

研究论文

# 向海自然保护区丹顶鹤生境结构空间特征

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**摘要** 丹顶鹤为国家一级保护珍稀禽类, 是向海自然保护区重点保护对象, 在我国乃至世界范围的丹顶鹤保护中占有重要的地位。近年来, 由于自然条件和人类活动的干扰, 丹顶鹤的天然家园-沼泽湿地发生退化, 其生存受到威胁, 丹顶鹤的数量波动变化较大。为了有效地保护丹顶鹤有必要详细了解和掌握其生境结构的特征和变化特点, 以了解丹顶鹤的生境动态。在RS、GIS技术和统计分析方法的支持下, 运用景观生态学方法对向海自然保护区丹顶鹤生境空间结构特征从景观特征、生境斑块空间关系和生境破碎化3个方面进行分析。选择景观斑块面积、周长、斑块大小以及斑块密度等描述保护区景观格局基本特征。利用斑块的邻接边界长度和斑块间隙指数分析丹顶鹤生境——沼泽斑块的邻接关系和聚集程度, 数据表明沼泽斑块与人类活动频繁的耕地邻接较为紧密, 而自身的间隙指数自20世纪70年代以来有明显增大趋势。分析了由于自然原因和人为活动影响所造成的丹顶鹤生境斑块的破碎化程度。计算结果表明, 由于沼泽生境自身条件的限制, 研究区内物理性破碎化减少的生境面积为2039.6 hm<sup>2</sup>, 人为破碎化(居民地和道路)减少的生境面积为3845.1 hm<sup>2</sup>, 这样研究区内丹顶鹤适宜生境面积为13680.1 hm<sup>2</sup>, 可见人类活动对丹顶鹤生境影响很大。研究为保护区内丹顶鹤物种的保护和生境管理提供重要的科学依据。

**关键词** [生境结构](#); [空间特征分析](#); [丹顶鹤](#); [向海自然保护区](#); [遥感与地理信息系统](#)

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## The spatial structure analysis of the Red-crown Crane's habitat in Xianghai National Nature Reserve based on RS and GIS techniques

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**Abstract** Xianghai National Nature Reserve plays a key role in the protection of Red-crown crane (*Grus japonensis*), a worldwide endangered waterfowl species, which has been listed as one of rare birds by Chinese government. Recently, Red-crown crane's habitat is threatened by both natural factors and human activities. In order to quantitatively analyze the cause and effects of the red-crown crane's habitat change in Xianghai National Nature Reserve, the pattern dynamics of the habitat from 1976 to 2000 is calculated with the help of RS, GIS techniques and statistical methods. Three aspects of spatial landscape configurations of the study area are analyzed here. Firstly, a variety of landscape indices, such as proportional index of landscape components, diversity index and so on, are selected to describe the primary landscape dynamics of Xianghai National Nature Reserve at landscape level. The result shows that the landscape diversity in the study area is rich and no dominance occurs. Grassland occupies the largest area with a proportion of 23.48%, and marsh land lies in the second position with a proportion of 18.87%. The results also demonstrate that marsh land area has decreased largely since 1976a, by contraries, the area of arable land and salt-alkali land has increased greatly. Secondly, indices describing adjacent edge length and pa

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ch gap are used to express the spatial adjoining or neighboring relationship between the crane's habitat and other land use/cover categories, and the proximity characteristics among the habitat patches. The result tells us that the marsh habitats are mostly close to arable land and salt-alkali land. As salt-alkali land is often transferred from arable land, the adjoining relationship between marsh land and arable land and salt-alkali land is unfavorable for Red-crown crane to inhabit or breed in the marsh habitats. This also means that the Red-crown crane habitat is faced with severe human disturbance. Finally, the spatial fragmentation of the Red-crown crane habitat is analyzed. According to former studies, Red-crown cranes primarily choose reed marsh patches as their habitats. But being a suitable habitat, a reed marsh patch must possess of favorable landscape characteristics, e.g., the minimum reed marsh patch size ( $>30 \text{ hm}^2$ ), the least distance ( $<15 \text{ m}$ ) from the habitat patch to the closest water body. Human activities also put negative effects on the selection of a habitat, so that reed marsh patches within a distance of 1.5 km to residential area or roads are not considered as Red-crown crane habitat here. Thus there is only 13,680.1 ha of reed marshes suitable for red-crown crane inhabiting in the total 19,567.0 ha reed marshes while considering the above mentioned constraints to habitats.

**Key words** analysis \_ habitat structure \_ Red-crown crane \_ Xianghai National Nature Reserve \_ RS & \_ GIS

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