Analyzing the Effects of Environmental Factors on the Site Index of Hinoki Cypress (*Chamaecyparis obtusa*) and Sugi (*Cryptomeria japonica*) Manmade Coniferous Forest Stands in the Shikoku National Forest using GIS

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Site index is used for assessing site quality in forest management and have become important for estimating forest carbon stock and absorption in these days. The objective of this study was to analyze the effects of environmental factors (temperature, precipitation, soil type, and rock type) on the site index of Hinoki cypress (*Chamaecyparis obtusa*) and Sugi (*Cryptomeria japonica*) manmade coniferous forest stands in the Shikoku National Forest using GIS.

Data from 1400 field plots of Hinoki cypress and Sugi in the Shikoku National Forest were used. The site index data of each plot were calculated using the guide curve in the existing empirical yield table of the Shikoku National Forest Regional Office. The index age of site index is 40 years in Japan and the site index data were extracted from 30 to 60 years, around the index age. The number of extracted plots was 236 for Sugi, and 297 for Hinoki cypress. The 3rd mesh data or various types of digital cartographic information in 1 km square mesh are provided by the Geographical Survey Institute of Japan and annual mean temperature, annual total precipitation, monthly mean temperature, monthly total precipitation, soil type and rock type of the 3rd mesh data were used as the environmental factors in GIS. Regression analysis was used to analyze the effects of temperature and precipitation on the site index. One-way ANOVA and multiple comparisons were used to analyze the effects of the soil and rock types on the site index.

The annual mean temperature and the monthly mean temperature from January to December had a positive relationship with the site index data of the Hinoki cypress and the Sugi. The annual total precipitation and the monthly total precipitation from February to November had a positive relationship with the site index data of the Sugi, while the parameters of precipitation had no effect on the site index data of the Hinoki cypress. With regard to the effect of the rock types on the Hinoki cypress and the Sugi site index, there were significant differences of variance across all groups. Using multiple comparisons, the groups were separated into two classes in the Sugi and into three classes in the Hinoki cypress. On the other hand, with regard to the effect of soil types on the Hinoki cypress and the Sugi site index, there were not significant differences of variance across all groups.