

# The National Forum Report 2021

Pakistan



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## Solar Irrigation for Agricultural Resilience (SoLAR) project

SoLAR project aims to generate knowledge to sustainably manage water-energy and climate interlinkages through the promotion of solar irrigation pumps (SIPs). The 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.

Achieving progress in poverty reduction with minimal carbon emission is at the core of the climate and sustainability challenge. This need is particularly acute in South Asia, where further expansion of irrigation holds the promise of pulling smallholders out of poverty but will also result in large increases in carbon emissions due to overwhelming dependence on fossil fuel-based groundwater pumping. SIPs offer a “climate resilient” solution, yet adoption is slow. Little is also known about the impact of SIPs on groundwater use. In this six-part SDC-IWMI webinar series, we explored some of these larger questions around energy transition and SIPs in four South Asian countries.

## Introduction to The National Forum

In the recent past, solar pumping technology has emerged as an alternative to diesel and electric pumps. Water professionals in Pakistan are concerned that converting pumps to solar will result in indiscriminate pumping and eventually lead to further groundwater depletion. While Pakistan does not have a specific policy on solar technology for groundwater pumping in agriculture, it does have several policies that have a bearing on it.

The National Water Policy 2018 (NWP-18) makes several references to groundwater pumping, with the goal of regulating groundwater withdrawals to curb over-abstraction and promote aquifer recharge. It also aims to develop hydropower to increase the share of renewable energy. As per the 18th Amendment of the Constitution, governance and management of water resources have devolved to the provinces. Each province has embarked on different paths to deliver on the NWP-18. All the provincial governments have planned and/or have launched subsidized solar irrigation pump plans, mostly coupled with High-Efficiency Irrigation Systems (HEIS), especially in Punjab and Sindh. At this point, only the Punjab province has succeeded in implementing its program to some extent, whereas in the Khyber Pakhtunkhwa and Sindh provinces, the programs are at pilot stages, and in Baluchistan, the programs have not been implemented at all.

The Ministry of Science and Technology, through the Pakistan Council of Research in Water Resources (PCRWR) in collaboration with International Water Management Institute (IWMI) Pakistan and CGIAR’s Water, Land and Ecosystems Program, jointly organized a Pakistan Water Week 2021 International Conference with the theme *Needs for Sustainable Water Management in Climate Crisis for Indus Basin* in Islamabad, Pakistan from 06<sup>th</sup> – 09<sup>th</sup> December. The National Forum was held as a part of Pakistan Water Week 2021.

The National Forum discussed these issues with the sector experts to find out the best possible future course of action for Pakistan in its policy related to solar based irrigation systems. Experts from different backgrounds got together to discuss the real potential of solar based irrigation in Pakistan. This National Forum was held as part of Pakistan Water Week 2021 under Thematic Area 3: Technologies and Innovations - Responding to the Challenges on 6<sup>th</sup> Dec 2021. Almost 20 participants attended the session, both in-person and online on zoom link.

## Opening remarks by Mark Smith

Mark Smith (Director General, IWMI) in his opening remarks gave reference to increase in groundwater pumping due to increase in tube well pumps in last few decades. This has led to decrease in groundwater levels. SIPs can address this issue, but the government authorities are of the view that SIPs remove the constraint of diesel/ electricity bill; thus, SIPs will lead to indiscriminate groundwater pumping. To address this concern, data backed evidence is required which can lead to policies supporting sustainable irrigation practices. He added that with SIPs there is no going back, we need to make sure that SIPs are managed in a way that sustainable and equitable groundwater pumping is ensured.

## Keynote Presentation I

Topic: ***Solar Pumps and Energy-Water Nexus in Gujarat: Assessing World's Largest Pilot on Grid-connected Solar Irrigation Pumps (SKY)***

Presenter: Dr. Tushaar Shah, Emeritus Scientist IWMI

### Summary of the Presentation

The key driver of solar irrigation in India was subsidies on farm supplies. In 2015, IWMI piloted Dhundi model in Gujarat by the name of Solar Power as Remunerative Crop (SPaRC). 25 year contract was done under SPaRC to buy surplus solar power from farmers at Rs 4.63/kWh. Data from Jan-16 till Dec-20 showed that overall solar energy (in kWh) sold to grid increased relative to the solar energy used in irrigation declined and income earned through sale of surplus power continuously increased.

