

represent conditions in a typical project area, and to estimate the over-all pumping requirements. However, because of the decrease in potential recharge capacity from the upper to the lower ends of the doabs, more tubewells will be needed in the northern zones of the Former Punjab than in the southern part and in Bahawalpur. To compensate for this, canal revamping will be required to increase diversion of surface water to the downstream regions.

In low-lying regions, the depth of the water table at present is only two or three feet, and in old river traces and other depressed areas open water stands on the surface. The high evaporation from these areas dissipates a large amount of water and leaves large residues of dissolved minerals. Adjacent higher lands have lower evaporation rates, and a ground water flow from the high to low areas is induced which prevents the former from becoming waterlogged. The ground water rise in three observation wells in Rechna Doab is illustrated in Figure 7.2.

The inference that most of the water which caused the historic rise in the water table came from the canal system is reached through a process of elimination. Infiltration from the rivers must have been small because of the low underground hydraulic gradients in their vicinity and because of the character of the soil under the rivers. Water applied to land, either by irrigation or precipitation, was mostly lost through evapotranspiration, and never reached the water table except in those relatively small areas where the ground water stood close to the surface. It may be inferred therefore that the distribution system constituted the major source of recharge. This inference is supported by many water-balance measurements on the canal system made during the last thirty years.

The reticulate distribution system is made up of many sizes of channels. In flowing to the fields the water passes through main canals, branches, distributaries, minors, water courses, and finally to the farm ditches. The larger channels carry water during all but a few weeks of the year. The length of this system is very great, being measured in thousands of miles in the Former Punjab alone.

The determination of the leakage rate from the canal system by summation of unit losses is imprecise. This rate can best be estimated by a calculation based on the rate of rise of the water table. In Rechna and Chaj Doabs, well records show that until the water table rose to within about 10 feet of the land surface the rate of rise was as much as 1.5 to 1.7 feet per year. In other regions, including Bahawalpur, the rise was less rapid.