

Water Resources Green Efficiency in China: Evaluation, Spatial Association Network Structure Analysis, and Influencing Factors

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Abstract : This paper utilizes the Super-SBM model to assess water resources green efficiency (WRGE) among provinces in China and investigate its spatial and temporal features, based on the characteristic framework of "economy-environment-society." The social network analysis is employed to examine the network pattern and spatial interaction of WRGE. Further, the quadratic assignment procedure method is utilized for examining the influencing factors of the spatial association of WRGE regarding "relationship." The study reveals that: (1) the spatial distribution of WRGE demonstrates a distribution pattern of Eastern>Western>Central; (2) a remarkable spatial association exists among provinces; however, no strict hierarchical structure is observed. The internal structure of the WRGE network is characterized by the feature of "Eastern strong and Western weak". The block model analysis discovers that the members of the "net spillover" and "two-way spillover" blocks are mostly in the eastern and central provinces; "broker" block, which plays an intermediary role, is mostly in the central provinces; and members of the "net beneficiary" block are mostly in the western region. (3) Differences in economic development, degree of urbanization, water use environment, and water management have significant impacts on the spatial connection of WRGE. This study is dedicated to the realization of regional linkages and synergistic enhancement of WRGE, which provides a meaningful basis for building a harmonious society of human and water coexistence.

Keywords : water resources green efficiency, super-SBM model, social network analysis, quadratic assignment procedure

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