

辽西北半干旱地区森林的植被多样性及生态系统多样性服务经济价值分析

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摘要:【目的】探究半干旱气候区不同植被恢复类型的植被多样性及生态系统多样性服务经济价值差异, 并分析其驱动因素。【方法】对半干旱气候区四种典型的植被恢复类型(灌木林、针阔混交林、杨树-榆树混交林、杨树林)进行样地调查, 记录物种、胸径、树高、冠幅、水平结构、郁闭度、密度等信息, 同时在样地中采集土壤样品, 分析土壤三个深度(20cm、40cm、60cm)的含水量、容重及孔隙度。主林层和林下灌木层的多样性指标包括 Simpson 指数、Shannon-wiener 指数和 Pielou 均匀度指数。对多样性及多样性服务价值与林分信息进行相关性分析, 并通过逐步回归探究多样性的驱动因素。【结果】杨-榆混交林的主林层与林下灌木层多样性指数与生态系统多样性服务价值均为最高。林下生物多样性与土壤含水量、孔隙度、林分水平结构及冠幅呈显著正相关; 主林层 Simpson 指数、Shannon-wiener 指数与土壤含水量呈显著正相关, 与容重及树高呈显著负相关, Pielou 均匀度指数与郁闭度、密度呈显著负相关; 多样性服务价值与林分密度呈显著正相关。逐步回归结果表明, 林分的水平结构和冠幅对林下灌木层的多样性有正贡献; 20cm 深处土壤含水量对主林层的 Simpson 指数和 Pielou 均匀度指数有正贡献, 但树高和郁闭度对主林层多样性指标均存在负贡献; 林分密度对生态系统的多样性服务价值存在较小的正贡献。【结论】在半干旱地区, 拥有相对较高含水量及孔隙度的土壤有助于生物多样性的形成; 同时, 更为复杂的主林层林分水平结构对林下生物多样性的提高有促进作用, 适当增加林分密度能够间接提高生态系统多样性服务经济价值。

关键词: 植被恢复类型; 多样性; 多样性服务经济价值; 土壤

Analysis of Vegetation Diversity and Ecosystem Diversity Service Economic Value of Forests in Semi-arid Area of Northwest Liaoning Province

Abstract: 【Objective】 To explore the differences of vegetation diversity and ecosystem diversity service economic value among different vegetation restoration types in semi-arid climate region, and analyze their driving factors. 【Method】 Four typical vegetation restoration types (shrub forest, coniferous and broad-leaved mixed forest, poplar-elm mixed forest and Yang Shulin) in semi-arid climate area were investigated, and information such as species, DBH, tree height, crown width, horizontal structure, canopy density, etc. were recorded. At the same time, soil samples were collected in the sample plots, and three soil depths (20cm, 40cm and 60cm) were analyzed. The diversity indexes of main forest layer and understory shrub layer include Simpson index, Shannon-wiener index and Pielou evenness index. The correlation between diversity and its service value and stand information was analyzed, and the driving factors of diversity were explored through stepwise regression. 【Result】 The diversity index and ecosystem diversity service value of the main forest layer and understory shrub layer of poplar-elm mixed forest were the highest. The biodiversity under forest is positively correlated with soil water content, porosity, stand horizontal structure and crown width. Simpson index and Shannon-wiener index of main forest layer are positively correlated with soil water content, negatively correlated with bulk density and tree height, and Pielou evenness index is negatively correlated with canopy density and density. The service value of diversity is positively correlated with stand density. The results of stepwise regression showed that the horizontal structure and crown width of the stand had a positive contribution to the diversity of shrub layer under the forest. Soil water content in 20cm depth has positive contribution to Simpson index and Pielou evenness index of main forest layer, but tree height and canopy density have negative contribution to diversity index of main forest layer. Stand density has a small positive contribution to the diversity service value of ecosystem. 【Conclusion】 In semi-arid areas, soils with relatively high water content and porosity contribute to the formation of biodiversity. At the same time, the more complex horizontal structure of the main forest layer can promote the improvement of biodiversity under the forest, and increasing the density of the forest can indirectly improve the economic value of ecosystem diversity services.

Key words: vegetation restoration type; Diversity; Economic value of diversified services; soil