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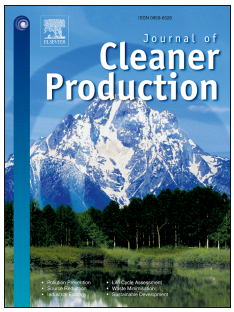

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Exploration and Assessment of Optimal Policy Combination for Total Water Pollution Control with a Dynamic Simulation Model

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Abstract:

This paper develops and illustrates an effective method to explore an optimal policy combination (OPC) for total water pollution control in a river basin through constructing a dynamic optimization simulation model consisting of socioeconomic model, water pollutant model and energy model based on input-output approach. The impacts induced by the introduction of water pollution control policies on economic development and industrial restructuring with water pollutant discharge constraints have been comprehensively evaluated within the horizon of 2011-2020. Based on the objectives of local economic development and water pollution control, the model obtains a global optimal solution with consideration of the full effects. The OPC and industrial restructuring collectively contribute to meeting the water pollutant discharge constraints. The changing trends in pollutant discharge structure and sectoral production are traced after deriving the OPC. The OPC influenced by the diversity and efficiency of policies and constraint settings is specified through clarifying the implementation of each policy and technology that contribute to the reduction in water pollutants promoted by the subsidies. This study helps to realize regional sustainable development by manifesting the best trade-off between economic development and water environmental conservation as well as effectiveness of policies adopted.

Keywords:

Total water pollution control; Dynamic optimization simulation model; Input-output; Optimal policy combination;