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Estimating Carbon Sequestration Potential of Forest and Its Influencing Factors at Fine Spatial-Scales: A Case Study of Lushan City in Southern China

编号	030036905
推送时间	20221114
研究领域	森林经理
年份	2022
类型	期刊
语种	英语
标题	Estimating Carbon Sequestration Potential of Forest and Its Influencing Factors at Fine Spatial-Scales: A Case Study of Lushan City in Southern China
来源期刊	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH
期	第369期
发表时间	20220821
关键词	fine-scale biomass expansion factor tree growth equation carbon sequestration potential site characteristics ;
摘要	<p>Accurate prediction of forest carbon sequestration potential requires a comprehensive understanding of tree growth relationships. However, the studies for estimating carbon sequestration potential concerning tree growth relationships at fine spatial-scales have been limited. In this paper, we assessed the current carbon stock and predicted sequestration potential of Lushan City, where a region has rich vegetation types in southern China, by introducing parameters of diameter at breast height (DBH) and tree height in the method of coupling biomass expansion factor (BEF) and tree growth equation. The partial least squares regression (PLSR) was used to explore the role of combined condition factors (e.g., site, stand, climate) on carbon sequestration potential. The results showed that (1) in 2019, the total carbon stock of trees in Lushan City was 9.22×10^5 t, and the overall spatial distribution exhibited a decreasing tendency from northwest to south-central, and the carbon density increased with elevation; (2) By 2070, the carbon density of forest in Lushan City will reach a relatively stable state, and the carbon stock will continue to rise to 2.15×10^6 t, which is 2.33 times of the current level, indicating that Lushan forest will continue to serve as a carbon sink for the next fifty years; (3) Excluding the effect of tree growth, regional forest carbon sequestration potential was significantly influenced on site characteristics, which achieved the highest Variable Importance in Projection (VIP) value (2.19) for slope direction. Our study provided a better understanding of the relationships between forest growth and carbon sequestration potential at fine spatial-scales. The results regarding the condition factors and how their combination characteristics affect the potential for carbon sequestration could provide crucial insights for Chinese carbon policy and global carbon neutrality goals.</p>
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