ABSTRACT

Kenya has had five failed rain seasons for the last three years. In this context, there was a mass recurrent crop failure, death of livestock and wildlife, persistent water scarcity, and droughts of varying intensities. There have been a lot of challenges in assessing climate change and variability impacts in Kenya due to limited data sources. Further, assessing the local and regional effects on the hydrological cycle, food security, and available water resources remains a great regional threat. Reference evapotranspiration, is the evaporative power climatic parameter of the atmosphere, vital for water budgets on the land surface. The study's main goal was to analyze hourly reference evapotranspiration, from two climatic regions using single levels ERA5 hourly dataset from 2000 to 2022. The dataset was sought from three stations from, arid, and semi-arid savannah tropical conditions regions (Voi Garissa, and Mombasa) with elevations between 57 m to 579 m, and three (Trans-Nzoia, Nyeri, and Embu) sought from humid Kenya highlands (>1350 m). Reference Evapotranspiration was calculated using Penman-Monteith (FAO56), the standard methodology developed by Food and Agriculture Organization. Results from 5 years (2018 to 2022) in Taita-Taveta County indicated that ranged from 0.17±0.2 mm/hour in 2020 to 0.22±0.2 mm/hour in 2022. Daily averages were 4.17±1.2 mm./day to 5.2±1.1 mm/day in 2020 and 2022 respectively. The mean monthly and was highest in March with an estimated value of 159.7±53.7 mm/month while the lowest was 120±15 mm/month in December. This is because March falls at the onset of the long rainy season in Kenya where precipitation is high while December is the last month of the short rainy season when precipitation reduces significantly. These results are vital because they enhance comparisons of the spatial climatological patterns and variability of seasonal precipitation about the evaporative power and demand variation across regions. Further, it will necessitate investigations of uncertainties from the datasets for better decision-making after comparisons with analysis from field meteorological datasets and soil moisture data measurements currently being carried out in Kenya. Further comparison of the results with reference evapotranspiration from the original station and the Global Land Evaporation Amsterdam Model dataset will also be investigated.