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Development of a multiple drought index using a dynamic naive Bayesian classifier

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Because of increased impacts of drought on people and society and greater awareness of the disaster risk reduction such as prevention, mitigation and preparedness, drought planning and policies processes have been developed during the last two decades. The most important component of drought plan is to identify a drought event, because based on the identification of drought decision makers can determine appropriate response measures in practice. In this study, we developed a multiple drought index that can be used to identify a drought event for drought planning. This study employed the dynamic Naïve Bayesian Classifier (DNBC), which is an extension of the Hidden Markov Model (HMM), to classify drought severity for integrated drought assessment by using various drought indices: Standardized Precipitation Index (SPI), Streamflow Drought Index (SDI), Evaporative Stress Index (ESI) and Water Supply Capacity Index (WSCI). The DNBC was calculated for the sub-basins of the Han River basin. To provide unified criterion based on four drought indices, comparative analysis was performed considering actual drought damage reported by news medias and public reports. The overall results indicated that the SPI, SDI, ESI, and DNBC have the hit rates of 0.42, 0.40, 0.49, and 0.55, respectively, as the accuracy for drought identification.