

EGU2020-8934

<https://doi.org/10.5194/egusphere-egu2020-8934>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Tradeoffs in water extremes: combining hydraulic and economic modeling to assess the economic and financial viability of de Lastras de Cuéllar Dam, Spain

Héctor González López, C. Dionisio Pérez-Blanco, and Laura Gil-García

Universidad de Salamanca, Salamanca, Spain (hector.gonzalez.lopez@usal.es)

Abstract

Growing population and water demand (e.g for irrigation, water supply) and the vagaries of climate, now aggravated due to climate change, intensify societal exposure to water extremes and the economic and environmental impact of floods and droughts in Mediterranean basins. The Douro River Basin Authority (DRBA) in central Spain is assessing whether to build a dam in the Cega Catchment (Spain) with the twofold objective of substituting irrigation withdrawals from overallocated aquifers with relatively more abundant surface water, and of mitigating flood damage in the middle and lower stretches of the Cega River -the only non-regulated river in the DRB. This paper assesses and compares the costs of two alternative adaptation strategies to growing scarcity and more frequent and intense water extremes, namely dam construction v. the statu quo strategy where no dam is built. To this end, a Positive Multi-Attribute Utility Programming (PMAUP) that mimics farmer's behavior and responses is used to assess the impacts on agricultural employment and gross value added of selected strategies in the irrigation sector; while the hydrologic model River Analysis System (HEC-RAS) is used to simulate the economic impact of flood events considering standard return periods, based on the global flood depth-damage functions developed by Huizinga et al. (2017). Both models are used to run 900 simulations reproducing alternative socioeconomic and climatic/hydrologic scenarios. The result is a database representing multiple plausible futures, which is used to identify vulnerabilities of proposed adaptation strategies and potential tradeoffs between responses -notably those referring to the design and operation rules of the dam, and the potential impact of floods and droughts. This methodology and the resultant database are combined with experts' knowledge through robust decision-making tools to identify the preferred (i.e. robust) adaptation policy.