Climate change impact assessment of sub-alpine vegetation in national park using CMIP5 GCMs

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In South Korea, national parks occupy the largest area among the protected areas designated to protect biodiversity and ecosystem. Among the 17 mountainous national parks, the vegetation in alpine and sub-alpine regions are very vulnerable to climate change. The objective of this study is to estimate the impact of climate change on sub-alpine vegetation considering uncertainties of future climate and the species distribution method. Observation data were gridded to 3 km spatial resolution from 1981 to 2010 using the Improved GIS-based Registry Model (IDW-IGISRM) based on the Inverse distance weighting (IDW). To reduce future uncertainty of climate change, future climate scenarios of RCP 4.5 and RCP 8.5 of CMIP5 GCM were utilized. In order to increase the spatial resolution of the GCM, Simple Quantile Mapping, one of the various bias correction and downscaling techniques, was applied. Bioclim DB, a bioclimatic variable considering temperature and moisture conditions, was established using monthly maximum temperature, minimum temperature and precipitation data among detailed GCM data. Impact assessment was held using Biomod2 of R package, for endangered sub-alpine vegetation in the National Forest Inventory (NFI). Verification of the species distribution models were carried out using AUC (Area Under the Curve) and TSS (True Skill Statistics). The result of this study is expected to be utilized for protected area management measures for biodiversity conservation in forests.

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