

## Use of various drought indices to analysis drought characteristics under climate change in the Doam watershed

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### Abstract

Drought and flooding have historically coexisted in Korea, occurring at different times and with varying cycles and trends. The drought indicators measured were (PDSI), (SPI), and (SPEI) in order to statistically analyze the annual or periodic drought occurrence and objectively evaluate statistical characteristics such as the periodicity, tendency, and frequency of occurrence of droughts in the Doam watershed. To compute potential evapotranspiration (PET), both Thornthwaite (Thor) and Penman-Monteith (PM) parameterizations were considered, and the differences between the two PET estimators were analyzed. Hence, SPIs 3 and SPIs 6 revealed a tendency to worsen drought in the spring and winter and a tendency to alleviate drought in the summer in the study area. The seasonal variability trend did not occur in the SPIs 12 and PDSI, as it did in the drought index over a short period. As a result of the drought trend study, the drought from winter to spring gets more severe, in addition to the duration of the drought, although the periodicity of the recurrence of the drought ranged from 3 years to 6 years at the longest, indicating that SPIs 3 showed a brief time of around 1 year. SPIs 6 and SPIs 12 had a term of 4 to 6 years, and PDSI had a period of roughly 6 years. Based on the indicators of the PDSI, SPI, and SPEI, the drought severity increases under climate change conditions with the decrease in precipitation and increased water demand as a consequence of the temperature increase.

Therefore, our findings show that national and practical measures are needed for both winter and spring droughts, which happen every year, as well as large-scale and extreme droughts, which happen every six years.

**Keywords :** Drought severity, Extreme events, Standardized Precipitation Index (SPI), and Palmer Drought Severity Index (PDSI), Potential evapotranspiration (PET).

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