

Solar powered irrigation pumps (SPIP) in South Asia

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Country wise adoption of SPIP

Country	Estimate of total Units Installed*	Official Targets for SPIP**	Qualified Companies for solar pumping systems***
Bangladesh	391	50,000	13
India	13964	1,000,000	19
Nepal	85	No Target Yet	43
Pakistan	NA	30000	139

*Bangladesh – Pumps installed by IDCOL and Hossain et al (2015) ; India - NABARD, 2014; Nepal - 81 pumps for drinking water purpose have been installed in the mid-hills and 4 pumps installed by ICIMOD

**Bangladesh - Target for 2025; India - Target for 2020-21, Pakistan - Proposed by Pakistan Solar Association

***Official Government websites

India has subsidy led models for uptake of SPIP

- Promoted by Ministry of New and Renewable Energy (MNRE) since 1992.
- MNRE target is to install 1,00,000 SPV water pumps with a financial support of INR 400 crores during 2014-15 (target was not met, money remained unspent).
- Government of India has supported adoption of SPIP through subsidies and loan arrangements.
- NABARD has 40 (grant):40 (loan): 20 (equity) model

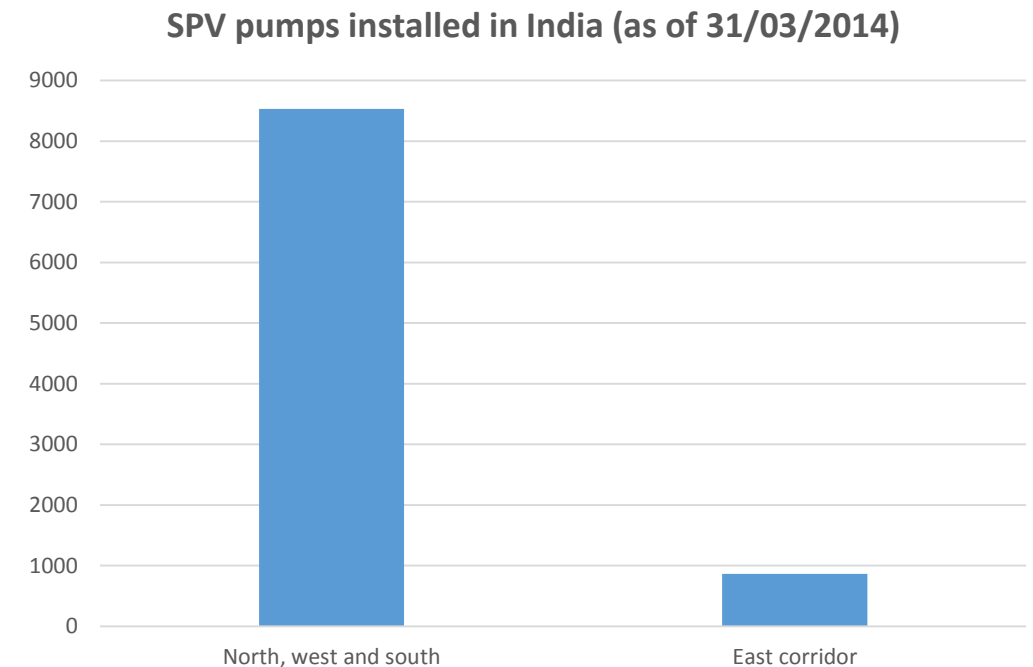
State level Subsidies in India

State	Central Government Subsidy	Current State Level Subsidy	Total Subsidy	SPV pumps installed till 2014-15
Andhra Pradesh	30%	59%	89%	-
Bihar	30%	60%	90%	139
Gujarat	30%	65%	95%	85
Haryana	30%	30%	60%	469
Karnataka	30%	60%	90%	551
Punjab	30%	40%	70%	1857
Rajasthan	30%	56%	86%	4501
Tamil Nadu	30%	50%	80%	829

