

The timing of these water supplies is also somewhat capricious. The irrigation system of the Indus Valley is unique among major irrigation developments in that it includes almost no storage facilities. Water from the Indus, the Jhelum, and the other rivers is diverted into the canal systems when and as available, so that the timing of releases depends mostly on the arrival of the monsoons and the other, less important, rains. Furthermore, farmers are permitted to withdraw water only in accordance with a rigid cycle of allocations that does not respond to the extent of moisture depletion in their fields. As a result of these two characteristics, it is rare that water can be applied to the crops at the most advantageous time.

The quality of irrigation water is extremely good, averaging about 250 ppm of dissolved salts. Even this moderate salt concentration can lead to difficulties, however, if the salts are allowed to accumulate in the soil over a period of decades, as has happened in the Former Punjab.

Agricultural practices in the Former Punjab are, naturally, attuned to this scanty and unreliable water supply. Several aspects of this response are worth noting. We mentioned above that customary depths of irrigation are shallow by world standards. At the same time, land in the Former Punjab is not intensively utilized in spite of the heavy pressure of population. As was seen in Table 1.12, only about two-thirds of the cultivable area was actually cultivated on the average during the 1950's. Although this is partly due to abandonment of saline lands, to a large extent the restriction of acreage is dictated by the insufficiency of the water supply: spread as thinly as it is, it still cannot cover the entire arable area. By restricting acreage and irrigating thinly the farmers economize, in a sense, on the use of water. Their third response to their inadequate water supply is to economize on the use of other agricultural inputs, particularly fertilizer and commercial high-quality seeds. They are not in a position to invest heavily in preparing crops that may fail because of lack of timely water. With respect to fertilizer, particularly, they recognize that it is dangerous to apply fertilizer to land without an assured water supply. Thus the chronic water shortages impede the modernization of farming methods in all respects.

All this will be changed by the availability of supplementary water supplies from the tubewells. Tubewell development on the scale we are contemplating will provide more than an additional foot of irrigation water per year, and the delivery of this water can be timed quite flexibly in response to need. Furthermore the amount of water withdrawn from the aquifer be varied from year to year to compensate for variations in the supply of surface water. In short, the tubewells will provide an enhanced, more reliable, and better timed flow of water than has ever before been available in the Former Punjab.