

Abstract

This research dealt with the application of stochastic methods and inverse modeling technique in setting up a comprehensive regional groundwater flow model of the Chiang Mai basin. Both deterministic and stochastic approaches were used to simulate groundwater flow regime in the semi- to unconsolidated aquifers. The flow model used in this study was a USGS finite-difference groundwater flow program called MODFLOW-2000 and the inverse modeling codes included PEST, UCODE, and PES (one of the package in MODFLOW-2000). Deterministic model simulation indicated that the annual water budget of the basin under steady-state condition was 241 Mm³. The most sensitive parameters were hydraulic conductivity and recharge. Through stochastic simulation, the model uncertainty was evaluated. The uncertainty in water budget is ± 12.1 Mm³ (95% confidence) and the average error in estimated heads was approximately ± 4 m.