the decision variables y and z. Because the objective function is of a non-linear form, this is a problem in non-linear programming.(7) For given values of the parameters L, F and M, the object of this mathematical analysis is to choose that set of non-negative values for the decision variables y, z and w, subject to the six constraints described previously, that will maximize the net benefit function or objective function.

(e) Results of Mathematical Analysis

Optimum solutions have been obtained for values of
L = 15, 10, 5; F = 10, 5, 1; M = 5, 2; A = 1200, 700 mg/liter; R = 2.4 maf/yr; CMAX = 2000, 1500 mg/liter; B = 0.10; Δ = 3.5 ft/yr.

By selecting all possible combinations of the values of the parameters listed above, 72 optimal solutions were obtained. The values of the decision variables, y, z and w, that maximize the net benefit function for the individual runs fall into one of two categories, namely;

(1) y = 0, z = 1.71, w = 0 and
(2) y = 0.81, z = 2.61, w = 0 (maf/yr)

In order that the relationship between the benefit and cost parameters L, F and M and the optimal values of the decision variables y, z and w may be more clearly depicted, Figure 7.6 has been prepared.(8) For a given value of M = 5, Figure 7.6 exhibits three regions in which a design might fall depending on the relative values of L and F. For example, Region I indicates that the decision is optimal when the values of the decision variables are: y = 0, z = 1.71 and w = 0 (maf/yr). The following table displays optimum values of the decision variables along with the salinity of the applied irrigation water in the saline zone for the three regions shown on Figure 7.6.

Region	Value of decision variables at maximum net benefits maf/yr			Salinity of applied irrigation water in the saline area-mg/l
	y	z	w	C
I	0	1.71	0	1180
II	0.81	2.61	0	1384
III	5.0	7.0	4.87	2000*

*Values given here for region III are for Δ = 3.5 ft/yr, CMAX = 2000 mg/liter, and A = 1200 mg/liter.

(7) The mathematical details of the method used are discussed in the Appendix Report "Indus Basin Studies," Harvard Water Resources Group.

(8) The development of Figure 7.6 is described in detail in the Appendix Report.