

Conjunctive Use of Surface and Groundwater to Improve Food Productivity in the Dry Zone Area

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Abstract

This research presents alternate policy decisions based on technical strategies to operate minor and medium irrigation schemes with integrated conjunctive use of surface and groundwater to improve groundwater systems in a restricted area for the economic pumping for agricultural and domestic water use, by optimizing the use of groundwater and surface water. Forty one domestic dug wells were identified as observation wells among the available domestic/agro wells within the study area of 185.23 km², to represent the aquifer. This study area was divided into forty one Thiessen polygons. A complete water balance study for each polygon for each season was carried out. Water levels were predicted for changes in operational policy of minor and medium irrigation schemes by forgoing certain percentage of cultivation, boundary treatment to reduce the transmissibility in steps, and combination of both. The economic feasibility was analysed by taking the energy saved in pumping of raised groundwater as a benefit and boundary treatment cost and income loss due to change in operational policy of minor and medium irrigation schemes by forgoing certain percentage of cultivation as cost. The present worth of benefit and cost for various interest rate and project life period were calculated and compared. Change in operational policy of minor and medium irrigation schemes by forgoing one third of the cultivation under them or keeping one fourth of the storage of minor and medium irrigation schemes at any time together with 40% - 50% reduction in boundary permeability will recover an average of 60% to 70% of the loss of water table in any consecutive season in almost 95% of the area under consideration.