

Importance of Demand Estimation in Irrigation-System Management

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Abstract

Systems engineering research is conducted to analyze improvements in performance of a water-storage and -distribution system in response to improved monitoring of irrigation demands. The Mahaweli system in Sri Lanka, a multireservoir system with both hydropower and irrigation objectives, has been selected as a case study. The operation of the Mahaweli system is simulated using a regression model obtained through implicit stochastic optimization. Spatially independent, cross-correlated, and systematic errors in irrigation demands are considered. These three types of errors have similar patterns in their effects on system operation. When the Mahaweli system is operated optimally, both energy shortages and irrigation shortages increased with increasing standard deviations of error. This indicates that improving the measurements of irrigation demand would be beneficial to both farmers and hydropower recipients.