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基于不可替代性的青海省三江源地区保护区功能区划研究

Irreplaceability-based function zoning of nature reserves in the Three Rivers Headwater Region of Qinghai Province

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中文摘要:

具有代表性、灵活性、综合性的保护区功能区划指标是决定区域划分合理与否的关键因素。不可替代性是近年来引入生物多样性保护规划的新概念,表达一个规划单元在实现整体保护目标中的重要性,能够反映生物多样性保护价值的空间分异规律,将其与人类活动干扰指数结合,可以在划分不同值域与功能分区之间建立联系。在系统保护规划框架下,首先根据三江源生物多样性特征确定了研究区域的指示物种和优先保护生态系统,然后结合物种生境特性,利用地理信息系统(GIS)技术进行了指示物种潜在分布范围预测,最后借助生物多样性保护规划软件(C-Plan)计算了三江源地区不可替代性指数,结合人类活动干扰进行了功能区划分,并对比了现有功能区划与新功能区划的贡献率。研究结果表明,不可替代性较高区域与原核心区空间分布基本一致(包括东部中铁、军功、麦秀森林灌丛区;西部索加、曲麻莱湖泊湿地地区,高寒草甸区;北部扎陵湖、鄂陵湖、星星海湿地地区;及南部玉树、囊谦森林灌丛区,当曲沼泽湿地地区);在保护区总面积未增加条件下,基于不可替代性的新功能划较原功能区划的保护贡献率及保护效率有显著提高,核心区保护贡献率由61.20%增长到71.21%,新核心区+缓冲区总贡献率由77.57%增长到92.43%,保护区整体贡献率由91.20%增长到95.40%;从保护对象被保护情况看,新功能划与原功能区划均能完全涵盖所有保护对象,但新功能划所包含的满足保护目标的保护对象明显增多,原功能区核心区,核心区+缓冲区,核心区+缓冲区+实验区完全实现目标的保护对象分别占27.50%,47.50%和80.00%,新功能划分别为32.50%,77.50%和87.50%(新功能划下,只有苔草草甸、冰川雪山、湖泊3种生态系统类型和盘羊、黑颈鹤两个动物物种未达到保护目标)。讨论了该研究的意义、方法评价及现实问题,并提出三江源自然保护区功能区划调整建议:(1)结合实际情况,基于不可替代性和人类活动的功能区划对现功能区划进行适当调整以增加保护区的保护贡献率;(2)对于缓冲区中保护价值较高、人类活动干扰又较强的区域应进行严格的管理,制定完善的管理策略,避免因人类活动引起生物多样性丧失;(3)鉴于当地经济发展需求,可以考虑在研究确定的实验区及其外围开展水电站与矿产开发项目,但必须考虑开发项目对周围水域、植被及居民的影响。本研究可为三江源自然保护区功能区划的调整及资源开发提供参考,对三江源生物多样性的保护具有重要意义。

English Summary:

Representative, flexible and comprehensive indicators are key factors to determine whether the nature reserve function zoning is rational or not. Irreplaceability, which indicates the importance of each individual planning unit in achieving the entire conservation objectives and reflects the spatial distribution and variation pattern of biodiversity conservation values, is a concept recently introduced to biodiversity conservation planning. Combined with the index of human activity disturbance, irreplaceability can be segmented into different ranges to establish relationship with function zoning. Within the framework of systematic conservation planning, this study first identified indicator species and priority ecosystems according to the characteristic of biodiversity in Three Rivers Headwater Region. Then, potential habitat distribution areas of the identified indicator species were predicted using GIS based on the species habitat characters, and the irreplaceability values were calculated by using C-Plan software. Finally, the calculated irreplaceability values were combined with the human activity disturbance index to delineate the function zones by irreplaceability value range segmentation. Contribution of the new function zones and that of the original ones to biodiversity conservation was also compared. The results showed that the spatial distribution of the areas with high irreplaceability (including Zhongtie, Jungong and Maixiu in the east; lakes and alpine meadows in Suojia and Qumalai in the west; wetlands of Zhalinghu, Elinghu and Xingxinghai in the north; forest and shrub areas of Yushu, Nangqian and marsh of Dangqu area in the south) matched principally that of the the core zones of original ones. The percentage contribution of the new function zones improved much more than that of the original ones even with no increase in the area of the zones. With the new function zones, the percentage contribution of the core zone, the core zone + buffer zone, and the entire three zones increased from 61.20% to 71.21%, 77.57% to 92.43%, and 91.20% to 95.40%, respectively. In terms of protection status of the surrogates, both the new function zones and the original ones covered all the surrogates, but the new zones covered more surrogates than the original ones. Percentage of surrogates protected by the original core zone, core zone and buffer zone, and the entire three zones was 27.50%, 47.50% and 80.00%, respectively. However, the corresponding percentage of surrogates protected by the new zones was 32.50%, 77.50% and 87.50%, respectively. All the protected objects met the targets in the new function zones but three types of ecosystems including lakes, Carex meadow, glaciers and snow mountains, as well as two species of Argali sheep (*Ovis ammon*) and Black-necked Crane (*Crus nigricollis*). This paper discusses the implication of the study and potential application of the employed methodologies, and puts forward proposals to adjust function zoning of the Three Rivers Headwater Region in the near future. The proposals are as following: building new nature reserves or adjusting existing ones based on the results of this study and actual conditions in order to improve the contribution to protection; carrying out strict management of and developing comprehensive strategies for the areas with high irreplaceability values and high man-included disturbance in the buffer zones in order to avoid losing biodiversity caused by human activities; conducting reasonable exploitation of water power and mines in the experimental zones identified by this study with consideration of local economic development status and the impacts on surrounding water, vegetation and residents.

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