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**THE MODELLING OF POTENTIAL EVAPOTRANSPIRATION BASED ON CLIMATE DATA USING EMPIRICAL AND HEURISTIC METHODS****Abstract:**

The aim of this paper titled “The Modelling of Potential Evapotranspiration Based on Climate Data Using Empirical and Heuristic Methods” is to estimate the potential evapotranspiration in the Ergene Basin, Turkey. Accurately observing the amount of total evapotranspiration in any given region usually is a perilous task given the fact that setups to directly observe evapotranspiration are costly build and highly effort-inducing to operate. Therefore, calculating the potential evapotranspiration of a region by using the FAO-56 Penman-Monteith formula instead of observing directly is preferred. However, FAO-56 PM formula requires a lot of different data sets, which may not be accessible in various regions, to effectively utilize. For this reason, scientists have been researching different methods to calculate potential evapotranspiration without the need for numerous climate data sets. In this paper, in the first step, reference evapotranspiration was calculated using the FAO-56 PM empirical formula. In the second step, potential evapotranspiration was calculated using the Blaney-Criddle empirical formula. In the third step, climate data including  $R_s$ ,  $E$ ,  $T_{max}$ ,  $T_{ort}$ ,  $T_{min}$ , and  $Sh$  were used to calculate potential evapotranspiration using the MARS and GMDH heuristic methods. Among these methods, the GMDH method combining  $R_s$ ,  $E$ ,  $T_{max}$ ,  $T_{ort}$ ,  $T_{min}$ , and  $Sh$  yielded the best performance with performance criteria of  $R^2= 0.9846$ ,  $MSE=49.07$ ,  $MAE=5.56$ , and  $AARE=7.23$  compared to the reference evapotranspiration.

**Keywords:**

Evapotranspiration, FAO-56, Blaney-Criddle, Heuristic Methods, Ergene Basin

**JEL Classification:** C51, C52