

Groundwater Irrigation in North India: Institutions and Markets, by A. Banerji, J. V. Meenakshi and Gauri Khanna, SANDEE Working Paper No. 19-06

Abstract

This paper analyzes the institutions and markets that govern groundwater allocation in the sugarcane belt of Uttar Pradesh, India, using primary, plot-level data from a village which shares the typical features of this region. Electricity powers tube well pumps, and its erratic supply translates into randomness in irrigation volumes. The paper finds that plots are water-rationed, owing to inadequate supply of power. A simple model shows that a combination of such rationing and the village-level mechanism of water sales can lead to great misallocation of water across plots, and result in large crop losses for plots that irrigate using purchased water. We infer the existence of a social contract that mitigates these potential losses in the study area to a remarkable extent; in its absence, average yields are estimated to be 18% lower. The finding that the water allocation is close to efficient (given the power supply) marks a sharp contrast with much of the existing literature. Notwithstanding the social contract, the random and inadequate supply of power, and therefore water, is inefficient. The dysfunctional power supply is part of a larger system of poor incentives to produce reliable and adequate power. In simulations we find that such reliability can improve yields by up to 10 %, and pay for a system of electricity pricing that gives incentives to the power supplier to actually provide adequate power. However, even at reasonably high power prices, irrigation volumes are large enough to continue to seriously deplete the water table. The problem is that traditional rights of water use do not take into account the shadow price of the groundwater. We provide a rough first analysis to suggest that a 15% markup on the economic unit cost of providing electricity would make for intertemporally efficient water use.

Key words: Water markets, water tables, water production function, water pricing.