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URBAN CULTURAL ECOSYSTEM SERVICES DEMAND ASSESSMENT AND SPATIAL DEPENDENCE RESEARCH: A CASE STUDY OF SHANGHAI SUBURBS

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Abstract

The rapid pace of urbanization is placing unprecedented pressures on the demand for cultural ecosystem services (CES) in cities, particularly in suburban areas where ecological functions intersect with human activities. Understanding this demand is crucial for supporting sustainable urban planning, ecosystem management, and human well-being. This study integrates ecological structure analysis with social evaluation methods to investigate CES demand in suburban landscapes, using geotagged photo data as a proxy for human perception and use. Spatial clustering analysis revealed distinct high–high clusters of CES demand, highlighting strong spatial aggregation patterns in suburban contexts. To further explore the drivers of CES demand, geographically weighted regression (GWR) models and spatial regression models were employed, with CES demand as the dependent variable and biological, social, and infrastructural indicators as explanatory factors. Results indicated that GWR achieved a superior fit compared to global regression, underscoring the importance of spatial heterogeneity and the localized influence of explanatory variables on CES demand. Among the tested factors, infrastructure exhibited the strongest spatial dependence, demonstrating that the adequacy of supporting facilities is a decisive factor in shaping CES demand. Water bodies, along with proximity to natural and cultural landscapes, also exerted significant influence in suburban areas, emphasizing their critical role in guiding landscape planning and tourism development. Furthermore, population-related variables revealed nuanced impacts: population density showed a positive association with aesthetic service (AS) demand, while exerting a negative effect on recreation and tourism service (RTS) demand. These findings suggest that CES demand patterns are jointly shaped by ecological structures, landscape attributes, and demographic characteristics. Overall, this study provides empirical evidence that the interplay between infrastructure, ecological resources, and population dynamics critically determines the spatial distribution and intensity of CES demand. The results offer valuable insights for enhancing suburban landscape planning, improving ecosystem protection strategies, and promoting equitable access to cultural ecosystem services, thereby contributing to sustainable urban development and human well-being.

Key words: cultural ecosystem services demand, geographic weighted regression, spatial dependence, spatial distribution, spatial regression model

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