

Comparison of EDI with SPI as a globally unified drought

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Abstract

In this paper, progressive methods for assessing drought severity from diverse points of view were conceived. To select a fundamental drought index, the performances of the Effective Drought Index (EDI) and 1-, 3-, 6-, 9-, 12-, and 24-month Standardized Precipitation Indices (SPIs) were compared for drought monitoring data accumulated over 200-year period from 1807 to 2006 for Seoul, Korea. The results confirmed that the EDI was more efficient than the SPIs in assessing both short and long-term droughts. We then proposed the following methods for modifying and supplementing the EDI: (1) CEDI, a corrected EDI that considers the rapid runoff of water resources after heavy rainfall; (2) AEDI, an accumulated EDI that considers the drought severity and duration of individual drought events; and (3) YAEDI, a year-accumulated negative EDI representing annual drought severity. In addition to these indices, to more accurately measure and diagnose droughts, we proposed the utilization of (4) the Available Water Resources Index (AWRI), an existing index that expresses the actual amount of available water. Using the improved methods above, we assessed and summarized important droughts that have occurred in Seoul over the 200 years from 1807 to 2006.

Keywords: Effective Drought Index (EDI), Standardized Precipitation Index (SPI), Quantification of drought severity, Drought after heavy rain, Drought climatology