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Integrating climate impacts across energy, water, land systems within a global framework

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IIASA's Integrated Assessment Model (IAM), MESSAGEix-GLOBIOM is used in various assessments to understand scenarios of socio-economic development within the energy and land systems across scales (global, country, basin). However, the representation of climate impacts and water systems within IAMs until now has been limited. The study goes a step forward on improving the representation of climate impacts and the capability to analyze interactions between population, economic growth, energy, land, and water resources in a dynamic system simultaneously. It uses spatially resolved representation of water systems to retain hydrological information without compromising computational complexity, and simplified water availability and key infrastructure assumptions mapped with the energy and land systems. The results from this study inform the required regional and sectoral investments pathways across mitigation and non-mitigation pathways. The results also highlight the importance of water as a constraint in energy and land-use decisions and implications of global responses to the limited water availability from water resources – renewable water, non-renewable groundwater, desalinated water.