bangladesh and Nepal)	Completed: The final draft is submitted for internal review	Journal article based on the research report on Policy review on GESI in SIP in Nepal and Bangladesh (30-06-2022) Report on Desk Assessment for the development of country-specific emission factors in the agriculture sector of Nepal on specific request from NDC Partnership and Government of Nepal
	Two to three blog posts and regular contributions to the SDC-SoLAR newsletter – throughout the year	Not yet started. The vendor has been selected, and all questionnaires are under preparation. Surveys to be launched in March/April 2021	• Workshop Report on World Water Week (30-04-2022) • Province / local level workshops Report (31-12-2022) • Popular articles published
2.2.3 Grid-connected pilot in Nepal	Technical notes, methodological notes, and instruments for surveys	• Site feasibility survey and selection completed • A four-party agreement was signed between Chhipaharmai Rural	• Installation of the MG grid in the next six months • On-site monitoring protocol tested and implemented

		Municipality, IMWI, NEA, and AEPC. • Methodological note on impact assessment drafted.	
	Draft baseline report summarizing results from qualitative and quantitative surveys, including GESI outcomes	Not yet started: Will start after installation of MG system only	Baseline report with results from surveys, including GESI outcomes
	Technical report with installed micro-grid system and its functioning	Not yet started: due to field restrictions related to COVID-19	Grid connection completed
3.1.1 Training for local technicians in Nepal	Training materials (curricula/modules); Trainee has been chosen; All technical and logistical arrangements are finalized.	Nepal: 7-day residential training completed with 20 farmers.	• Finish second training • Develop a training manual (in Nepali and with detailed contents)
	Training report including details of persons attended	Submitted	a training report with details of training delivery, participants, feedback, etc.
3.2.2 National Forum in Nepal	National forum workshop report	Completed: Webinar organized on 5th of February 2022 and webinar report has been prepared.	Organize and prepare workshop report
	At least one policy brief outlining the main findings and policy implications	In progress	Policy brief based on the theme of the national forum

Table 4. Progress in planned activities in Pakistan in 2021

Activity No.	Deliverables that were due in 2021	Status	Plan for 2022
1.2.3 GW related studies embedded in demonstration pilot in Pakistan	Dataset on groundwater usage of diesel vs. solar pumps in Pakistan Punjab sites – July 2021 socio-economic survey and Nov 2021 for Kharif season	• Phone surveys for rapid enumeration • Completed: Data collected through Rapid Enumeration Survey in three districts of the province of Punjab with a total of 624 respondents • The final household survey commenced in November 2021 with the same set of respondents as in the Rapid Enumeration survey.	Finalize Data set on actual groundwater usage of 12 sites in three different districts of Punjab for Rabi and Kharif seasons in 2022 and write reports based on it
	Report/working paper on impact of SIPs on groundwater	Completed: Report combining results from phone surveys and face-to-face rapid enumeration completed and is under internal review.	Journal article on the effect of SIP on groundwater market to be submitted by December 2022
	A policy brief for the government on the promotion of SIPs	Partially Completed: Methodological Note was completed and shared with Team. Suggestions incorporated and the note revised	To be submitted by May 2022
	Collection of Data for the Kharif season – April 2021 – October 2021	Partially Completed: Instruments for in-situ monitoring to be installed by June 2022.	Complete survey to be deployed in 2021
	Draft Manuscript based on analysis – Dec 2021	Partially completed: Data collection and compilation in progress	Journal article on the behavioral study to be submitted by April 2022
	Blog posts and regular contributions to the SDC-SoLAR newsletter –	Completed: Video documentary screened on the World Water Week.	More popular articles to be published

	throughout the year		
2.2.4 Demonstration pilots and simulation of grid-connected pumps through heat sinks in Pakistan	Method Statement	In progress: A situational analysis study for the province of Khyber Pakhtunkhwa, Balochistan & Sindh was completed. Delayed, to be done in 2022: simulation pilot through the heat sink and choice experiment.	Report on detailed methodology for the choice experiment to be submitted by March 2022
3.1.1 Training of local technicians in Bangladesh, India, and Nepal; training for farmers in Pakistan	Training curricula, including training modules	Completed: Four training conducted on: • 1) "Design of Solar Pumping Unit for Precision Surface Irrigation" with 70 participants at a partner university. • 2) "Operation and Maintenance of Solar Pumping Unit and Precision Surface Irrigation" was delivered to 19 farmers. • 3) Laser grading to prepare the field for precision surface irrigation using SIP to 04 staff members of PARC in Islamabad on • 4) Virtual training on laser grading to prepare the field for precision surface irrigation using SIP • to 06 KFUEIT researchers and staff was delivered	Development of training curricula, including training modules
	Training report, including details of personnel trained.	Completed	Training Report
3.2.2 National Forum in Pakistan	National forum workshop report	A national webinar was conducted on the 5th of December 2021, and a report has been prepared.	National Forum in 2022

Table 5. Progress in planned Regional activities in 2021

Activity No.	Deliverables that were due in 2021	Status	Plan for 2022
2.3.1	Administration of innovation funds	Completed: Three more innovation funds grants were awarded along with the five awardees in 2020, making it a total of 8 IF partners.	Regular monitoring of activities of the grantees
3.1.2	Training of groundwater, energy, and agriculture officials in all four countries	Delayed but in progress: Discussions with IHE Delft on modalities of conducting training are delayed and yet to be finalized.	Agreement with IHE Delft to organize the training in 2022
3.2.1	Regional Knowledge and Policy Forum	• 1st Regional Forum was organized on 23rd and 24th February, and the report was prepared. • The soLAR website was regularly updated. • A logo for the SoLAR project has been approved by the PMC. • Six editions of newsletters were shared with more than 900 stakeholders.	• Regular updates to the SoLAR website – Throughout the year • Regular publication of SoLAR newsletter (one per quarter) – Throughout the year • Organization of the 2nd Regional Forum in a face-to-face mode and workshop report -30/09/2022