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Adaptation and optimal management of environmental flow regime in global change scenarios for a Mediterranean river basin,

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Allocate scarce water resources to support human well-being while sustaining healthy ecosystems under future climatic, hydrological and socioeconomic uncertainties is one of the grand environmental challenges of the twenty-first century. In this context, the present communication is part of a research project whose general objective is to optimize the environmental flow regime under several global and climate change scenarios in a case study in Eastern Spain (Serpis River).

To achieve this goal, we combine a multivariable habitat suitability model with hydraulic simulation to evaluate the available habitat under different flow regimes in a representative river reach. The use of this methodology will allow us to propose environmental flow regimes which not only fulfill native species requirements, but also deteriorate invasive species habitat.

In parallel, the economic cost of selected environmental flow regimes will be minimized, considering future hydrological and management scenarios in the Serpis River system. This involves the calibration and validation of a hydrological model for the main sub-basins of the system, and the development of a management model. Future climate variables for the last IPCC climate scenarios are derived from diverse combinations of global and regional models, which are statistically post-processed to correct the associated bias. Subsequently, these variables are used as inputs for the hydrological model to simulate future inflow series. To generate future agricultural and urban demands of the system, we combine these climate scenarios with local socioeconomic perspectives. Measures provided in the Serpis Basin Management Plan are also implemented. Finally, the economic cost and feasibility of the proposed flow regimes are simulated and evaluated.

Results presented in this communication will focus on the simulation of global change scenarios in the Serpis River system, and the simulation-optimisation of management rules that improve current environmental flow regimes.

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