Construction and Optimization of Green Infrastructure Network in Mountainous Counties Based on Morphological Spatial Pattern Analysis and Minimum Cumulative Resistance Models: A Case Study of Shapingba District, Chongqing

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Abstract : Under the background of rapid urbanization, mountainous counties need to break through mountain barriers for urban expansion due to undulating topography, resulting in ecological problems such as landscape fragmentation and reduced biodiversity. Green infrastructure networks are constructed to alleviate the contradiction between urban expansion and ecological protection, promoting the healthy and sustainable development of urban ecosystems. This study applies the MSPA model, the MCR model and Linkage Mapper Tools to identify eco-sources and eco-corridors in the Shapingba District of Chongqing and combined with landscape connectivity assessment and circuit theory to delineate the importance levels to extract ecological pinch point areas on the corridors. The results show that: (1) 20 ecological sources are identified, with a total area of 126.47 km^2, accounting for 31.88% of the study area, and showing a pattern of 'one core, three corridors, multi-point distribution'. (2) 37 ecological corridors are formed in the area, with a total length of 62.52km, with a 'more in the west, less in the east' pattern. (3) 42 ecological pinch points are extracted, accounting for 25.85% of the length of the corridors, which are mainly distributed in the eastern new area. Accordingly, this study proposes optimization strategies for sub-area protection of ecological sources, grade-level construction of ecological corridors, and precise restoration of ecological pinch points.