

The realities and challenges of contemporary groundwater-based smallholder irrigated farming across the Indus, Ganges and Yellow River basins

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Abstract Groundwater has played an increasing role in irrigated farming, livelihood support, poverty alleviation, and national food security in India, China, Pakistan, Bangladesh, and Nepal since the advent of the green revolution in the 1960s. This paper presents a synthesis of the results of a cross-regional research effort, based on surveys in more than 60 villages, to map the contemporary realities and constraints of groundwater use and adaptation in irrigated agriculture within smallholder farmer communities across the alluvial plains of the major Indus, Ganges and Yellow river basins in Asia. The results show a general over-exploitation of groundwater resources in Pakistan, western India and China, and relative under-utilization in eastern India and Bangladesh. But more interestingly, and despite its great significance, practically nowhere is groundwater managed in an integrated manner. As a result, its use is sub-optimal where smallholders today employ a range of adaptation and coping strategies to uphold groundwater benefits. The research findings point to various axes along which to identify solutions and focus equitable and sustainable policies and management interventions.

Key words groundwater; irrigation; smallholder farming; energy; coping strategies; India; China; Pakistan; Bangladesh; Nepal