*Various sources

India: Current financial models exacerbate inequities

- Adoption is limited to medium and large farmers.
- Demand of NABARD loan cum grant model is depressed due to high subsidies.
- More adoption in groundwater scarce regions (west and south), than in groundwater abundant eastern part.
- Likely to increase inequity in terms of access and exacerbate gw over-exploitation in already over-exploited area



Commercial model in Pakistan: Only large farmers benefit

- Very less subsidy. Large farmers adopt due to lack of electricity and high cost of diesel.
- Large commercial farmers, who can afford SPIP by paying full cost invest in these systems.
- Government of Pakistan is proposing to install 30,000 SPIP in the next three years through loan financing for small farmers.
- Loan amount to not exceed 1,000,000 Pakistani Rupees and repayment period is within one year to be done in equal half-yearly instalments.
- Falling ground water level is a concern in Pakistan.

Fee for service models in Bangladesh

- Fee for service model: Farmers buy water from private companies/NGOs
- Private companies/NGOs/Farmers can buy pumps using 50 (grant): 35 (loan): 15 (equity) model. They sell water farmers
- This model is successful in providing SPIP accessibility to small and marginal farmers.
- Currently 445 SPIP have been approved for installation under this model. Of them, 196 are in operation.
- Water distribution and payment collection are some of the major challenges for the success of this model.
- SPIPs used intensively in boro (summer) season. Rest of the year, panels lie idle

SPIP in Nepal

- AEPC administers a subsidy (75%) to promote community solar pumps for drinking water, but there is not yet an official government policy for SPIP.
- Several international development organizations are piloting demonstration projects to showcase the technology (e.g. ICIMOD, IDE, Winrock).
- IDE and Winrock are promoting very small pumps for kitchen garden and specifically targeting small and marginal farmers
- ICIMOD has piloted 1HP (1200w) and 2HP (2400w) pumps
- Objective is to find **Sustainable Financial Solutions for Upscaling**

Pakistan

Low Subsidy

Nepal??

