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An Integrated Water Resources and Economic Approach for Optimizing Water Allocation Policies.

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Abstract

Reservoir / river systems analysis models are generally used in the formulation and evaluation of alternative plans for responding to water related problems and needs. One of the main problems is the water resources allocation and the cost associated with pumping, if needed. Taking the appropriate decision is considered as a techno-economic issue. The case study presented in this paper involves a complex system of three dams, two pumping stations and two diversion structures all serving an agricultural production unit. The objective of this research is to determine a suitable and feasible water allocation/pumping policy as a “trade-off” between minimizing the water deficiency and the cost of pumping. To achieve this objective, a water resources model was developed using HEC-5. A multi-criteria decision approach was implemented to determine the most appropriate water release policy and the capacity of the water diversion facilities. The parameters used were subject to a sensitivity analysis to assess their relative impact on the determined policy. The suggested release policy allows a reduction of half the total of the pumping costs with only 3% reduction in the water allocation reliability, as measured by the failure frequency of demand satisfaction and the average shortage index.