

Assessment of future climate change impact on non-point source pollution loads of a small rural watershed using QuickBird high resolution satellite imagery

MI-SEON LEE¹, GEUN-AE PARK², MIN-JI PARK², JONG-YOON PARK² & SEONG-JOON KIM²

¹ *Dept of Rural Engineering, Konkuk University, 1 Hwayang-dong, Gwangjin-gu, 143-701 Seoul, South Korea*
misun03@konkuk.ac.kr

² *Dept of Civil & Environmental System Engineering, Konkuk University, 1 Hwayang-dong, Gwangjin-gu, 143-701 Seoul, South Korea*

Abstract This study is to assess the impact on runoff and non-point source pollution of a small rural watershed of future climate change scenarios using Soil and Water Assessment Tool (SWAT) model. The NIES (National Institute for Environmental Studies) MIROC3.2 high-resolution climate data by SRES (Special Report on Emissions Scenarios) A1B and B1 scenarios of the IPCC (Intergovernmental Panel on Climate Change) were adopted, and the data was downscaled by Change Factor method through bias-correction using 30 years (1977–2006) of weather data for three meteorological stations. As a model set-up, the model was calibrated for two years (1999–2000) using daily streamflow and monthly water quality (SS, T-N and T-P) data, and validated for another two years (2001–2002) based on Landsat land use of a 255.4 km² watershed. The future assessment was accomplished by preparing QuickBird land use data for a 1.21 km² sub-watershed located in the upstream watershed. The future impact on the runoff and non-point source pollution by the climate change was analysed from the simulated results of SWAT for the 2020s (2010–2039), 2050s (2040–2069) and 2080s (2069–2099). The future predicted annual streamflow decreased with a change of –16.5 % (2020s), –9.4 % (2050s) and –13.8 % (2080s) comparing with 2002 streamflow as a base year. For the future water quality, the future sediment load increased depending on surface runoff change in spring and summer seasons.

Key words high resolution satellite image; non-point source; SWAT; future climate change; GCM; downscaling