Potential for Solar Irrigation in Pakistan: A Critical Inquiry

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GOP Subsidy On Solar Panels

Subsidies for Farmers

The government is providing subsidy to farmers for following interventions being promoted by On-Farm Water Management wing of Agriculture Department.

Installation of High Efficiency (Drip/Sprinkler) Irrigation System (HEIS)

Name of Project	Government Share (Subsidy)	Farmers' Contribution	Project Area
Punjab Irrigated-Agriculture Productivity Improvement Project (2012-13 to 2020-21)	The government provides 60 percent of total system cost for installation of HEIS on upto 15 acres. The government also provides 60 percent subsidy for construction of water storage pond, if needed, on the basis of site- specific technical requirements	Remaining 40 percent	Entire Punjab
Command Area Development of Jalalpur Irrigation Project (CAD-JIP) (2019-20 to 2022-23)	The government provides 80 percent of total system cost for installation of HEIS on upto 15 acres	Remaining 20 percent	Khushab and Pind Dadan Khan tehsils

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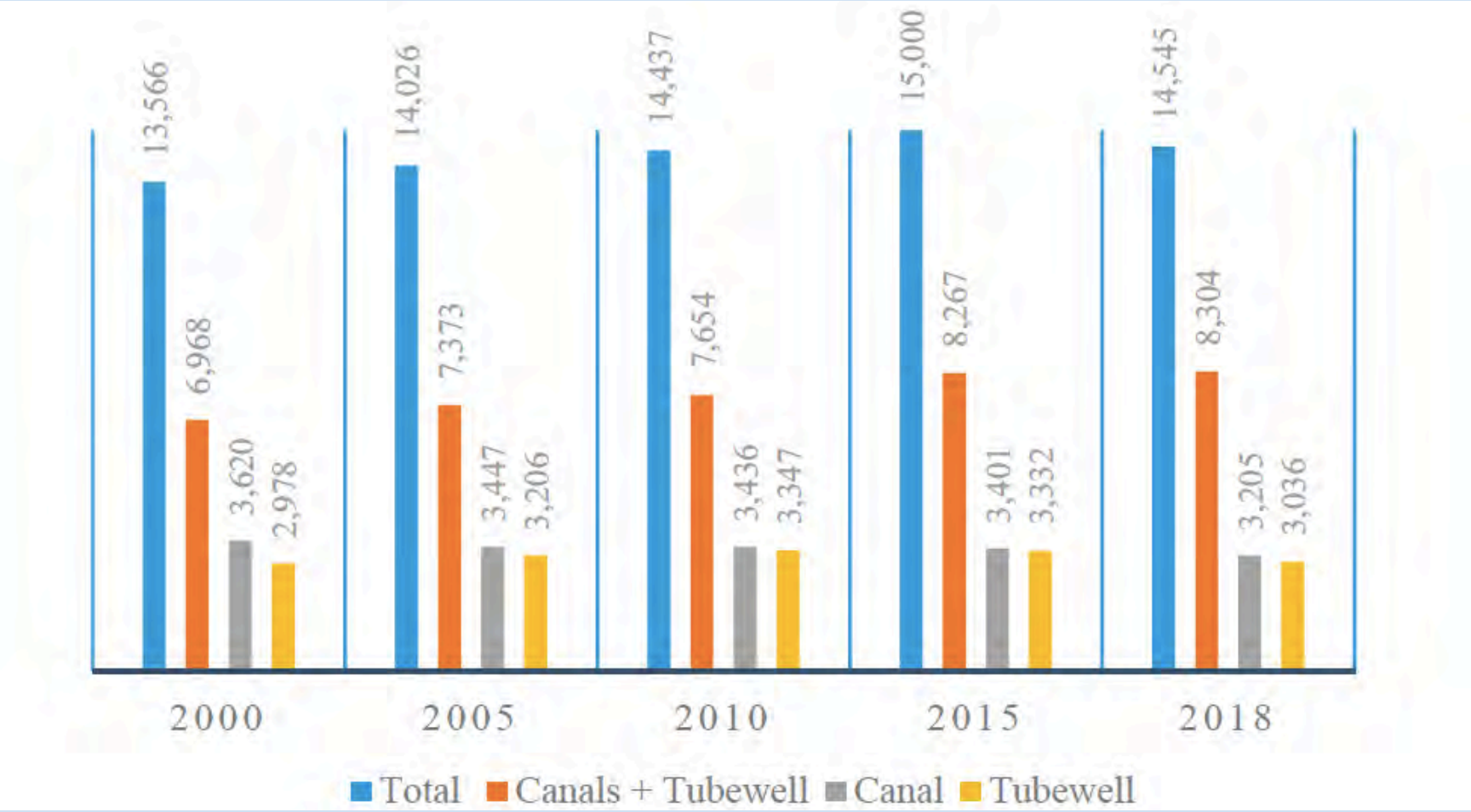
The Issue Is Groundwater

