

## Comparison of Empirical Models for Estimation of Groundwater Potential Recharge in a Semi-Arid Region Utilizing Lysimeter Data

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### Abstract

In the present research, the performances of six empirical models, i.e., simple threshold exceedance, fixed proportion exceedance, quadratic function of storage, power function of storage, cubic function of storage, and exponential function of storage were investigated for estimation of groundwater potential recharge in a semi-arid region. First, the FAO Dual Crop procedure was used to calibrate evaporation from bare soil during the occurrence of potential recharge period. Then, the empirical models were calibrated utilizing soil moisture and potential recharge data. For validation of empirical models, soil moisture and potential recharge were simultaneously estimated for an independent event. Results indicated that 5 of the six models (except for the simple threshold exceedance model) were able to estimate potential recharge with a reasonable accuracy, showing the maximum computed value of *NRMSE* (Normalized Root Mean Square Errors) of 24.4 percent. According to validation results, exponential, cubic, and power function models provided better estimation of potential recharge in comparison with the linear models. Also, all of the applied empirical models were able to simulate soil moisture during the recharge period with an acceptable accuracy. Finally, the exponential model with minimum *NRMSE* value for soil water simulation and also acceptable performance of potential recharge estimation was recommended for estimation of potential recharge in the study area.

**Keywords:** Groundwater potential recharge, Evaporation from bare soil, Empirical models.

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