

Impact of SKY: A Perspective of Women Farmers

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Introduction

The agriculture sector in India, as per the India Energy Outlook, accounts for a staggering 80% of the country's water demand. Within the total cultivable area, 51% relies on rainfed irrigation while the remaining 49% depends on irrigation systems. Out of the 26 million water pumps in use, 9 million are diesel-powered, with the remaining 17 million operating on electricity (mostly derived from fossil fuels). As we navigate the intricate nexus of water demand, irrigation practices, and the environmental impact of powering irrigation, it becomes imperative to identify sustainable energy solutions. There is a global shift towards sustainable energy systems and these systems, including solar, wind, biomass, small-scale hydro, have huge potential to minimise emissions from agriculture while supporting resilient livelihoods.

The adoption of Solar Irrigation Pumps (SIPs) has gained significant attention in recent years, providing a clean alternative for farmers reliant on diesel pumps, especially in areas without access to electricity. One key concern raised in the literature on SIPs relates to groundwater extraction, given the marginal cost of pumping is zero. However, the adoption of grid-connected SIPs allows farmers to feed surplus solar power back into the grid, thereby augmenting their farm income. In comparison to diesel generators, which require manpower to operate, SIPs offer the advantage of ease of operation and several unintended benefits, particularly for women farmers.

The role of women in agriculture is significant. Despite their significant involvement in various agricultural activities, such as sowing, transplanting, and post-harvest operations, the value they bring often goes unnoticed.

For example, women undertake labor-intensive tasks like weeding, transplanting, and milling in rice cultivation, particularly due to the outmigration of male farmers seeking better job opportunities in urban areas. Women, especially from marginalized social groups, also manage and maintain water sources for production, such as cleaning water channels and maintaining bunds (Mitra and Rao 2019). In Gujarat alone, 47% of women are engaged as agricultural laborers, and 22% are cultivators, highlighting their substantial presence in the agricultural workforce (Economics & Statistics Division of the Department of Agriculture & Farmers Welfare, 2023).

The adoption of SIPs in India began in the 2010s through national and state-level programs, resulting in over 2.7 lakh SIPs currently in operation across the country. However, the specific role of women in the adoption of solar irrigation and its impact on them remains largely undocumented. This note aims to address this gap by documenting impact stories from the field, particularly from the perspective of female farmers.

SKY and Grid-Connected SIPs

We focus on the Suryashakti Kisan Yojana (SKY) which is a state-level grid-connected SIP scheme, designed to benefit 4,500 farmers in Gujarat. This initiative aims to provide clean energy for irrigation and offers farmers the opportunity to sell excess electricity to the grid. The scheme stands out by providing a solar panel capacity at 1.25 times the current contracted load of the irrigation pump, enhancing the farmers' ability to generate surplus electricity. In terms of the financial model, participants are required to contribute 5% of the total cost upfront, while the government of Gujarat guarantees a 65% loan. Additionally, a central subsidy covers 30% of the total cost, making the scheme financially viable for farmers. A unique feature of SKY is the Evacuation-Based Incentive (EBI), introduced to motivate farmers to export electricity. Under this incentive, farmers receive Rs.3.5 per kWh for each unit of electricity exported to the DISCOM. An additional Rs.3.5 per kWh is given as an EBI for every unit of electricity sold. Thus, the scheme not only promotes clean energy but also makes a targeted effort to address the critical issue of sustainable groundwater use in the agricultural sector. The SKY-enrolled farmers receive 12 hours of daytime electricity unlike the 8-hour supply to their non-SKY counterparts.

To comprehend the specific advantages of SKY grid-connected SIPs from the perspective of female farmers, we conducted field visits in the Anand and Botad districts of Gujarat. These visits aimed to gain insights into how this innovative approach to irrigation and energy provision, impacts women actively involved in agricultural activities.

Unveiling the Significance of Daytime Power

One of the notable benefits emphasized by female farmers during our field visits is the availability of reliable daytime power facilitated by grid-connected SIPs. This improvement has led to a significant reduction in drudgery for women engaged in agricultural activities. It also ensures that irrigation and farm-related tasks can be efficiently carried out during daylight hours, providing female farmers with more time during the day for household chores and other productive activities. Thus, providing them a better balance between domestic responsibilities and agricultural work.

