P-E1.

AN APPROACH FOR IRRIGATION SCHEDULING IN AN IRRIGATION SYSTEM

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The demand for water in recent times has increased due to new developments in water uses and climatic changes. One of the major uses of water is in irrigation schemes. The emphasis has therefore shifted to optimally operating these systems to minimize waste of water. This paper presents a model, developed to optimally operate a diversion type irrigation scheme. A technique is developed to particularly apply in diversion schemes where a constant water requirement is preferred.

Dynamic Programming (DP) is selected as the optimization technique due to its ability to incorporate non-linear objective functions and constraints. The model optimally allocates irrigation water to different plots along a main canal. This spatial distribution is limited to a single time step and the optimum results are sequentially integrated in time to form the final policy. Physical canal properties of the system such as reach length, maximum canal capacities, area of plots, evapotranpiration and rainfall are the initial inputs required for the model. The modeling process is separated into two stages. In the first, weekly total irrigation requirements of each plot were estimated and various different patterns of daily releases during the week were derived to supply these requirements. The second stage applies DP to find the best combination from these alternatives, which provide a flow with a least amount of deviations within a period.

The model is applied to Gampolawela Rajaela Irrigation Scheme in the Kandy District to test the applicability. The scheme irrigates a command area of 162 ha by diverting water from Ulapane Oya. The command area is divided into seven tracts located along the canal. The last tract of 77 ha is fed by a feeder canal bringing water from Mahaweli river.

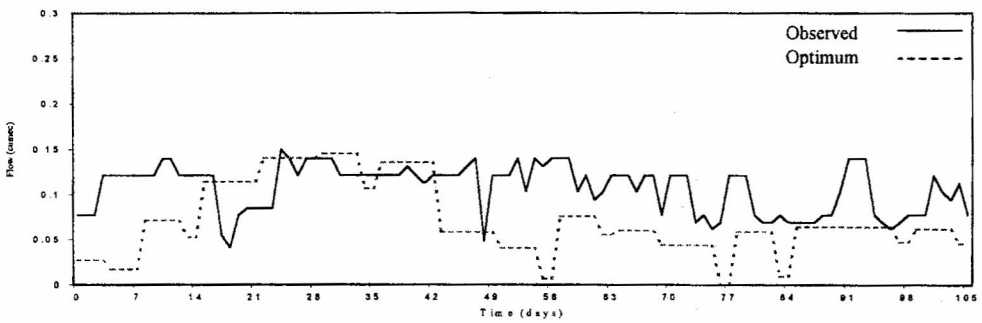

Figure 1. Comparison of observed and optimum releases in the canal – Yala 1997

The results show the effectiveness of the developed model. The optimum releases have lesser fluctuations compared to the observed releases. Also, it allocates water efficiently. The model could be applied at the planning and operational stages.