

## Analysis and Quantification of Historical Drought for Basin Wide Drought Preparedness

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**Abstract :** Drought is a recurrent climatic feature that occurs in virtually every climatic zone around the world. Korea experiences the drought almost every year at the regional scale mainly during in the winter and spring seasons. Moreover, extremely severe droughts at a national scale also occurred at a frequency of six to seven years. Various drought indices had developed as tools to quantitatively monitor different types of droughts and are utilized in the field of drought analysis. Since drought is closely related with climatological and topographic characteristics of the drought prone areas, the basins where droughts are frequently occurred need separate drought preparedness and contingency plans. In this study, an analysis using statistical methods was carried out for the historical droughts occurred in the five major river basins in Korea so that drought characteristics can be quantitatively investigated. It was also aimed to provide information with which differentiated and customized drought preparedness plans can be established based on the basin level analysis results. Conventional methods which quantifies drought execute an evaluation by applying a various drought indices. However, the evaluation results for same drought event are different according to different analysis technique. Especially, evaluation of drought event differs depend on how we view the severity or duration of drought in the evaluation process. Therefore, it was intended to draw a drought history for the most severely affected five major river basins of Korea by investigating a magnitude of drought that can simultaneously consider severity, duration, and the damaged areas by applying drought run theory with the use of SPI (Standardized Precipitation Index) that can efficiently quantifies meteorological drought. Further, quantitative analysis for the historical extreme drought at various viewpoints such as average severity, duration, and magnitude of drought was attempted. At the same time, it was intended to quantitatively analyze the historical drought events by estimating the return period by derived SDF (severity-duration-frequency) curve for the five major river basins through parametric regional drought frequency analysis. Analysis results showed that the extremely severe drought years were in the years of 1962, 1988, 1994, and 2014 in the Han River basin. While, the extreme droughts were occurred in 1982 and 1988 in the Nakdong river basin, 1994 in the Geumg basin, 1988 and 1994 in Youngsan river basin, 1988, 1994, 1995, and 2000 in the Seomjin river basin. While, the extremely severe drought years at national level in the Korean Peninsula were occurred in 1988 and 1994. The most damaged drought were in 1981~1982 and 1994~1995 which lasted for longer than two years. The return period of the most severe drought at each river basin was turned out to be at a frequency of 50~100 years.

**Keywords :** drought magnitude, regional frequency analysis, SPI, SDF(severity-duration-frequency) curve

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