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Due to a reliable and constant supply of electricity, I can water my cotton fields on time, unlike earlier without solar power, which had a negative impact on the yield. I also had to stay awake during the night to visit the field, which resulted in minor foot injuries from the small pebbles and gravel on the poorly lit pathways. The SKY has been beneficial for us,

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reported a female SKY farmer who had been growing cotton on her farm before the SKY scheme.

Another female farmer added, “With 12 hours of daytime electricity, I am able to allocate time to fodder production and collection to feed my cattle.

I can also take better care of my cattle than before and have started selling milk to the neighbors.”

A female farmer from Piplav village of Anand district mentioned, “I wish to have solar because of the 12-hour daytime electricity feature”.



Photo: IWMI

Developing Operational and Entrepreneurial Skills

Female farmers highlighted that the scheme provided opportunities to enhance their operational and entrepreneurial skills, which in turn signifies a pathway to growth, empowering female farmers through skill development and entrepreneurial opportunities.

"My father-in-law taught me and my sister-in-law to operate SIPs. Since both my husband and brother-in-law are employed in non-farm jobs, we are responsible for selling water using SIP, especially when our father-in-law is not available," stated a female farmer from Dhundi village in the Kheda district of Gujarat. Breaking the chains of patriarchy, dissemination of training on operating SIP systems has empowered these female farmers to contribute to the decision-making in the household.

Intensification of Agriculture

The intensification of agriculture has supported diversification of activities for women. Selling excess electricity has added to their income, allowing for increased financial flexibility in managing household expenses, enhancing farm activities, establishing kitchen vegetable gardens, and diversifying assets. Combining a drip irrigation system with SIP has resulted in reduced water wastage and improved crop health.

For instance, a female farmer from Dhundi highlighted,

As compared to pre-2016 times, we've ventured into growing greens like fenugreek and coriander for the local market. Income from selling the electricity supports our household expenditures. We've also diversified our assets by purchasing a new tractor and a motorbike. I believe others should also adopt SIP for their farms.

A neighboring female farmer from Dhundi added, "While there hasn't been any crop diversification, the quality of the harvest has improved, and we've utilized the increased income from SKY to install pipelines in our field."

Another female farmer from Botad explained, "The additional income is used to buy pesticides, fertilizers, and insecticides for our crops."



Operational Challenges

Concerning the governance of private installer companies, we received mixed responses from farmers across the villages. Operational difficulties like physical breakdown of the SPV system or voltage fluctuations led farmers to rely on unreliable nighttime power supply, raising concerns over their safety, especially for the female farmers. Addressing these challenges will be essential to ensure its wider adoption.

Farmers from Botad raised concerns on the governance by the private installer company assigned. A male farmer from Ratanpur village reported, "The private solar services company is ignorant about our complaints and unresponsive to our calls and emails. As per the contract, if the SPV remains shut for more than 48 hours after raising a complaint of malfunction, the company will pay Rs. 4 per unit for the electricity that could not be generated. The company owes a significant amount as a penalty to the farmers."

In contrast, farmers from Dhundi village were satisfied with the services of the installer company. A female farmer from Dhundi reported, "The private company has been responsive to complaints in case of a malfunction of the SPV system".

Way Forward

A collective examination of responses from female farmer beneficiaries reveals positive implications arising from the availability of daytime power. Access to a stable power supply is proving to be a catalyst for the intensification of agricultural activities. Female farmers, in particular, are actively engaging in learning the operational aspects of SIPs and developing entrepreneurial skills. This underscores the scheme's potential not only to enhance agricultural practices but also to empower women in the rural context. However, it is crucial to address the reported challenges effectively. The success of the scheme hinges on resolving operational issues, ensuring governance by private companies, and facilitating a seamless transition for farmers embracing SIPs.

Moreover, while these stories provide valuable insights, it is essential to complement them with large-scale empirical studies. Rigorous research can systematically test the hypotheses presented in this note, providing a more comprehensive understanding of the scheme's impact and its potential scalability.

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