



“Gheorghe Asachi” Technical University of Iasi, Romania



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## TEMPORAL ANALYSIS OF TREND USING NON-PARAMETRIC APPROACHES FOR REFERENCE EVAPOTRANSPIRATION IN TARAI REGIONS OF UTTARAKHAND, INDIA

Atish Sagar<sup>1\*</sup>, Pramit Pandit<sup>2</sup>, Yogesh Kumar<sup>3</sup>, Bikramjeet Ghose<sup>4</sup>

<sup>1</sup>Department of Agricultural Engineering, Rabindranath Tagore Agriculture College, Deoghar-814157, India

<sup>2</sup>Department of Agricultural Statistics & Computer Application,  
Rabindranath Tagore Agriculture College, Deoghar-814157, India

<sup>3</sup>Department of Soil and Water Conservation Engineering, GBPUAT, Pantnagar -363149, India

<sup>4</sup>Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur-741252, India

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### Abstract

Evapotranspiration (ET) is an important component of the hydrological cycle, transferring water from the ground surface to the atmosphere via evaporation and plant transpiration. Recent research has used long-term climate data sets, such as the Global Land Data Assimilation System (GLDAS) or the Climate Research Unit Time Series (CRUTS), to study ET trends and patterns. This study examined trends in evapotranspiration data from 1991 to 2016 using a nonparametric Mann-Kendall test for the *tarai* region of Uttarakhand, INDIA. The results showed distinct differences in evapotranspiration trends. A decreasing trend in January and an increasing trend in August has been observed in the FAO-PM method. Temporally, the magnitude of the trend varied from -0.584 mm/year to 0.566 mm/year. The Penman method revealed a decreasing trend in October, the magnitude of the trend varied from -0.411 mm/year to 0.177 mm/year, followed by November, January, and December whereas, decreasing trends in July and December were observed with Hargreaves. Sen's trend analysis was used to determine the magnitude of trends in various methods for estimating ET. The FAO-PM method had the highest trend magnitude, while Penman, Priestly, Hargreaves, and radiation methods had the lowest. Monthly trend analysis was also performed using the ITA method, which successfully detected non-monotonic trends in January and June. Most data points fell below the 1:1 line, indicating a downward trend. Characteristic patterns in different evapotranspiration categories were distinct in each month, with a steady decrease trend in October and a decreasing trend in March.

*Key words:* innovative trend analysis, mann-kendall test, reference evapotranspiration, sen's slope, tarai region

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\* Author to whom all correspondence should be addressed: e-mail: atish.iari@gmail.com