larger harvests in the near future come at the cost of reduced harvests later on. We provide sensitivity analyses with respect to pumping cost, agricultural prices and the discount rate. The novelty of our paper is the integrated geophysical-economic model that captures the interaction between economic drivers and geophysical processes.

Hydroeconomic analysis of droughts in the Ebro basin using copulas for streamflow simulation

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Abstract

Climate change intensifies water scarcity in arid and semi-arid regions where pressures on water resources are significant, further compromising the sustainability of water systems. Climate change triggers more frequent, longer and intense droughts that bring about serious challenges for management. Hydroeconomic analysis provides a modeling framework for policy design at basin scale, taking into consideration the spatial and temporal relationships between water sectors. In this study, an integrated hydroeconomic model of the Ebro basin is used to analyze the economic impacts of climate change under several water management alternatives. An innovative approach, the Copula procedure, is used to generate longer, and more intense and frequent drought events. Several policy scenarios are simulated by combining two water allocation rules, proportional share or water markets, with the possibility of investments in advanced irrigation systems. The sustainability of the Ebro water system is evaluated by looking at its reliability, resilience and vulnerability under each policy alternative. The risk assessment of the benefit losses informs on the water system exposure to extreme drought events, and the contribution of management options in reducing potential losses. The results highlight that climate change exacerbates the likelihood of substantial economic losses from droughts, which compromise the sustainability of the water system. Water markets and irrigation efficiency enhancements reduce uncertainty and losses from droughts, although there is a trade-off between irrigation benefits and damages to aquatic ecosystems. However, the effectiveness of this policy combination decreases for longer and intense droughts.

Externality and common-pool resources: the case of artesian aquifers

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Abstract

This paper studies a specific class of common-pool resources whereby rivalry is not characterized by competition for the resource stock. Artesian aquifers have been identified as