Prediction of Climate Change Impacts on Streamflow of Daecheong Lake Area in South Korea

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Abstract

According to the IPCC analysis, severe climate changes are projected to occur in Korea as the temperature is expected to rise by 3.2 ℃, the precipitation by 15.6% and the sea level by 27cm by 2050. It is predicted that the occurrence of abnormal climate phenomena - especially those such as increase of concentrated precipitation and extreme heat in the summer season and severe drought in the winter season - that have happened in Korea in the past 30 years (1981-2010) will continuously be intensified and accelerated. As a result, the impact on and vulnerability of the water management sector is expected to be exacerbated. This research aims to predict the climate change impacts on streamflow of Daecheong Lake area of Geum River in South Korea during the summer and winter seasons, which show extreme meteorological events, and ultimately develop an integrated policy model in response.

We projected and compared the streamflow changes of Daecheong Lake area of Geum River in South Korea in the near future period (2020-2040) and the far future period (2041-2060) with the reference period (1991-2010) using the HEC-HMS model.

The data from a global climate model HadGEM2-AO, which is the fully-coupled atmosphere-ocean version of the Hadley Centre Global Environment Model 2, and RCP scenarios (RCP4.5 and RCP8.5) were used as inputs for the HEC-HMS model to identify the river basins where cases of extreme flooding or drought are likely to occur in the near and far future. The projections were made for the summer season (July-September) and the winter season(November-January) in order to reflect the summer monsoon and the dry winter. The results are anticipated to be used by policy makers for preparation of adaptation plans to secure water resources in the nation.

Keywords : HEC-HMS, Climate Change, Streamflow, Rainfall-runoff

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