Analysis of the Relative Importance of Stand Structure and Site Conditions for the Productivity, Species Diversity, and Carbon Sequestration of *Cunninghamia lanceolata* and *Phoebe bournei* Mixed Forest

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Abstract: Forest stand structure (the characteristics and interrelationships of live trees) and site conditions (the physical and environmental characteristics of a specific location) have been linked to forest regeneration, nutrient cycling, wildlife habitat, and climate regulation. While the effects of stand structure (i.e. spatial and non-spatial) and site conditions on the single function of *Cunninghamia lanceolata* and *Phoebe bournei* (*CLPB*) mixed forest have been studied in previous studies, the relative importance of stand structure and site conditions in terms of productivity, species diversity, and carbon sequestration remains unresolved. In this study, a structural equation model (SEM) was adopted to analyze the relative importance of stand structure and site conditions for the forest productivity, species diversity, and carbon sequestration of *CLPB* mixed forest in Jindong Forestry in Hunan Province. Our research demonstrates that site conditions have a greater influence on forest functions than stand structure, and that non-spatial structures have a greater overall impact on forest functions than spatial structures. Specifically, the intensity of the influence of site conditions and non-spatial structure on functions, in descending order, is productivity, carbon sequestration, and species diversity. In contrast, the intensity of the influence of spatial structure on functions, in descending order, is carbon sequestration, species diversity, and productivity. These findings provide valuable insights for the management of *CLPB* mixed forest in Jindong Forestry and have significant reference value for the close-to-natural forest management (CTNFM) of pure *Cunninghamia lanceolata* forests.

Keywords: stand structure; site conditions; forest functions; structural equation model; *Cunninghamia lanceolata*; *Phoebe bournei*