

Long term climate variability, trend and drought occurrence: the case of Loka Abaya, Ethiopia

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ABSTRACT: This study investigates the variability and trends in rainfall and temperature, as well as drought patterns in the Loka Abaya district of Ethiopia, over a 42-year period (1981–2022). The Coefficient of Variation (CV), Mann-Kendall trend test, and Standardized Precipitation Evapotranspiration Index (SPEI) were employed to examine variability, trends, and drought occurrences, respectively. Results indicate that the annual rainfall exhibited low variability (CV: 17.54%), while seasonal rainfall showed higher variability: Belg (spring) at 28.3%, Kiremt (summer) at 26.6%, and Bega (dry season) at 37.8%. Although the annual rainfall trend declined over time, it was not statistically significant ($p > 0.05$). Seasonal trends revealed a significant decrease in Belg rainfall, whereas Kiremt rainfall increased slightly but without statistical significance. The annual minimum and maximum temperatures showed an increasing trend, with the minimum temperature increase being statistically significant. The minimum temperatures during the Kiremt and Belg seasons also showed significant increases, whereas the maximum temperatures did not significant trend. Drought occurrences were assessed using the SPEI at 3-month and 12-month time scales. Severe to extremely severe droughts were identified in the years 1984, 1986, 1987, 1993, 2002, 2004, 2009, 2012, 2015, 2016, and 2022. These findings highlight the increasing frequency and intensity of droughts, as well as significant temperature increases and variability in rainfall patterns. The insights provide critical guidance for policymakers and stakeholders to develop effective adaptation and mitigation strategies, enhancing resilience to climate variability and its associated risks in the region.

KEYWORDS: rainfall, temperature, Mann-Kendall test, coefficient of variation, anomalies.

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