



## **Nationwide Simulation of Water-Energy-Food Nexus: Model Development and Implementation**

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Water, energy, and food (WEF) security have been realized as a global issue and a WEF nexus concept is receiving spotlight as a novel concept to develop sustainable resources management plans. The three valuable resources are inevitably interconnected, such that energy needs water for electricity production, water needs energy for pumping, treating and distributing, and finally, food requires water and energy for irrigation/production. The WEF nexus appears as a novel concept to integrate and interconnect the water, energy, and food production and consumption processes in a single framework. The complexity of the linkage leads to the necessity of a simulation model to analyze the often invisible interconnections and quantify the actual amount of available, produced, and consumed resources. This study introduces a computer simulation model to calculate the security of water, energy, and food considering the nexus among resources on a nationwide scale. The developed model implements the system dynamics approach to simulate the feedback analysis and two-way interconnections among resources. The model was calibrated and implemented to investigate resources security under plausible future scenarios in South Korea. Furthermore, simulations altering policy parameters (prioritization, allocation, and/or trading) are possible to investigate the resources management policy using an optimization algorithm.

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