- Conjunctive Reality
- Pakistan has approximately 1.2 million groundwater wells.
- Pakistan is the third-largest user of groundwater, consuming about 9% of the global groundwater abstraction and occupying 4.6% of the total groundwater-irrigated area of the world

Accessing Our Water



Source: Qureshi 2020

Agriculture: By the Numbers

- 20 % of GDP
- 27 % of total land area
- 44 % of total labor force
- 90 % of total water use
- 85% + famers are small holders (0.5 – 5 Hectares)
- Dependence on canal waters; Rainfall contributes 15 % of agricultural productivity

(Qureshi 2020)

Some history

- Waterlogging and salinity – 1960s and 1970s
- Groundwater was only 8 % of total usage at the time.
- 52% of the land in the entire country – water logged.

Transformation

- Salinity Control and Reclamation Projects (SCARP) – 1962
- Deep drainage tubewells installed to drawdown groundwater table.
- A major boom in private tubewell development in the 1980s.
- Peter Engines: 12 – 16 hp
- Shift to cash crops – Rice and Sugar Cane

- Tubewell and drought resilience
- But over pumping has a cost.
- 2003-2011 monitoring shows that groundwater levels are dropping in most districts in the Punjab.

- “green revolution is more a tube well revolution than a wheat revolution.” (Repetto, 1994; Shah et al., 2007).

- It is estimated that at least 75 % of the increase in water supplies in the past 25 years is from public and private groundwater pumps.
- Groundwater withdrawals exceed renewals.
- Governance Issues.

