

While the second design entailed a much smaller investment in wells and would require considerably smaller power costs than the first, it had the marked disadvantage of providing water sufficient for the intensive development of only 11.6 million acres of cultivated land. This area is a great deal less than that occupied at the present time. Farming could be maintained over the present area only at the cost of a relatively low intensity of cultivation.

The first scheme was shown to be economically more efficient than the second when the discount rate was taken as 4 per cent per year. At this discount rate, the present value of the time stream of benefits and costs of the mining scheme was 8 per cent larger than that in which recharge only was pumped. Moreover at *all* other discount rates from 0 to 10 per cent per year the first scheme outranks the second. The ranking is insensitive to the discount rate and the Panel Plan with 100-foot mining and large scale tubewell development affords a better investment than the second scheme.

The opinion has been expressed by some that the Panel Plan did not sufficiently take into account the difficulty that in mining over time the quality of groundwater will deteriorate due to the fact that salinity generally increases with depth. The Panel examined many hundreds of profiles of salinity and found that while this increase occurs in many places—indeed most places—the reverse is also true, and the *average* increase in salinity in 100 feet of depth was not large. Moreover, there are factors that operate to *improve* the quality of the groundwater over time. Several of the curves of salinity vs. time [1, Chapter 7] Figures 7.18 and 7.19 show a decrease in salinity after 30 years of operation. This decrease would have been even greater if the salt-flow model had been run under the plausible assumption that with a low watertable some of the salt leached below the root zone would be stored permanently in the soil pores above the watertable.

The Panel's principal argument for mining, however, did not rest upon the foregoing economic analysis. A more realistic but less quantifiable argument is that until a very large amount of surface storage is built, intensification of water use and cultivation can be accomplished in the Northern Zone only by mining or by greatly reducing the area of cultivated land. The latter would result in large social costs and perhaps monetary costs of resettlement and other adjustments.

#### Ghulam Mohammad's Budget for the Northern Zone[4]

A somewhat similar argument applies to the budget given by Ghulam Mohammad. Although he does not recommend a marked reduction in net cultivated area, his gross sown area in the Northern Zone would be much smaller than