

研究论文

道路网络扩展对区域生态系统的影响——以景洪市纵向岭谷区为例

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摘要 道路网络的存在和扩展影响着周边景观的生态格局和过程, 进而影响区域生态安全, 定量表达道路影响域生态系统变化对生态系统管理具有重要意义。选取景洪市为研究区, 利用缓冲区分析、对比分析和情景分析, 研究道路与生态系统格局变化的关系, 进而揭示不同道路类型对区域生态安全的影响。结果表明: 近20a研究区林地、灌丛有所减少, 旱地和建设用地增加显著, 而道路为显著的驱动因子。景观的多样性, 均匀度, 斑块密度和人工干扰指数也随着道路缓冲距离增加而降低。道路影响域内林地受道路影响最大, 其次为草地, 旱地或灌丛, 而旱地的斑块数目受低等级道路影响最多, 其他等级林地数目最多。情景分析表明, 随着道路网络的扩展, 生态系统分维数、斑块数目增加, 平均斑块面积减少, 显示破碎化程度加剧, 而低等级道路对区域景观格局的变化贡献率最大。

关键词 [道路网络](#); [生态效应](#); [景观格局](#); [纵向岭谷区](#); [景洪市](#)

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Effects of road networks on regional ecosystems in South west mountain area: A case study in Jinhong of Longitudinal Range-Gorge Region

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Abstract The direct or indirect influences of ecological process caused by roads can extend from population to landscape level. On the large scale, the influences are created and expanded by the road networks. The existence and extension of road networks affect adjacent landscape pattern and process within the road effect zone. The landscape fragmentation also brings pressure on regional ecological security. Considering the particular natural environment and ecological characteristics of Longitudinal Range-Gorge Region in Lancangjiang River valley of Yunnan Province, estimation of road effects on ecosystems in the region will be more reasonable and practical. The paper takes Jinhong county as an example to quantify the landscape pattern affected by road construction and to assess its effect on regional ecosystem. Buffer, comparison and scenario analysis were used to elucidate the effect of road on landscape pattern and its ecological risk. Using GIS software, road buffers were divided into different classes and the buffers can be considered as road effect zone. Seven scenarios were set as no road, rural road networks overlay, third class road overlay, second class road overlay, first class road overlay, expressway under construction overlay, and planning first class road overlay. Land use and landscape pattern index were compared to discern the changes under different scenarios and in different buffers. The results showed that forest and shrub decreased while farmland and constructed land increased in the past 20 years in the studied area. In addition, the land use change rate increased near roads while landscape pattern diversity index, evenness index, patch density, and human-disturbing index decreased. Existence of road networks has been potential driving force to region land use change. The analysis of land use in road effect zone showed that forests were mostly affected by road, followed by grassland, farmland or shrub land. The largest patch number affected is farmland near the low-level roads while it is forest near high-level road. Scenario analysis showed that the fractal dimension index, patch number, and average patch area decreased with development of road networks. Different

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t road networks showed that low-level roads such as rural roads and third class roads contribute d most to the regional patch number and area change. In general, expressway plays little role on t he landscape pattern change.

Key words [road networks](#) _ [ecological effect](#) _ [landscape pattern](#) _ [Longitudinal Range-Gorge Region](#) _ [Jinghong](#)

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