Tubewells Across Pakistan

- Punjab – 90%
- Sindh – 4.4%
- Balochistan - 3.8%
- Khyber Pakhtunkhwa – 1.8 %

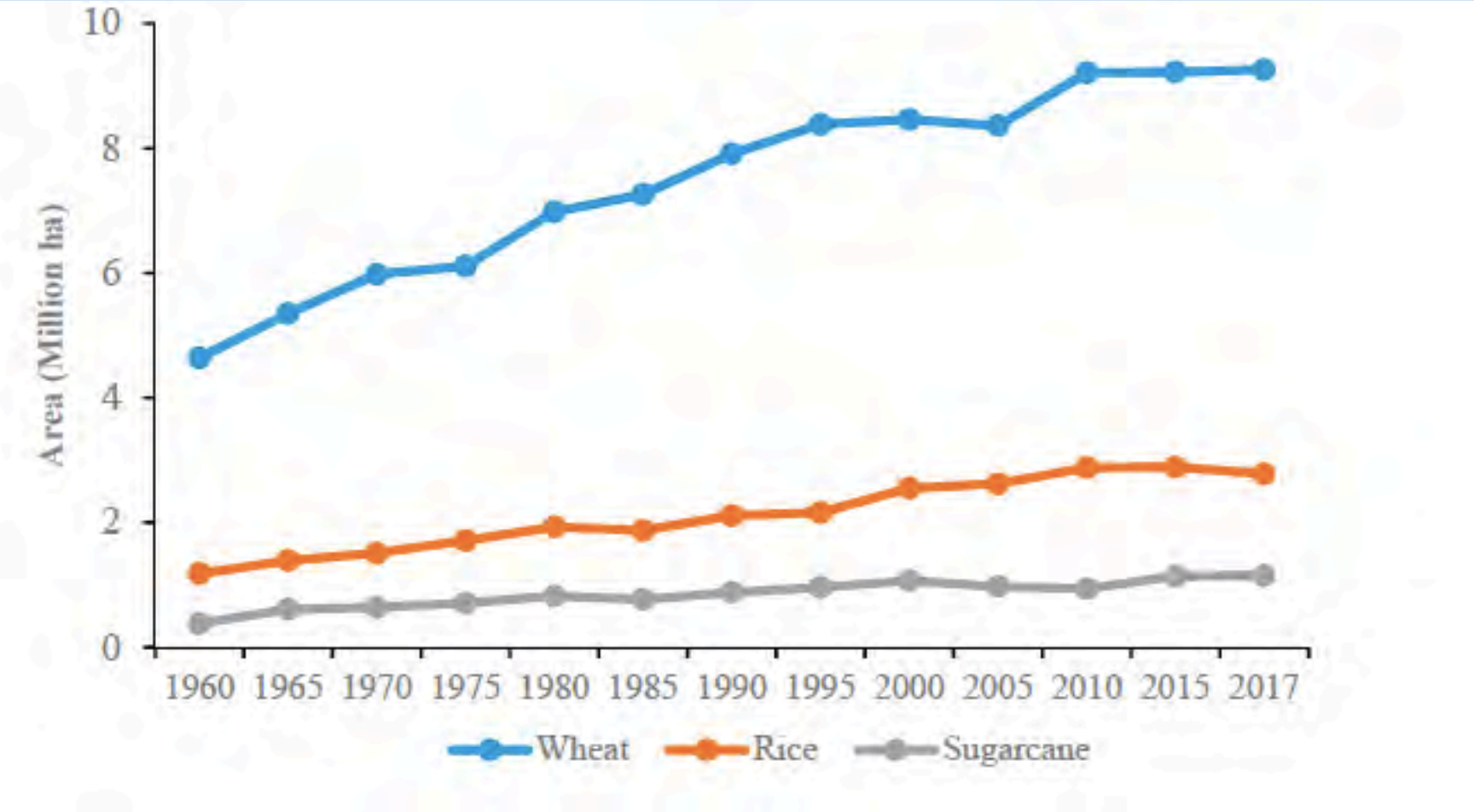
- 85 % of tubewells are diesel operated (low O & M costs)
- 15 % are electric

- Yes, Groundwater levels are going down but there is another concern.