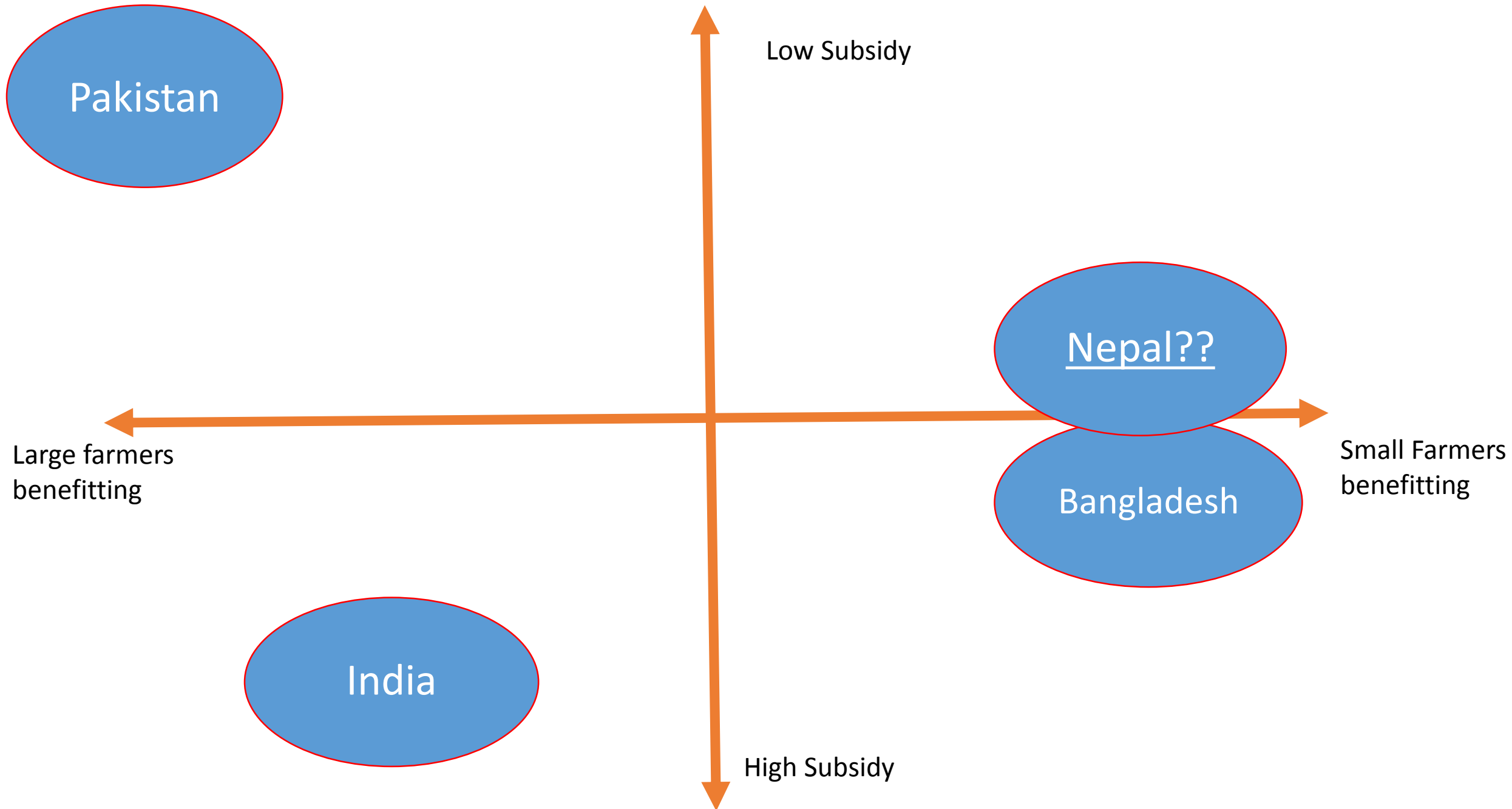
Large farmers
benefitting

Bangladesh

Small Farmers
benefitting

India

High Subsidy



WLE pilot of SPIP in Saptari

- In August 2015, ICIMOD installed four SPIP systems in Saptari district of Nepal. These systems have been provided for demonstration purposes for a year.
- Starting April 2016, we will run a Randomized Control Trial to test the impact of three financial models on demand for SPIP
 - Subsidy model: 40% subsidy: 60% equity
 - Loan model: 40% subsidy: 40% loan:20% equity
 - Rental model: Pay monthly rent
- Special rates for women and very small/marginal farmers who apply as a group (subsidy up to 60%)

Description of sites

Site location (VDC)	Type of pump	Beneficiary	Number of farmers utilizing	Total command area (hectares)
Haripur	1 HP	Farmers' association	4	2.3
Boriya	1 HP	Male farmer	1	2.7
Rayapur	1 HP	Female farmer	6	2.4
Hardiya	2 HP	Water seller	11	3.8



