

应用指示种预测森林管理对物种多样性及群落组成的影响

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Application of indicator species in predicting forest management effect on forest species diversity and community composition.SU Xiu-jiang^{1,2}, LI Yuan-liang¹, SINGH AN³, YAN Shao-kui¹, ZHANG Dai-gui⁴, WANG Si-long¹

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摘要

采用指示种分析方法,研究了会同亚热带森林物种多样性和群落组成对森林管理的响应.从357个林下种中鉴定出显著性指示种94个,并构造新的指示种数据集,检验指示种数据集和源群落数据集之间的关联,评估指示种对林下植被管理效应的预测潜能.结果表明:指示种数据集和源群落数据集之间存在极显著的关联(Mantel $r=0.898$),指示种数据集很好地预测了生物多样性的变化(回归分析, $R^2>0.74$);指示种很好地预测了群落组成对森林管理的响应(ANOVA, $F>16.79$);非度量多尺度排序(NMDS)以及K-means聚类分析表明,对于不同森林管理的样地类型,指示种数据集的识别能力和源群落数据集是一致的.从物种多样性、群落组成以及在森林类型的识别上,指示种数据集和源群落数据集有一致性规律,作用几乎相同,因此森林评估可以利用指示种代替源群落预测森林管理效应,以减少森林全面调查的成本.

关键词: 指示种 群落组成 多样性 森林生态系统

Abstract:

By using indicator species analysis (ISA) method, this paper studied the feasibility of using indicator species to reflect the responses of species diversity and community composition of subtropical forests in Huitong of China to forest management. Ninety-four significant indicator species from 357 understory species were identified, and a new indicator species dataset (community level) was constructed to examine the association between indicator species dataset and original community dataset, and to evaluate the predictive potential of indicator species in reflecting forest management effect. There existed a strong association between the two datasets (Mantel $r=0.898$). The indicator species dataset could well predict the management effect on species diversity (regression analysis, $R^2>0.74$) and community composition (ANOVA, $F>16.79$). When the two datasets were applied to Nonmetric Multi-Dimensional Scaling (NMDS) ordination and K-mean cluster analysis, the indicator species dataset could well identify the forest types with different management treatments, as the original community dataset did. Also, the indicator species dataset nearly played the same role as the original community dataset in identifying the species diversity, community composition, and forest type. It was suggested that for saving costs in overall investigation of forest ecosystem, indicator species could be used as a surrogate of full community to predict forest management effect.

Key words: indicator species community composition diversity forest ecosystem

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