Modelling Urban Rigidity and Elasticity Growth Boundaries: A Spatial Constraints-Suitability Based Perspective

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Abstract : In the context of rapid urbanization, urban sprawl has brought about extensive negative impacts on ecosystems and the environment, resulting in a gradual shift from "incremental growth" to ‘stock growth’ in cities. A detailed urban growth boundary is a prerequisite for urban renewal and management. This study takes Shenyang City, China, as the study area and evaluates the spatial distribution of urban spatial suitability in the study area from the perspective of spatial constraints-suitability using multi-source data and simulates the future rigid and elastic growth boundaries of the city in the study area using the CA-Markov model. The results show that (1) the suitable construction area and moderate construction area in the study area account for 8.76% and 19.01% of the total area, respectively, and the suitable construction area and moderate construction area show a trend of distribution from the urban centre to the periphery, mainly in Shenhe District, the southern part of Heping District, the western part of Dongling District, and the central part of Dadong District; (2) the area of expansion of construction land in the study area in the period of 2023-2030 is 153274.6977hm2, accounting for 44.39% of the total area of the study area; (3) the rigid boundary of the study area occupies an area of 153274.6977 hm2, accounting for 44.39% of the total area of the study area, and the elastic boundary of the study area contains an area of 75362.61 hm2, accounting for 21.69% of the total area of the study area. The study constructed a method for urban growth boundary delineation, which helps to apply remote sensing to guide future urban spatial growth management and urban renewal.

Keywords : urban growth boundary, spatial constraints, spatial suitability, urban sprawl
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