1 HP pump for farmers' association in Haripur



Training on basic do's and don'ts



Training on collecting data from flow meter



Women farmers with 1 HP pump in Rayapur



Flow meter installed to measure discharge



Women farmers operating the system



2HP system in Hardiya

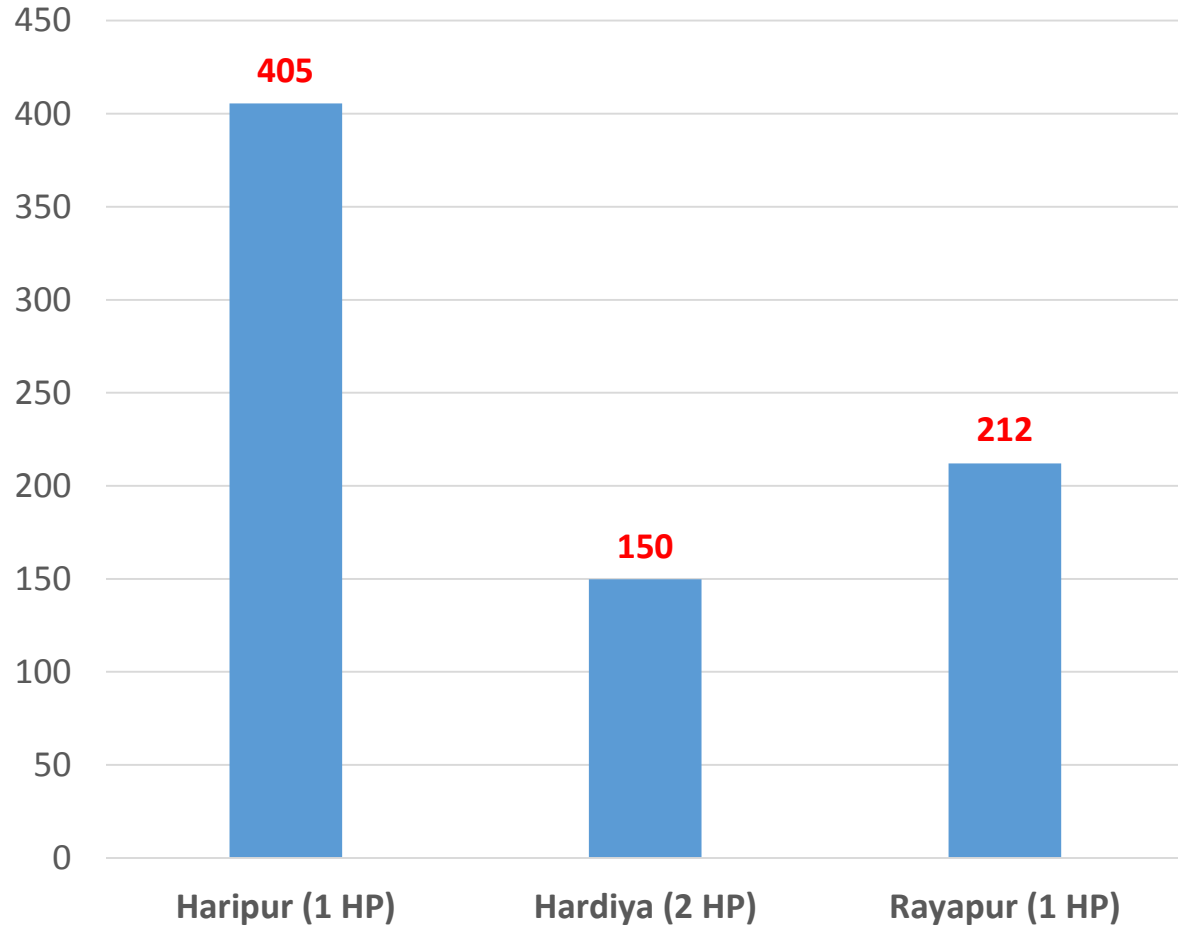


Panels need to be cleaned regularly to increase flow

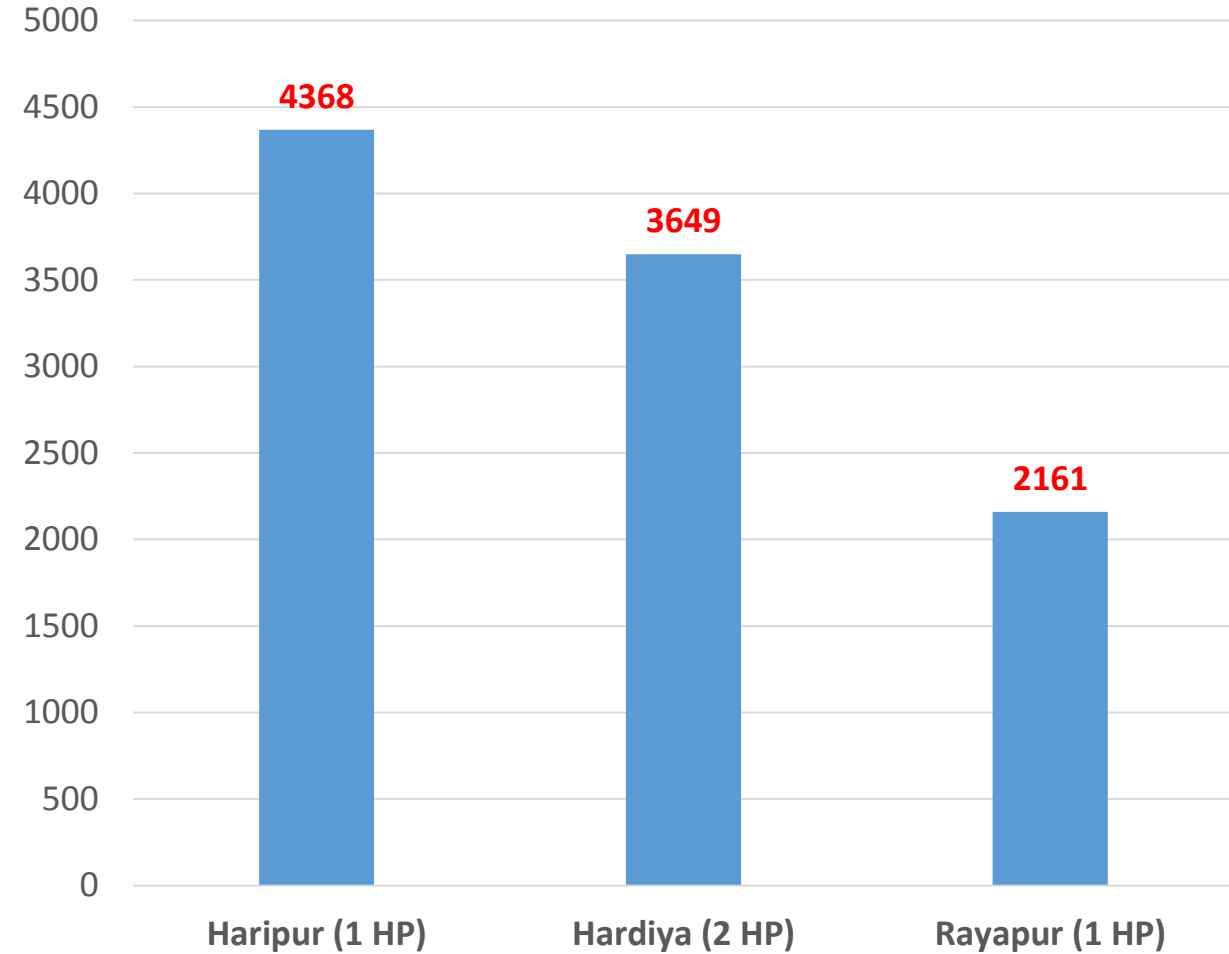


