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學術論文

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題目：Does artificial ecosystem recharge make sense? based on the coupled water orbit research framework

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論文摘要：

By formulating an innovative Coupled Water Orbit Research Framework (CWORF) in cohesion with the modified Hypothesis Extraction Method (HEM), this study undertakes a comprehensive examination and assessment of the Autonomous Water Orbit (AWO) linkages within each sector. Building upon this foundation, the CWORF also integrates Structure Path Analysis (SPA) to scrutinize the critical paths of the AWO in each sector. Additionally, the framework quantifies specific water consumption at different layers of the production chain, enabling a more precise assessment of water consumption and inter-sectoral water usage linkages compared to existing studies. By applying this framework, existing water conservation policies can be refined, thereby achieving enhanced environmental sustainability. The study utilizes six Input-Output (IO) tables and water resource bulletins spanning from 2002 to 2020, as published by the China Bureau of Statistics. It is instrumental in dissecting the current interplay between water resource utilization and economic development. This research aims to analyze the structural nuances of water consumption and the dependency characteristics across diverse sectors within the production chain. It strategically identifies pivotal paths and sectors in the production chain where water consumption is most pronounced, and highlights critical chains contributing to water stress. The results indicate that sectors such as “Farming, Forestry, Animal Husbandry, Fishery, and Water Conservancy” exhibit high water consumption. Furthermore, light industries, represented by “Food and Tobacco” and “Textile Product” sectors, significantly impact indirect water usage across sectors. The study also reveals that the strength of the water feedback loop in the economic system diminishes as the number of layers increases, with the aforementioned sectors frequently appearing in transmission paths and serving as key interface nodes. This research underscores the critical interconnections between water usage and economic activities providing a foundational framework for refining water conservation policies and enhancing water allocation and management capabilities. The introduced CWORF extends beyond conventional methods, offering a more precise and nuanced approach to measuring inter-sectoral water utilization.

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