

## **Study of Sub-Surface Flow in an Unconfined Carbonate Aquifer in a Tropical Karst Area in Indonesia: A Modeling Approach Using Finite Difference Groundwater Model**

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**Abstract :** Due to its porous nature, karst terrains - geomorphologically developed from dissolved formations, is vulnerable to water shortage and deteriorated water quality. Therefore, a solid comprehension on sub-surface flow of karst landscape is essential to assess the long-term availability of groundwater resources. In this paper, a single-continuum model using a finite difference model, MODLFOW, was constructed to represent an unconfined carbonate aquifer in a tropical karst island of Rote in Indonesia. The model, spatially discretized in 20 x 20 m grid cells, was calibrated and validated using available groundwater level and atmospheric variables. In the calibration and validation steps, Parameter Estimation (PEST) and geostatistical pilot point methods were employed to estimate hydraulic conductivity and specific yield values. The results show that the model is able to represent the sub-surface flow indicated by good model performances both in calibration and validation steps. The final model can be used as a robust representation of the system for future study on climate and land use scenarios.

**Keywords :** carbonate aquifer, karst, sub-surface flow, groundwater model

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