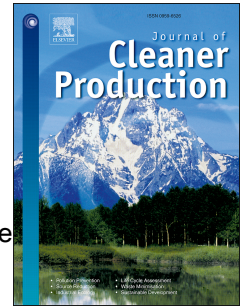


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TOWARDS SUSTAINABLE WATER-FOOD NEXUS: AN OPTIMIZATION APPROACH

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ABSTRACT

Water and food are facing increased demands from larger and more affluent populations thus necessitating a coordinated and effective management of limited natural resources. In this study, we present an optimization model developed for optimal resource allocation towards sustainable water and food security under nutritional, socio-economic, agricultural, environmental, and natural resource constraints. The core objective of this model is to maximize the composite water-food security status by defining an optimal water and agricultural policy that ensures nutritional guidelines while still maintaining food-preferences. This policy transforms optimum food demands into optimum cropping options given the water and land footprints of each crop or agricultural product. The model performance is evaluated with a hypothetical regional case study testing a wide spectrum of cases from the water-stressed to the land-stressed extremes thus showing the model's ability to suggest fundamentally different policy approaches. Results demonstrated the sensitivity of adopted water and food security definitions in shaping water and agricultural policies, thus reinforcing the need for agreements amongst the wide range of stakeholders at global scale.

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