In 2018, Government of Gujrat launched a scheme by the name of Suryashakti Kisan Yojna (SKY). Under this scheme farmers already connected to the grid were provided with the grid-connected PV system. The scheme targeted 33 districts and 12000 tube wells with 136 feeders. At least 70 percent of tube wells must sign up for a feeder to SKY-qualify. Farmers pay 5 percent up-front; 65 percent over 7 years from evacuation-based incentive of Rs. 3.50/kWh from Gujrat's government.

Under this scheme less than 20 percent of unmetered tube wells got connected to SKY feeders. On 12 SKY feeders solarized in 2018, consumption increased during Feb-April on all in 2019 but declined 2020 after first payment for energy sale was released. Technical and commercial losses of power declined from 26 percent to 5 percent.

In conclusion, SKY scheme succeeded in eliminating electricity subsidy, incentivizing energy-water conservation, full utilization of solar generation, and encouraging farmers to participate in solar investment. Though SKY could not stimulate private industry to participate in solar investment. According to Dr. Tushaar Shah SKY model can work better and succeed in Pakistan as compared to India as diesel tube wells dominate Pakistan's groundwater economy.

## Keynote Presentation II

Topic: ***Economic and environmental costs of solar irrigation pumps (SIPs): Examples from Balochistan and Punjab***

Presenter: Dr. Stephen Davies, IFPRI

### Summary of the Presentation

Presentation began with brief introduction of increasing scarcity of groundwater in Baluchistan. Water tables are declining annually by up to 30-40 feet. Reasons of this persistent decline in groundwater includes scanty rainfalls, persistent droughts, flat-rate subsidy on agricultural electric tube-wells to farmers, leading to tripling of installed pumps, agricultural intensification and switching to high-value, water-intensive crops.

Small group of farmers in Baluchistan were asked in survey about the reasons of groundwater depletion. The results from the survey showed that most of the farmers choose less rainfall and lack of dams as prime reasons of groundwater depletion but did not consider increase in number of tube wells to be the cause of this problem. On the other hand, due to binding agreement with IMF to phase out electric subsidy, when Baluchistan government tried to withdraw subsidies with some alternatives have led to farmer protests. As a result, there is a proposal to withdraw the subsidy on electric and provide 30,000 solar pumps to farmers in its place.

In IFPRI Discussion Paper 02013, simulations were run to test the impact of different policy options to reduce the impact of groundwater depletion in Baluchistan province. Results showed that shifting water to non-agricultural sector yields highest benefit of 5.4% on GDP and subsequently all type of households (HHDs) benefit i.e., all farm HHDs, rural non-farm HHDs, and urban HHDs.

Choice experiment was conducted to measure valuation and aspirations for drip irrigation in Punjab province. Results from choice experiment showed that farmers value subsidy on drip irrigation more as compared to equal amount of reduction in installation cost of drip irrigation. Additionally, because of drip irrigation system farmers indicated to be interested in growing vegetables and melons as compared to cereals.

## Panel Discussion

### Panelists:

- Ms. Divya Sharma (Swiss Agency for Development and Cooperation)
- Engr. Nasir Jamal (Rabial Technologies)
- Mr. Tahir Anwar, National Coordinator - MNFS&R
- Ms. Afia Salam, Climate & Environmental Journalist

### Moderator

- Dr. Azeem Ali Shah (International Water Management Institute)

### **Nasir Jamal**

- Subsidy program of SIPs coupled with drip irrigation system in Punjab could not be completely successful because farmers only participated in the program to avail 80% subsidy. As soon as government program was completed in a specific area most of the farmers sold the drip irrigation system. Farmers in rain-fed areas made good use of SIPs coupled with HEIS because of genuine water scarcity.
- It is also important to make sure that farmers get good quality SIP components i.e., solar panels. Quality-wise prices of solar panels should be available so farmer can make informed decision while installing SIPs. The farmer should know that how long specific quality solar panel will last so he can make informed investment.
- Mostly farmers in rain-fed areas should be targeted for SIP subsidy programs because farmers are willing to install technology i.e., many of the farmers contacted me to ask about the rain gun.
- Day light will be a limiting factor in over-exploitation through SIPs. In Baluchistan maximum daylight time is 7 hours and in Punjab it is 5 to 6 hours. Water abstraction ability of SIPs is not linear even within a day, rather it follows a hyperbolic path i.e., increasing till noon then falling till sunset.

