

Optimization of equitable irrigation water delivery for a large-scale rice irrigation scheme

ABSTRACT

Equitable water allocation is essential in an irrigation scheme for obtaining potential crop yields from the entire scheme, especially when water supply is inadequate. An optimization model achieved this goal by coupling an optimal water allocation model with available water supply and irrigation water demand for a river-fed rice irrigation system in Malaysia. This model consists of a paddy field water balance module and an optimization module. The outputs from the module are daily irrigation demand and surface runoff, if there is any. The optimization module consists of an objective function, which minimizes water shortage across the scheme area while maintaining equity in water allocation. This model performs optimization subject to several system constraints, and the decision variable of the model is daily releases or supply to the tertiary canals. Performance of this model remained unaffected under different water supply conditions, and the optimization model reliably examined the effects of alternate water allocation and management rules with field information. It improves efficiency and equity in water allocation with respect to crop growth stages and water shortages rather than simply cutting irrigation supply on a proportional basis to overcome water shortages.