Wife of the water seller can also operate the system

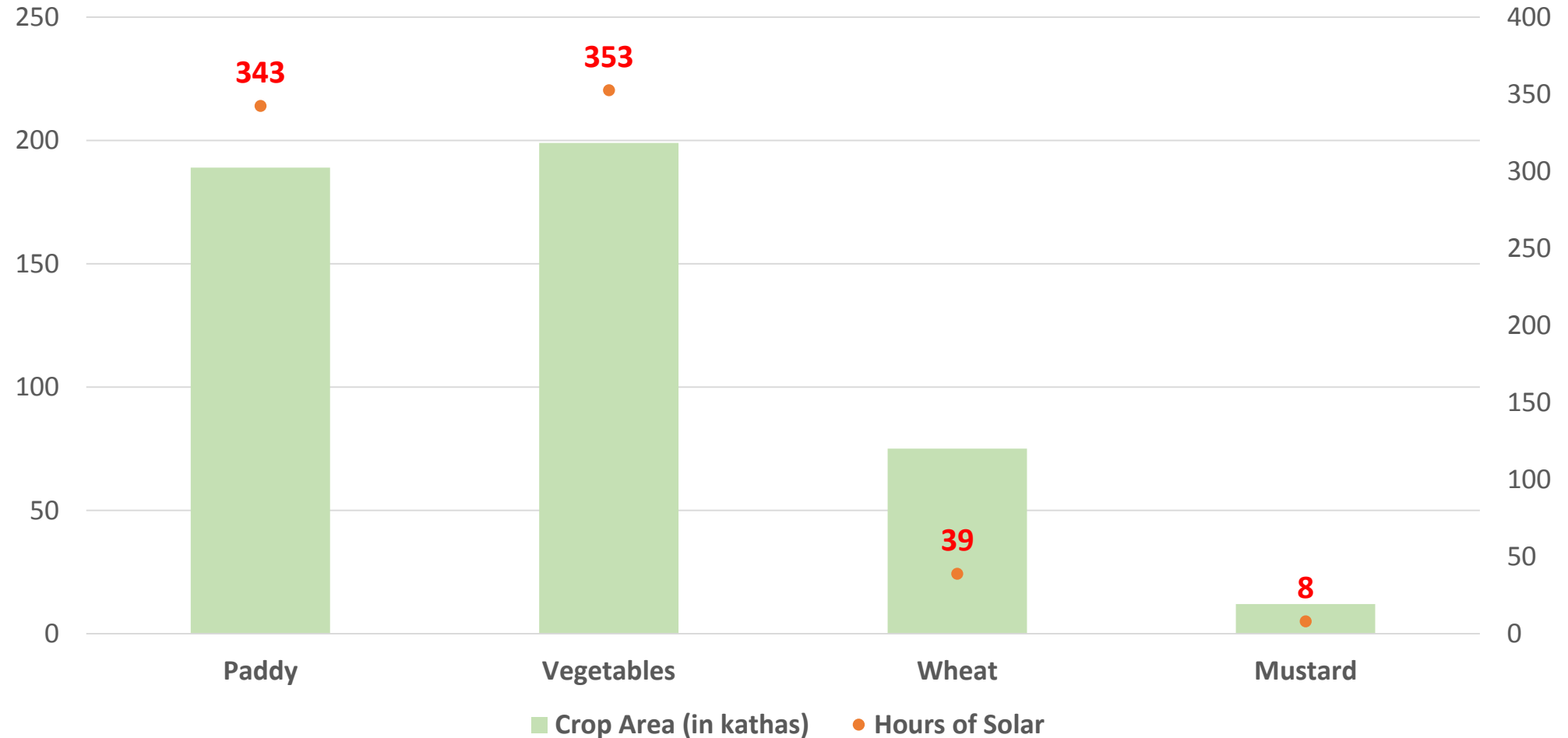
Total Hours of utilization of SPIP (Aug-Feb)



Total discharge ('000 liters) (Aug-Feb)



