The logic of the computing procedure that resolves these two decisions simultaneously is as follows. One condition for an efficient cropping pattern is that the contribution to the value of agricultural output of an additional acre-inch of water should be the same no matter which crop it is applied to. We shall call this contribution the marginal value of water. If, therefore, we make a guess as to the marginal value of water, we can deduce from that guess and from the water response curves for the individual crops theproper amount of water to apply to each crop so that an additional acre-inch of water applied to that crop would produce an increase in yields whose market value was just equal to the guessed marginal value. This initial guess therefore determines the depth of irrigation, the yield per acre, and the gross value of output per acre of each crop. Furthermore, if we make an estimate of the out-of-pocket costs of producing each crop, this can be deducted from the gross market value per acre to attain an estimate of the net market value per acre devoted to each crop, which will measure the excess of the value produced over the value of the transferrable economic resources used in producing the crop. This information can be used to estimate the efficient number of acres to be devoted to each crop by using the criterion that the cropping pattern should maximize the excess of value of agricultural output over the value of transferrable resources absorbed, subject to the limitations on the amounts of land and water available. Arriving at this optimal allocation of acreage is a standard linear programming problem. It should be noted that this problem and the solution deduced from it depend on the initial guess as to the marginal value of irrigation water, since this guess determines the level of irrigation applied to each crop, the gross value produced per acre, and the net value produced per acre. One of the results of this linear programming computation is an estimate of how much the total net value produced could be increased if an additional acre-inch of irrigation water were available, that is in effect a new estimate of the marginal value of irrigation water. If this new estimate is the same as the original guess, the original guess is confirmed and the cropping pattern deduced is the most efficient attainable one. However, it is most unlikely that this desirable result will occur on the very first guess. It is then possible by iterating, that is by revising the initial guess in the light of the results of the solution of the linear programming problem, to arrive at an initial estimate of the marginal value of water which will be confirmed by the final estimate.

The preceding paragraph describes the basic strategy of the approach to determining the optimal levels of irrigation and allocations of land for a given structure of prices, water response curves, water supply availability and land availability. One complication, however, is likely to arise that causes a slight divergence from the strategy just laid out. We defined the marginal value of water as the contribution that an additional acre-inch of