### **Tahir Anwar**

- HEIS will be not successful in areas of Punjab where water is sufficient rather water scarce areas of Baluchistan and Sindh can be targeted. Overall farmer journey towards technology should not be abrupt rather gradual. Techniques like different field configuration settings i.e., bed and furrow and technologies like precision laser land grading can be introduced first before making a push towards HEIS.

### **Afia Salam**

- Small and marginal farmers should be targeted in rain fed areas to promote sustainable practice. In this way their livelihoods will be safeguarded.
- Situation in Pakistan requires leapfrog steps rather than gradual adoption of sustainable practice. Things lacking to convince farmers in doing so are effective advocacy campaigns and highlighting success stories on mainstream media.

## Key Takeaways from the session

### **Takeaway 1:**

Earlier scheme of introducing SIP with HEIS could not achieve its desired results in Punjab as many farmers abandoned HEIS. For future schemes the transition to technology should be gradual and in line with farmer needs.

### **Takeaway 2:**

We need to carefully select areas where water is scarce and farmers value groundwater i.e., rain fed areas to promote solar and HEIS technologies.

## Appendix A: Session Agenda

<b>Thematic Area 3</b>	<b>Thematic Area 3: Technologies and Innovations - Responding to the Challenges</b>	
<b>Title</b>	<b>Thematic Session 2: The Real Potential of Solar-Based Irrigation in Pakistan</b>	
<b>Date:</b>	<b>Day 1: Monday - 6<sup>th</sup> December 2021</b>	
<b>Time</b>	<b>16:00 - 17:30</b>	
<b>Venue</b>	<b>Ambassador Hall III</b>	
<b>Zoom Link</b>	<a href="https://us02web.zoom.us/webinar/register/WN_qNtpvusCR9WHehwxHSGmUw">https://us02web.zoom.us/webinar/register/WN_qNtpvusCR9WHehwxHSGmUw</a>	
<b>Summary</b>	<p>In the recent past, solar pumping technology has emerged as an alternative to diesel and electric pumps. Water professionals in Pakistan are concerned that converting pumps to solar will result in indiscriminate pumping and eventually lead to further groundwater depletion. While Pakistan does not have a specific policy on solar technology for groundwater pumping in agriculture, it does have several policies that have a bearing on it.</p> <p>The National Water Policy 2018 (NWP-18) makes several references to groundwater pumping, with the goal of regulating groundwater withdrawals in order to curb over-abstraction and promote aquifer recharge. It also aims to develop hydropower to increase the share of renewable energy. As per the 18th Amendment of the Constitution, governance and management of water resources have devolved to the provinces. Each province has embarked on different paths to deliver on the NWP-18. All the provincial governments have planned and/or have launched subsidized solar irrigation pump plans, mostly coupled with High-Efficiency Irrigation Systems (HEIS), especially in Punjab and Sindh. At this point, only the Punjab province has succeeded in implementing its program to some extent, whereas in the Khyber Pakhtunkhwa and Sindh provinces, the programs are at pilot stages, and in Baluchistan, the programs have not been implemented at all.</p>	
<b>Panelists</b>	<ol style="list-style-type: none"> <li>1. Ms. Divya Sharma, SDC</li> <li>2. Engr. Nasir Jamal, Rabial Technologies</li> <li>3. Mr. Tahir Anwar, National Coordinator - MNFS&amp;R</li> <li>4. Ms. Afia Salam, Climate &amp; Environmental Journalist</li> </ol>	
	<b>Agenda</b>	
	<b>Moderator:</b> Dr. Azeem Ali Shah, IWMI	<b>Rapporteur:</b> Mr. Muhammad Zain Akbar
16:00-16:05	Setting the Scene: Dr. Azeem Ali Shah, IWMI	
16:05- 16:10	Opening Remarks: Dr. Mark Smith, Director General, IWMI	
16:10- 16:25	Keynote Speaker: Dr. Tushaar Shah, Emeritus Scientist IWMI	
16:25- 16:40	Keynote Speaker: Dr. Stephen Davies, IFPRI: Economic and environmental dimensions of solar irrigation pumps (SIPs): Examples from Balochistan and Punjab	
16:40- 17:10	Questions from Panelists	
17:10- 17:25	Questions and Answers from Audience	
17:25- 17:30	Closing Remarks	

Appendix B: Photo Gallery



**Panellists of the Session**



**Moderator of the Session – Dr Azeem Shah**





Participants of the session