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CHARACTERISING FOREST SUCCESSION STAGE AND BIRD COMMUNITY WITH ANALYSIS OF LIDAR-BASED FOREST STRUCTURE

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ABSTRACT:

Succession, also called ecosystem development, is one of the important theories to understand ecological processes. Since Odum (1969) suggested the strategy of ecosystem to reach maximum protection against disturbance, the concept of the maximum entropy production principle (MEPP) has been developed based on the second law of thermodynamics. According to this principle, biomass, entropy generated by system, complexity, and heterogeneity increase with ecosystem development. We examined the association of forest structure with the ecosystem development in temperate forests with the following questions: (I) Does structural complexity increase in forest with age? (II) What effects does the structural complexity have on a bird community? We characterized nine forest types of temperate forests in South Korea with dominant tree species such as *Quercus spp., Pinus spp., and Larix spp.* by using countrywide sampled airborne LiDAR data. We categorized nine forest types according to species composition (broad-leaved, coniferous, mixed forests) and forest successional stage (young, mature, and old forests). The results showed that the variables related to vertical structural complexity such as height variance, skewness, and diversity were the most significant to classify successional stages and increased with aging. The bird species diversity inclined with increasing horizontal structural complexity such as deviations of vegetation height and density within plot rather than vertical structural complexity. Moreover, the vertical and horizontal structural complexity had stronger effects on the bird community composition than bird species diversity. We conclude that forest structure becomes more complex together with ecosystem development and the structural complexity strongly affects bird species composition.

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