

性状多样性在优化自然保护区中的应用

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摘要:【目的】建立自然保护区被认为是在有限资源下应对生物多样性丧失最有效的途径之一,然而现有自然保护区存在分布不均、空间分配不能满足生物多样性保护等问题。识别植物多样性热点地区和保护差距在优化自然保护区中发挥了重要作用,使用不同种类的研究数据可以有效提高对热点地区和保护差距的识别能力。【方法】性状多样性是对生物某种或几种表型性状的多样性地理分布模式及其形成和发展的原因进行分析的功能生物地理学。其研究目的是探究生物性状的地理分布模式与物种多样性和生态系统之间的关系。花色与果色表型性状是植物通过与其他生物产生交互进而影响自身及后代生存和繁殖的主要性状。本研究使用花色和果色的性状多样性物种数据对陕西秦岭进行自然保护区优化,并使用特有物种、受威胁物种和保护物种这三种在过去优化自然保护区研究中常用的数据对其进行验证。【结果】通过对比现有自然保护区范围与四种数据确定的自然保护区范围($DH \cap EH \cap TH \cap PH$),发现陕西秦岭 14 个县区存在保护缺口,其中 5 个县区完全没有设立自然保护区。现有自然保护区面积只占四种数据确定自然保护区面积的 13.3%。TDS(性状多样性物种)识别保护缺口的面积占待优化自然保护区总面积的 87.4%,仅低于受威胁物种识别保护缺口的占比(95.8%)。【结论】陕西秦岭多样性保护存在空缺,宏观地使用植物功能性状数据有助于优化自然保护区空缺。

关键词: 性状; 分布格局; 多样性热点; 保护缺口; 自然保护区

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Enhancing Conservation Efforts in the Qinling Mountains through Traits Diversity Optimization

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Abstract: 【Objective】 Establishing conservation areas is considered one of the most effective approaches to counter biodiversity loss under limited resources. However, existing conservation areas suffer from issues such as uneven distribution and inadequate spatial allocation that fail to meet biodiversity protection needs. Identifying plant diversity hotspots and conservation gaps plays a crucial role in optimizing conservation areas. Utilizing different types of research data can significantly enhance the ability to identify hotspots and conservation gaps. 【Method】 Traits diversity(TD) is a functional biogeographic approach that analyzes the geographic distribution patterns and the formation and developmental causes of one or more phenotypic traits of organisms. The aim of TD research is to explore the relationship between the geographic distribution patterns of biological traits, species diversity, and ecosystems. Flower color and fruit color traits are key phenotypic traits through which plants interact with other organisms, thereby influencing the survival and reproduction of themselves and their offspring. This study utilizes phenotypic traits diversity species data of flower and fruit colors to optimize conservation areas in the Qinling

Mountains of Shaanxi. It also employs endemic species, threatened species, and protected species data—commonly used in past conservation area optimization studies—for validation. **【Result】** By comparing the existing conservation areas with those determined by the four types of data ($DH \cap EH \cap TH \cap PH$), it was found that there are conservation gaps in 14 counties in the Qinling Mountains of Shaanxi, with 5 counties having no established conservation areas at all. The area of existing conservation areas accounts for only 13.3% of the conservation area determined by the four types of data. The area of conservation gaps identified by PTDS constitutes 87.4% of the total area earmarked for optimization, slightly lower than the proportion identified by threatened species (95.8%).

【Conclusion】 There are gaps in biodiversity conservation in the Qinling Mountains of Shaanxi. Utilizing plant functional traits data on a macroscopic scale can help optimize these conservation gaps.

Key words: trait; distribution pattern; diversity hotspot; conservation gap; conservation area.