

## PERFORMANCE EVALUATION OF REFERENCE EVAPOTRANSPIRATION MODELS AND TREND ANALYSIS UNDER CLIMATE VARIABILITY IN SEMI ARID REGION

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**Research Summary:** Reference evapotranspiration (ET<sub>o</sub>) is an important parameter for climatological, hydrological and agricultural water management. FAO-56 Penman-Monteith (FAO56-PM) equation is one of the most accurate models. But it needs a detailed climate dataset from the weather stations. Therefore, empirical reference evapotranspiration models that can be based on a reduced set of climate data can be an alternative approach. In this study effort has been made to study seven southern cities of Saudi Arabia using various mass transfer, radiation-based, temperature-based reference evapotranspiration models were evaluated and further 70% data were calibrated and remaining data were used for validation with respect to standard FAO56-PM method based on the climatic data obtained from Meteorological Department. Moreover, new model based on aforementioned model are to be developed. The selected model was ranked using global performance index (GPI) which is based on the overall effect of ten statistical criteria. The results revealed that the calibration and validation of different ET<sub>o</sub> equations substantiate their performance. Thus, the validated models based on a reduced number of climatic parameters can predict the ET<sub>o</sub> accurately for southern region of Saudi Arabia within reasonable accuracy. Also, Sensitivity analysis has been performed for ET<sub>o</sub> with respect to various climatic data. Trend analysis has been performed using Mann-Kendall test to detect variation of ET<sub>o</sub> under variable Climate. Finally, contribution of various climatic parameters to compute ET<sub>o</sub> have been checked using machine learning model.

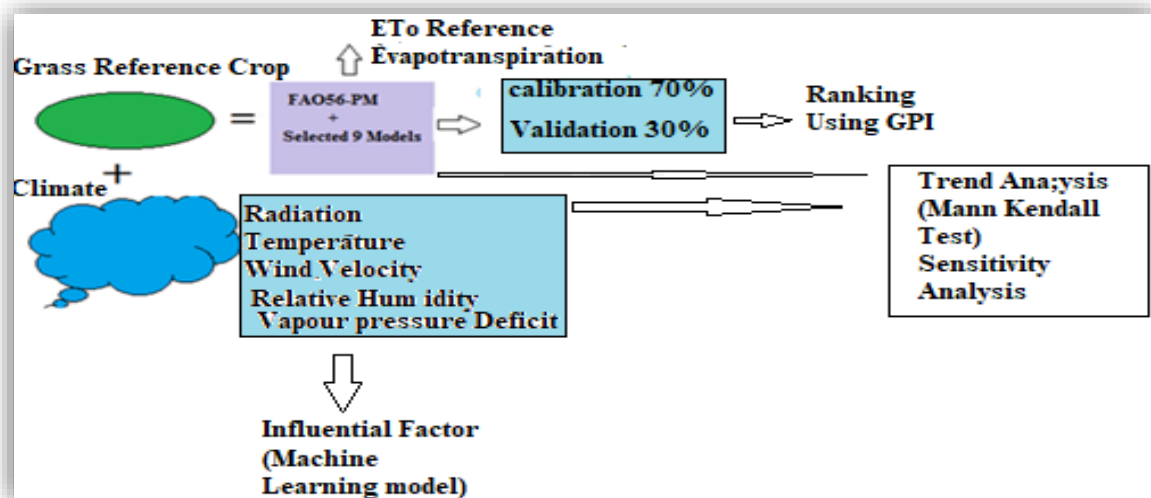


Figure 1: Graphical Interpretation