The basic principles related to drainage of agricultural lands have been covered and discussed in great detail in *Drainage of Agricultural Lands* edited by Dr. James N. Luthin (no. 7 in the monograph series AGRONOMY) and published in 1957 by the American Society of Agronomy. The purpose of this chapter is to discuss practical consideration in the design and operation of drainage systems, particularly as related to drainage of irrigated lands in arid and semiarid regions.

### I. MAGNITUDE OF THE PROBLEM

Drainage problems usually develop as a consequence of irrigation. Historic evidence of this fact can be found on every continent of the world. A major contribution to the decline and disappearance of some ancient civilizations can be attributed to their failure to heed the drainage hazard.

Even during the present century, some seemingly excellent irrigation schemes have failed or been weakened by the subsequent development of drainage problems. The threat of waterlogging and salt accumulation hangs over nearly every irrigated acre. It is this circumstance that has prompted socio-agriculturists to raise the question of whether irrigated agriculture is a permanent enterprise. The answer is that it can be made relatively permanent if proper drainage works are provided and operated properly. Israelsen and Ayazi (1957) state that irrigation and drainage are inseparable. The recognition and application of this basic fact is essential to the continued productivity of arid land soils.

#### A. Existing Drainage Problems

It is difficult to gauge the magnitude of existing drainage problems in irrigated areas because of the dynamic nature of their development. In some areas where irrigation water is obtained from pumped wells, a generally low groundwater table is maintained and drainage problems are minimized. A good example of this is the Salt River Valley of Arizona, USA (Marr, 1926), where 40 years ago much of the land in the valley was waterlogged. Development of pump irrigation has...