

Table S2 Calculation formula and description of stand structural diversity parameters

	Parameter	Abbreviation	Calculation formula	Description
Non-spatial structure diversity	Coefficient of variation	$CV$	$CV_{DBH} = \frac{SD_{DBH}}{\overline{DBH}}$	$SD_{DBH}$ represents the standard deviation of DBH; $\overline{DBH}$ denotes the average diameter of the trees in the sample plot. A higher CV indicates a greater degree of tree size differentiation within the stand.
	Skewness of distribution	$SK$	$SK = \frac{\sum_{i=1}^n (DBH_i - \overline{DBH})^3}{(n-1)SD_{DBH}^3}$	$n$ represents the number of trees in the sample plot, and DBH stands for diameter at breast height. $\overline{DBH}$ is the average diameter of the trees in the sample plot. A higher absolute value of SK indicates a greater degree of size differentiation within the forest.
	Gini coefficient	$GC$	$GC = \frac{\sum_{i=1}^n (2i - n - 1)BA_i}{\sum_{i=1}^n BA_i(n-1)}$	$BA_i$ represents the basal area of a single tree. A $GC$ value of 0 indicates an even distribution of tree sizes. The larger the GC, the more uneven the size or growth between trees. The higher the $GC$ , the more uneven the size or growth between trees.
	Shannon-Weiner index	$H$	$H' = -\sum (P_i \ln P_i)$	The diameter intervals are set at 5 cm, with DBH ranging from 5 to 65 cm. $P_i$ represents the total number of trees at each diameter level. $H'$ is used to analyze tree size diversity.
Spatial structure diversity	Dominance	$U$	$U_i = \frac{1}{n} \sum_{j=1}^n K_{ij}$	If the $j^{th}$ neighboring tree is larger than the $i^{th}$ reference tree, $K_{ij} = 1$ , otherwise $K_{ij} = 0$ . $DO$ describes the relative size of adjacent trees within a community structure unit. Four nearest neighboring trees and a reference tree were selected to form the spatial structure unit (as follows).
	Uniform angle index	$W$	$W_i = \frac{1}{n} \sum_{j=1}^n Z_{ij}$	The $W$ represents the angle between neighbors. If $a < a_0$ , $Z_{ij} = 1$ ; otherwise, $Z_{ij} = 0$ . The $W$ index indicates the spatial dispersion of the four nearest neighbors around the reference tree. Higher values indicate a transition from regular to random to clumped spatial patterns patterns.
	Stand Mingling	$M$	$M_i = \frac{1}{n} \sum_{j=1}^n V_{ij}$	If the $j^{th}$ neighboring tree is not of the same species as the $i^{th}$ reference tree, $V_{ij} = 1$ , otherwise, $V_{ij} = 0$ . A higher value indicates greater species diversity within the structural unit.
	Crowding index	$C$	$C_i = \frac{1}{n} \sum_{j=1}^n Y_{ij}$	If the $j^{th}$ neighboring tree's crown is connected to the $i^{th}$ reference tree's crown, $Y_{ij}=1$ , otherwise, $Y_{ij}=0$ . A higher value indicates greater tree density.