Optimal Pumping Strategy with Conjunctive Operational Rules

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Traditionally, the conjunctive use of surface water and groundwater often supplies surface water first. If surface water is insufficient, then groundwater is used. The traditional operation strategy may cause the problem that the pumped groundwater is excessively centralized. In this study, we proposed a new strategy and conjunctive operational rules to manage both surface and groundwater and to allow pumping groundwater during the non-drought periods. We link the groundwater simulation model with the management model, and use the global optimization algorithm to simultaneously optimize the spatial and temporal distribution curve which subject to the constraints of available surface water and the safety yield of groundwater. The Lanyang River watershed located in northeastern Taiwan is chosen as a study area. The trends of the historical weather records show that the probabilities of higher intensity rainfall and longer non-rainfall periods are increasing in the Lanyang River watershed. There is no reservoir in the Lanyang River watershed, and thus it may be more vulnerable to water shortage. In the study, we expect the conjunctive operational rule curve of surface water and groundwater can reduce the water shortage effectively comparing to utilizing the surface water only.

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