Trend and Probable Change Point in the Hydrologic Regime of Seomjin River, South Korea (1997-2020)

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(a) Purpose of study or research hypothesis

Water resource management and long-term hydrological risk management are needed to secure sustainable water resources and minimize damage caused by water disasters.

(b) Key issue(s) or problem(s) addressed

The Seomjin River is an agriculture-based river basin and thus vulnerable to drought/flood. It has strong flow variability, which can increase the likelihood of severe drought/flood occurrences, and a compounding impact with climate change would cause the abrupt transition from drought to flood or from flood to drought in the future.

(c) Methodology or approach used

In this study, we conducted the Mann-Kendall (MK) trend test and the Pettitt (PTT) test, using daily streamflow data (max:1997-2020) from 56 gage stations with streamflow records more than 10 years. Before the MK and PTT tests, we investigated the monthly ratio of daily missing values observations during the study period for uncertainties caused by missing values. First, we computed the monthly average using the daily streamflow records with no missing data and then computed annual average streamflow values from the monthly averages.

(d) Results or conclusions derived from the project

During the study period, 28 stations with no missing values were selected for MK and PTT tests. In the case of annual trend analysis, statistically significant trends (confidence level > 99%) were detected at 8 out of 28 stations (28.5%). Of these, three stations showed an increasing trend (10%) and five stations (18%) showed a decreasing trend. Over the seven stations, statistically significant fluctuation points were also detected, and the years in which the fluctuation points were searched were found in 2011 (four stations) and 2012 (three stations). In the seasonal trend analysis, statistical trends (confidence level > 99%) were detected at 11 stations in spring (March–May), 11 in summer (June–August), 9 in autumn (September–November), and 11 in winter (December–February), indicating that each season is contributed equally to the detected annual trends. In addition, the change points were detected in 17 stations in spring, 7 in summer, 18 in autumn, and 18 in winter, and the probable change year was station-dependent.

e) Implications of the project relevant to congress themes

To better understand the causes (climate/ anthropogenic factors) of these streamflow trends and change points, it is necessary to further study associations with precipitation. Understanding the hydroclimatology of Seomjin River will help increase the community's resilience to drought and/or

flood in the Seomjin River.

Keywords : Seomjin River, Streamflow, Non-parametric test, Mann-Kendall trend test, Pettitt test