*Upward Movement of Saline Water

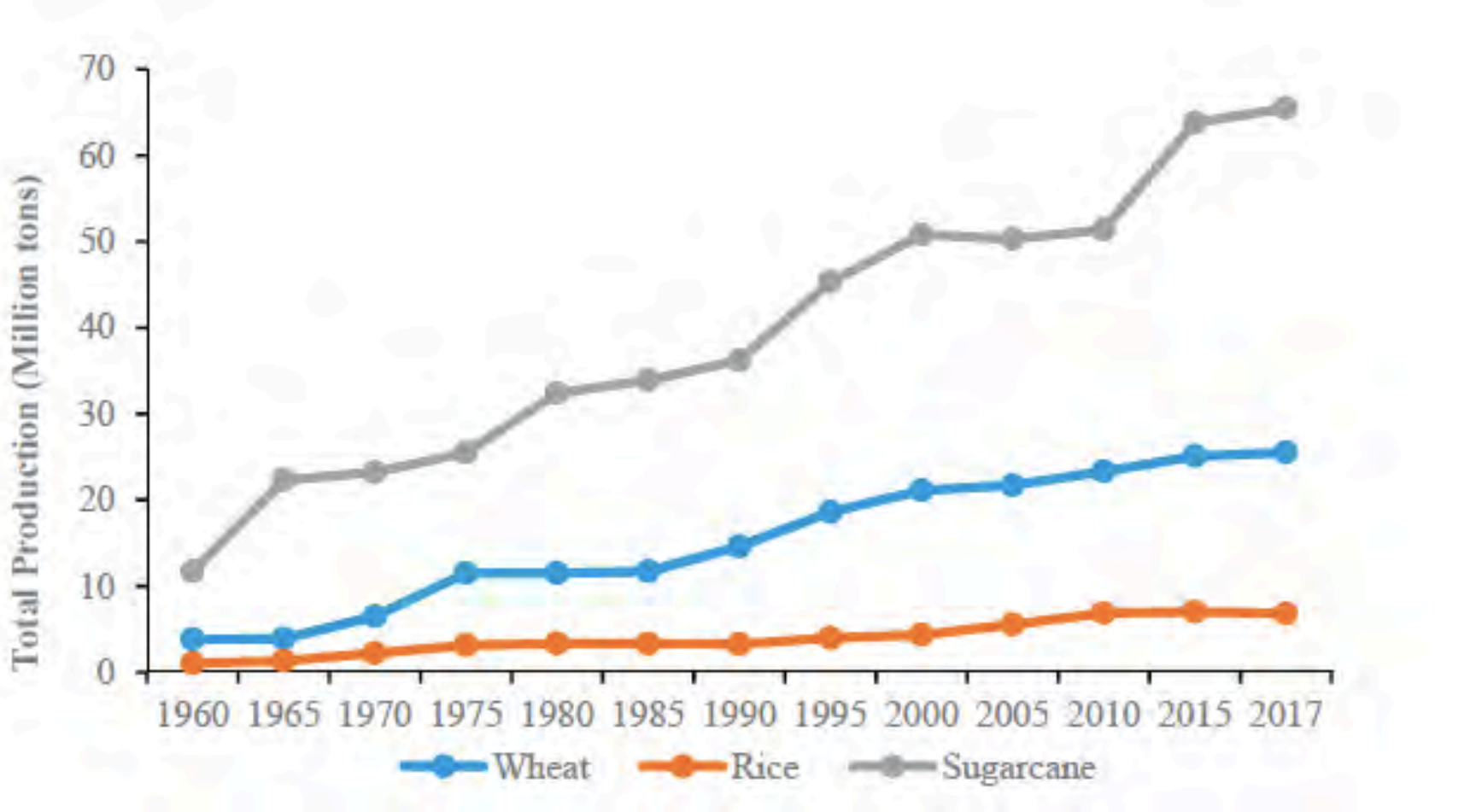
- In 1989, 7 percent of all wells were deeper than 50 meters. But by 2009 this number rose to 30% thus increasing the risk of salinization.

Increase in Cultivated Area



Source: Qureshi 2020

Cash Crops Productivity



Source: Qureshi 2020

- Despite intense groundwater use, agricultural productivity remains low, comparatively.
- Wheat production is 1.08 kg/ m3 in Pakistan vs 1.42 kg/m3 in Indian Punjab

Solar Powered Irrigation

- Cheaper
- Cleaner and Environmental/ Climate Friendly
- Internet of Things: Enhanced Connectivity

Solar Farm

Drip Irrigation

Drip Points Being Identified

Use of mulch to limit evaporation in hot temps

Orchard

Impact of Smog?

Risk Factors

- Over irrigation
- Expanding the land area under irrigation
- growing higher-value, but often more water-intensive, crops;
- Selling water to neighbors
- Any other?

How do we account for this?

- The prospect of higher returns per hectare, however, will encourage some farmers to expand planted areas or to switch to higher-value, more water-intensive crops (Berbel, 2014).

Key Issues Viz Water Governance

- Data Availability/ Sharing: Water Accounting
- Equity and Human Dimensions
- Entrenched Interests – lack of coordination
- Fragmented Regulations/ Legislation
- Lack of Regulatory Oversight
- Capacity Issues viz farmers
- Capacity Issues viz Govt Departments

Future Steps

- Watershed mapping and identification of existing tubewells.
- Identification of areas where future solar powered pumps might be installed
- Ban on installation in water stressed areas
- Capacity Building of farming communities
- Rainwater Harvesting
- Net metering and Connection with Grid