

*Up to a third of Pakistan's irrigated land lies prone to crop-killing salinity and sodicity syndromes.*

## Secondary Salinity in Pakistan — Harvest of Neglect

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**E**arly in 1989 with funding from the Netherlands, IIMI Pakistan began a five-year study, into what has frequently been described as the “twin menace” of waterlogging and salinity. These are syndromes that have long afflicted vast areas of irrigated farmland in Pakistan. Could improved irrigation management help minimize them? The study’s aim has been to identify, through detailed investigations in Punjab and Sindh provinces, new kinds of management interventions that might help keep these problems under control, followed by a second phase of action research to field-test promising remedial approaches.

At the project design stage, it was not appreciated that salinity in Punjab is now largely dissociated from waterlogging. Since the 1960s waterlogging has been greatly reduced by the installation and operation of public sector deep tubewells as part of Salinity Control and Reclamation Projects (SCARP). More recently, fast-growing use of groundwater for irrigation from

privately owned shallow tubewells, now numbering almost 300,000 countrywide, has greatly multiplied the “vertical drainage” effect of SCARP tubewells.

IIMI’s research as originally proposed was to focus on: “irrigation and drainage conditions of incipient and not yet apparent waterlogging and salinity problems.” The sites selected

in Punjab were distributary canal commands served by Gugera Branch Canal in the Lower Chenab Canal (LCC) system in the Rechna Doab, where studies on canal system performance and constraints to irrigated agriculture below the outlet were already well underway. By 1989, field observations and a body of anecdotal evidence from farmers indicated that these areas harbored a suitable range of incipient salinity conditions.

Further surveys revealed, however, that water tables were commonly more than three meters below the soil surface in these locales, rendering incipient waterlogging unlikely. That condition, however, did not disqualify

the chosen command areas as fitting places in which to address key salinity issues. On the contrary, data collected for other IIMI research projects were beginning to reveal largely unrecognized salinity problems in both places despite the absence of waterlogging.

We reason that this phenomenon results from widespread and increasing reliance by farmers in the lower reaches of canal commands, upon tubewell water of often marginal or poor quality for irrigation. Tubewells have become the farmers' response to increasingly inadequate and unreliable deliveries of good quality canal water proceeding down the system, the distributary and the watercourse.

The topography of the Rechna Doab is relatively flat with little natural drainage. It is underlain by a deep, high-yielding aquifer that is mostly coarse and sandy but contains occasional thick clay layers that must be screened-off when tubewells are installed. Nowadays most water tables in the Mananwala and Pir Mahal commands are three to eight meters deep, grading towards the tail ends of these distributaries.



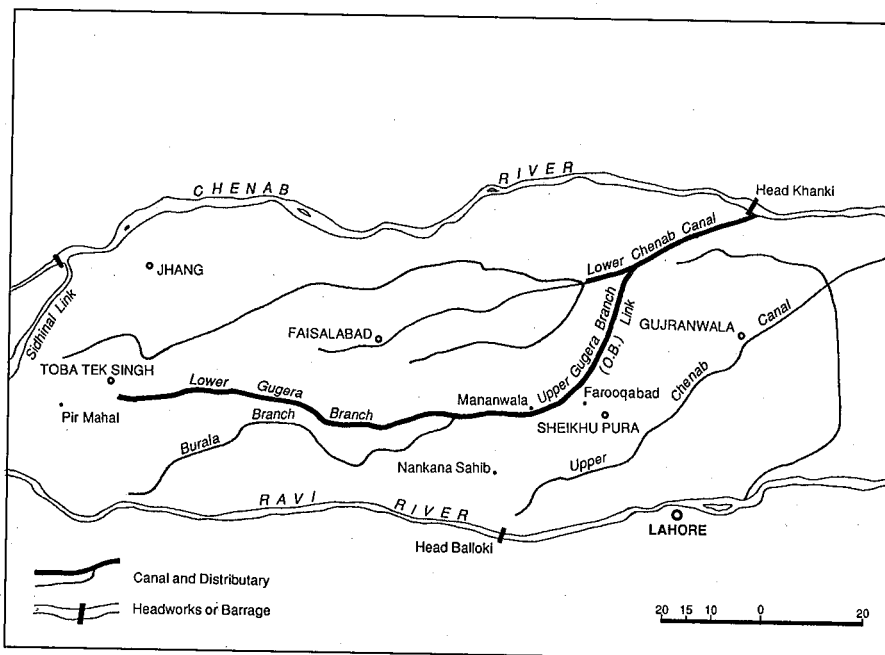
Using wooden billets to augment flow levels – an improvised response to deterioration of elderly control structures in Punjab.

Primary data for surface and tubewell water supply over several seasons have been collected by IIMI and its research collaborators in the Punjab Irrigation Department, for a large sample of watercourses off-

taking from Lagar and Mananwala distributaries in Farooqabad Sub-Division, and from Pir Mahal and Khikhi distributaries in Bhagat Sub-Division in the LCC system (see map).

In size and service area, both Mananwala and Pir Mahal are fairly typical distributaries in the LCC system; Lagar is somewhat smaller. In both subdivisions, public tubewells were initially installed to control waterlogging. More recently, private tubewell development has been extensive and rapid; densities of 5-7 wells/100 hectares are now common locally.

Mananwala Distributary is located in the Punjab rice-wheat agro-ecological zone. Rice (especially the high value *basmati* variety) is the predominant crop here during *kharif* season (mid-April to mid-October) wherever irrigation is sufficient, while wheat is the principal crop in *rabi* season (mid-October to mid-April).



Rechna Doab, Punjab, Pakistan.

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