

ESTIMATING POTENTIAL EVAPOTRANSPIRATION AND ITS SPATIAL DISTRIBUTION IN GREECE USING EMPIRICAL METHODS

**PAPADOPOULOU E., VARANOU E., BALTAS E.,
DASSAKLIS A. and MIMIKOU M.**

National Technical University of Athens, Faculty of Civil Engineering,
Department of Water Resources, Hydraulic and Maritime Engineering

EXTENDED ABSTRACT

This paper studies the potential evapotranspiration and its spatial distribution for the 10 out of the 14 water districts of Greece. The estimation of potential evapotranspiration is achieved by adopting empirical approaches, such as the Thornthwaite equation, the Blaney-Criddle formula and the Hargreaves method, all having as a requirement the availability of temperature data. The data set is made up of temperature time series, obtained from 137 gauging stations operated by the Ministry of Environment, Planning and Public Works, the Ministry of Agriculture, the National Meteorological Service, the Public Power Corporation and the National Observatory of Athens. The raw data are analysed and processed on a monthly time step. The Thornthwaite equation and the Blaney-Criddle formula are applied to the 10 out of the 14 water districts of the country, while the Hargreaves method is applied in the water district of Western Macedonia. The potential evapotranspiration estimated for each station using the above-mentioned methods is spatially integrated, in order to obtain the areal potential evapotranspiration. The methods adopted for the spatial integration of the point estimates are the Kriging method, the method of Inverse Distance Weighting, the Spline method and the Thiessen method, using applications in a Geographic Information System (GIS) with a spatial resolution of 200x200m². It was found that for the Thornthwaite and Blaney-Criddle methods, potential evapotranspiration is slightly larger in the eastern part of the country. Furthermore, the Thornthwaite method produced smaller values (ranging from 10 to 20%), compared to the Blaney-Criddle method. Finally, the Hargreaves method that was applied only in the water district of western Macedonia, overestimates potential evapotranspiration by approximately 30% and 12%, compared to the potential evapotranspiration estimated by the Thornthwaite and Blaney-Criddle methods respectively.

Key words: Potential evapotranspiration, Thornthwaite method, Blaney-Criddle method, Hargreaves method, Geographic Information Systems, spatial integration