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A goal programming model for land allocation for crops in udawalawa irrigation scheme in Sri Lanka

Jayasinghe A.D.K.C.D. and Samarathunga D.M.*

Department of Mathematics, University of Ruhuna, Matara, Sri Lanka.

Crops are not only produced for human consumption but also to get a profit in the economic aspects. Therefore, a proper cultivation plan is needed. In this study, a goal programming model is developed to determine a cultivation plan for selected crops in the Udawalawe Irrigation scheme. Udawalawe, Chandrika-Lake, Habaralu-Wewa, Kiriibban-Wewa, and Andara-Wewa are the reservoirs that are being selected for this research. Six regions between the above-mentioned reservoirs are being selected and aimed to study paddy, banana, sugarcane, and other crops cultivated in these areas. A weighted single objective is suggested for the model by considering all objectives. The primary objective of the model is to maximize the profit from the crops. Utilization of total available land for cultivation and minimizing positive deviation from the average monthly inflow to Udawalawe reservoir are the other objectives that we considered. The total area of available lands, availability of water, crop water requirement, reservoir storage limits, water storage continuity equations, and crop production targets are the constraints considered in the model. The model is implemented in MATLAB. According to the results, we can use all the area of available land in each region and the monthly inflow of water to the Udawalawe reservoir can be used less than or equal to its average value. Data was collected from regional agrarian officers. Under the given parameters, the proposed model can be applied to obtain a cultivation plan for the selected crops for each region that will maximize the profit while satisfying the other constraints.

Keywords: Profit maximization, Goal programming, Average, Udawalawe

*Corresponding author: samaremath@gmail.com