Hours of Utilization of SPIP by crop type



Impact on SPIP on cropped area

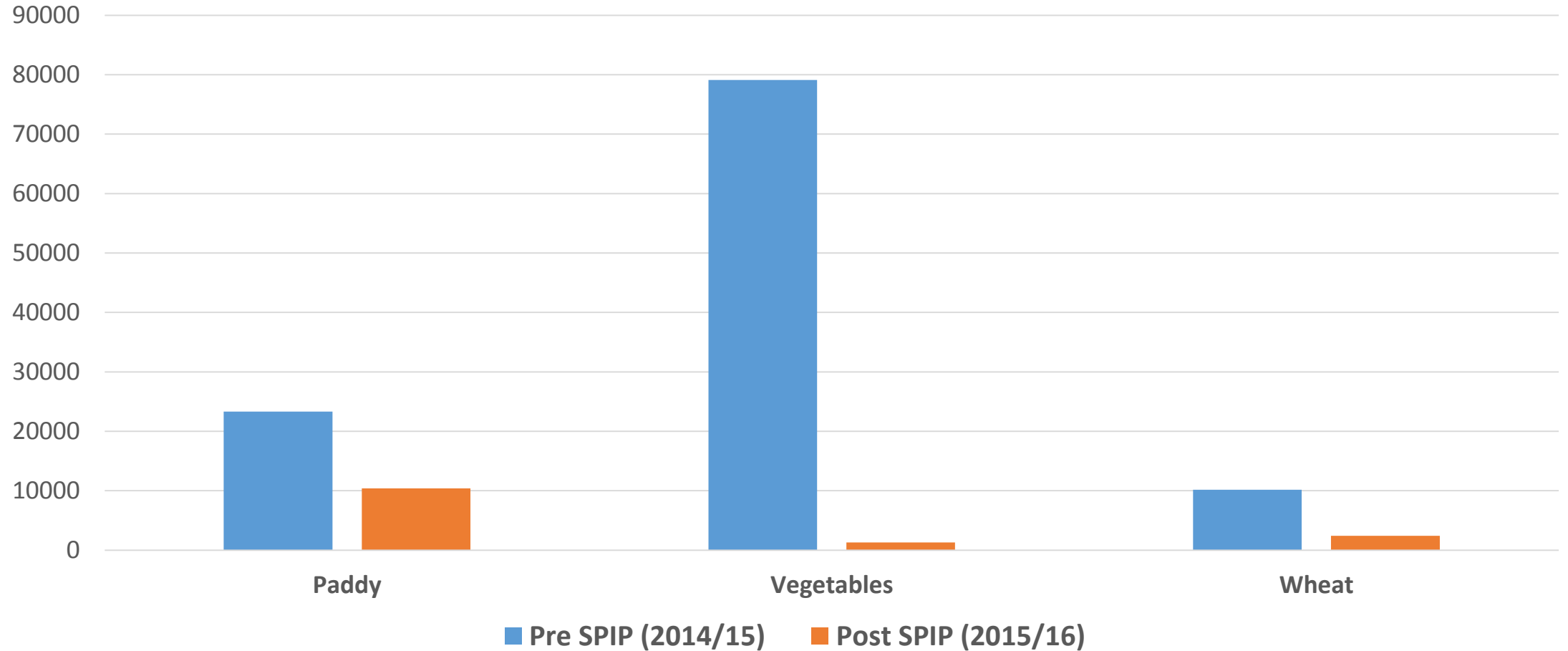
Cropped area (kathas)	Treatment (farmers with access to SPIP)N=22	Control (farmers without access to SPIP) N=13
Year 1 (before SPIP)	454	97
Year 2 (after SPIP)	499	89
Difference	45	-8
Difference in difference (Addition in area cropped attributable to SPIP)	+ 53 kathas	

Impact of SPIP on diesel savings

	Treatment (farmers with access to SPIP)N=22	Control (farmers without access to SPIP) N=13
Deisel cost/katha		
Year 1 (before SPIP)	248	240
Year 2 (after SPIP)	28	141
Difference	-220	-99
Difference in difference (Savings in diesel attributable to SPIP, Rs/katha)		-121

Diesel utilization has fallen drastically

Diesel Cost for irrigation in all sites



Some Quotes...

- Amrica Devi Yadav – from Rayapur
 - “SPIP has made irrigation less physically intensive, allowing me to operate it comfortably”.
- Ramakant Choudhary –from Haripur
 - “SPIP water is enough to irrigate about 3 Bighas of land. It helped to save our diesel cost from the earlier year and we are hoping to earn much this year. If we got a bigger system then the existing one, we are planning to increase our command area and the production too.”
- Jiten Yadav –from Hardiya
 - “Post-SPIP command area has been increased from earlier by around 8 Kattha, 2 new customer has been using water from SPIP to irrigate crops.”

Thank you