



Probabilistic Assessment of Drought Using Hidden Markov Model in Han River Basin

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Although many studies have been proposed through various drought indices continually, most of the studies use a pre-defined threshold for assessing drought, ignoring the inherent uncertainties. In this study, to consider inherent characteristics, probabilistic assessment of drought using Hidden Markov Model (HMM) based drought index (HMDI) is proposed instead of using pre-defined threshold. Since upstream is more easier to analyze a drought independently, we choose Pyeongchang and Namhan river basin for case studies, which are located on the most upstream in Han river basin. Drought is analyzed based on the averaged monthly streamflow data for the record length 1966-2009, provided by Water Management Information System (WAMIS). To consider monthly characteristics, 3, 6 and 12 months at the cumulative HMM are applied. For verifying the method, this study compares the HMM by using estimated posterior probability of each hidden state (HMDI) and Standardized Streamflow Index (SSI) which is one of using a pre-defined drought index. When using existing drought index SSI, only one value can be used as a criterion to determine the drought. However, the HMDI can classify the drought condition using inherent characteristics in the data unlike pre-defined threshold and showed probability of each drought condition at a particular point in time. In addition, through the comparison of actual drought events near the basin, the HMDI showed more similar to the actual drought result and better hydrological persistence.