

研究论文

# 人类活动效应对物种多样性影响的动力模拟——以洪湖湿地生境毁坏对水鸟物种多样性的影响为例

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收稿日期 2004-12-15 修回日期 2005-5-29 网络版发布日期: 2006-2-25

**摘要** 提出了随时间变化的人类活动效应对物种多样性影响的多物种竞争非自治动力模式, 并以洪湖为例模拟了湿地水鸟物种多样性对人类活动效应(生境持续毁坏)的响应过程。模拟发现: 对于强-强物种, 生境的持续破坏使得湿地水鸟的物种多度大幅度减小, 并发生优势种群的更替; 对于弱-弱物种, 将导致大批的弱物种种群迅速灭绝, 而余下的弱物种种群将做准周期振荡; 尽管停止对湿地生境的持续毁坏, 仍会使一批弱物种种群继续走向灭绝, 并且使得原来最强的几个种群最终灭绝。物种灭绝对生境毁坏的这种时间滞后性, 即破碎的生境中存在着一些“活死者”, 必须引起自然保护学家的关注, 否则会低估了实际处于灭绝边缘的物种的数目, 从而影响正确的物种保护决策的制订。

**关键词** [人类活动效应](#) [物种多样性](#); [洪湖湿地](#); [生境毁坏](#); [水鸟](#)

**分类号** [Q141](#)

## The dynamical simulation of the effects of human activities on species diversity: A case study of the effects of human-caused habitat destruction on waterfowls' species diversity in Honghu wetland

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**Abstract** Population explosion and human activities especially the pressures of land use and habitat destruction on environment, is one of the most important causes of the loss of species diversity. Species diversity is the bases of the survival and development of human being. Therefore, the study on the effects of human activities on species diversity is a hot issue of global biodiversity conservation. We have put forward a non-autonomous model of multispecies competitive coexistence model about the effects of human activities which is the function of time. Moreover, we have studied dynamically the effects of human activities on species diversity by simulating the response of species diversity of wetland waterfowls to human-caused habitat successive destruction as a case study. The simulated results showed that:

(1) When waterfowls are subject to successive habitat destruction, the responsive characteristics of superior-superior competitors are different from those of inferior-inferior competitors. For superior-superior competitors, the abundances of them will decline continually. The declining speed of more superior competitors is much higher than the less superior competitors because the more superior a species is, the more sensitive to habitat loss it is, which leads to the competitive rank and dominance species changing. For inferior-inferior competitors, the successive habitat destruction will lead to lots of much inferior competitors go extinct due to inadaptability to habitat loss and the rest oscillate quasi-periodically.

(2) When habitat destruction stop, for superior-superior competitors, the originally more superior competitors still decline continually and die out at the end, and originally less superior competitor

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s keep as the dominance species; for inferior-inferior competitors, many inferior competitors will go extinct quickly, and the rest will oscillate quasi-periodically. All the living species will come to a new equilibrium after about 3000yr. As mentioned above, although habitat destruction stops, some species still go extinct, which reveals there is a time debt for species extinction to respond to past habitat destruction, that is to say, there are some “living dead” species in present destroyed habitat. So more and more attentions must be taken to it from conservation biologists, or else, the number of endangered species will be underestimated and further the development of effective decision-making of biological conservation are affected disadvantageously.

**Key words** effects of human activities \_ species diversity \_ Honghu wetland \_ habitat

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