

ours or Harza's and his cropping intensity lower. He assumes almost as much diversion of river waters at canal heads, but only 16 MAF of tubewell supplies, because he believes that about half the seepage water from canals and water courses, after mixing with the underground water, will be too salty or too sodium-rich to be usefully recovered by pumping. Although he does not mention the Southern Zone, by implication he allots it only a minor fraction of the canal diversions, since he states that his diversion scheme for the Northern Zone follows Harza's. He neglects non-beneficial evapotranspiration, but we have included this in recomputing his budget.

THE ROLE OF PUBLIC AND PRIVATE TUBEWELLS

At the time the Panel Report was written, the vigorous growth of privately installed and operated tubewells was not anticipated. About 30,000 such tubewells have now been installed, and they are making a significant contribution to the productivity of agriculture in West Pakistan. This contribution will grow as the private tubewells continue to be installed at a rate of several thousand units a year. The policy of the government in designing new SCARP and new public tubewell fields should, of course, take this development into account in order that the maximum benefit to the economy can be realized from the public and private tubewells together.

It must not be thought that this is simply a question of public versus private ownership. The public and the private tubewells differ from each other technologically and they will be operated in accordance with different principles and purposes. From the planner's point of view each is suitable for obtaining a somewhat different set of goals. The more appropriate mode for developing the underground water resources of any particular area will depend upon the conditions and problems prevalent in that area. The private tubewell owners have already recognized this. Although the private tubewells are quite widely dispersed throughout the irrigated region of the Plain they tend to be much more heavily concentrated in the upper regions of the *doabs* than elsewhere. We can make only a few tentative remarks on the four-way integration of public tubewells, private tubewells, canals, and drainage works, and feel that the situation must be watched closely and a sound policy developed in the light of experience. Our understanding of the operating characteristics of the private tubewells is especially deficient in spite of the excellent beginning that has been made by the two sample surveys of their operations, one conducted by Ghulam Mohammad [5] and the other by Harza Engineering Company International [6].

From a technical point of view the major differences between the two types of well are in capacity and depth. The public wells are designed for a capacity of from 3.5 to 4.5 cusecs (7 to 9 acre feet per day) and have a draft of from