

Suitability Evaluation of Human Settlements Using a Global Sensitivity Analysis Method: A Case Study in of China

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Abstract : The suitability evaluation of human settlements over time and space is essential to track potential challenges towards suitable human settlements and provide references for policy-makers. This study established a theoretical framework of human settlements based on the nature, human, economy, society and residence subsystems. Evaluation indicators were determined with the consideration of the coupling effect among subsystems. Based on the extended Fourier amplitude sensitivity test algorithm, the global sensitivity analysis that considered the coupling effect among indicators was used to determine the weights of indicators. The human settlement suitability was evaluated at both subsystems and comprehensive system levels in 30 provinces of China between 2000 and 2016. The findings were as follows: (1) human settlements suitability index (HSSI) values increased significantly in all 30 provinces from 2000 to 2016. Among the five subsystems, the suitability index of the residence subsystem in China exhibited the fastest growing growth, followed by the society and economy subsystems. (2) HSSI in eastern provinces with a developed economy was higher than that in western provinces with an underdeveloped economy. In contrast, the growing rate of HSSI in eastern provinces was significantly higher than that in western provinces. (3) The inter-provincial difference of in HSSI decreased from 2000 to 2016. For sub-systems, it decreased for the residence system, whereas it increased for the economy system. (4) The suitability of the natural subsystem has become a limiting factor for the improvement of human settlements suitability, especially in economically developed provinces such as Beijing, Shanghai, and Guangdong. The results can be helpful to support decision-making and policy for improving the quality of human settlements in a broad nature, human, economy, society and residence context.

Keywords : human settlements, suitability evaluation, extended fourier amplitude, human settlement suitability

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