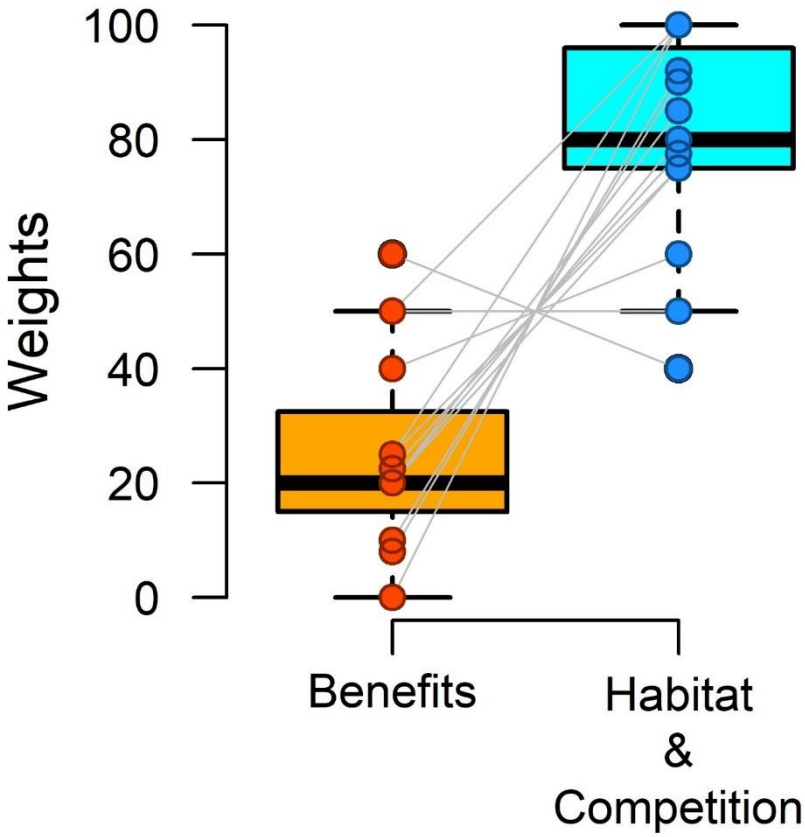
Supplementary Text 1

Two participatory workshops were celebrated in the city of Gandia (Comunitat Valenciana, Spain). Eleven stakeholders attended both of them. In the first workshop, the scenarios considered were presented to stakeholders and we asked for their feedback about the feasibility of the land use scenarios. Furthermore, we asked them to fill a questionnaire to collect their impression on how climate change would impact the economic and ecological performance of the system. Their recommendations were acknowledged in the refinement of land use scenarios that were used in the evaluation of the system performance and the examination of the dam re-operation options. In the second workshop, we presented the results achieved by the current dam operation and the impacts achieved by dam re-operation on both the economic and the ecological system performance. Moreover, stakeholders filled a questionnaire to gather again their impression of climate and land use change impacts (to evaluate changes compared to the previous one), their opinion on how they perceived the role of dam re-operation, as well as the relative importance of economic status compared to ecological status. The latter (Supplementary Fig. 1) was incorporated into the evaluation of dam re-operation options to find out which of them would have real implementation chances.

Stakeholders agreed on the severe impacts to be suffered by the Serpis river, pointing at ecosystems as the most vulnerable against them. They also considered as feasible all the land use scenarios shown, although they discussed that the drip irrigation implementation rates could be slightly optimistic. They also ranked the current land use scenario as the most likely to be materialized, in spite of yielding the worst system performance. Dam operation was ranked as the second mostly preferred option, just below the level of agreement achieved by wastewater reuse.

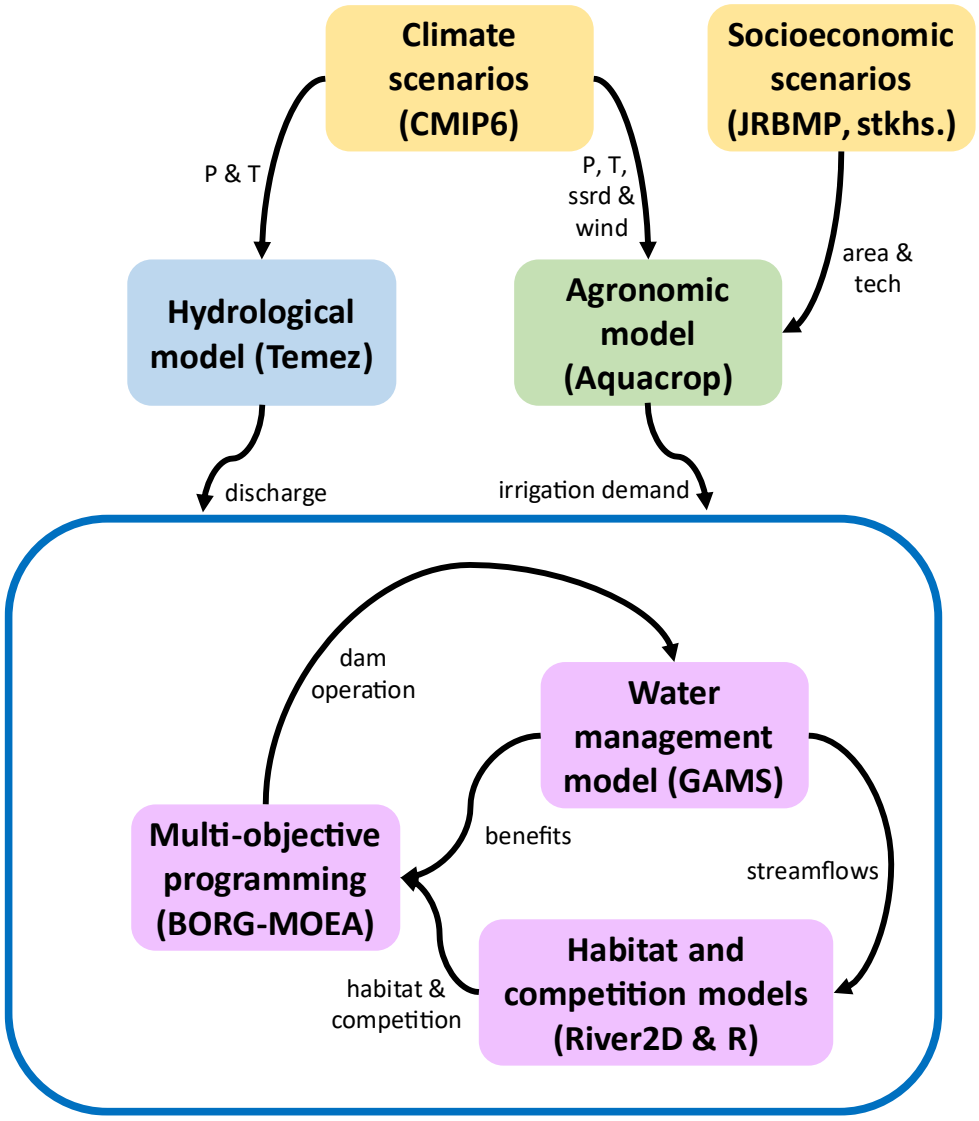
Supplementary Figures

Supplementary Fig.1: stakeholders' preferences on economic and ecological performance



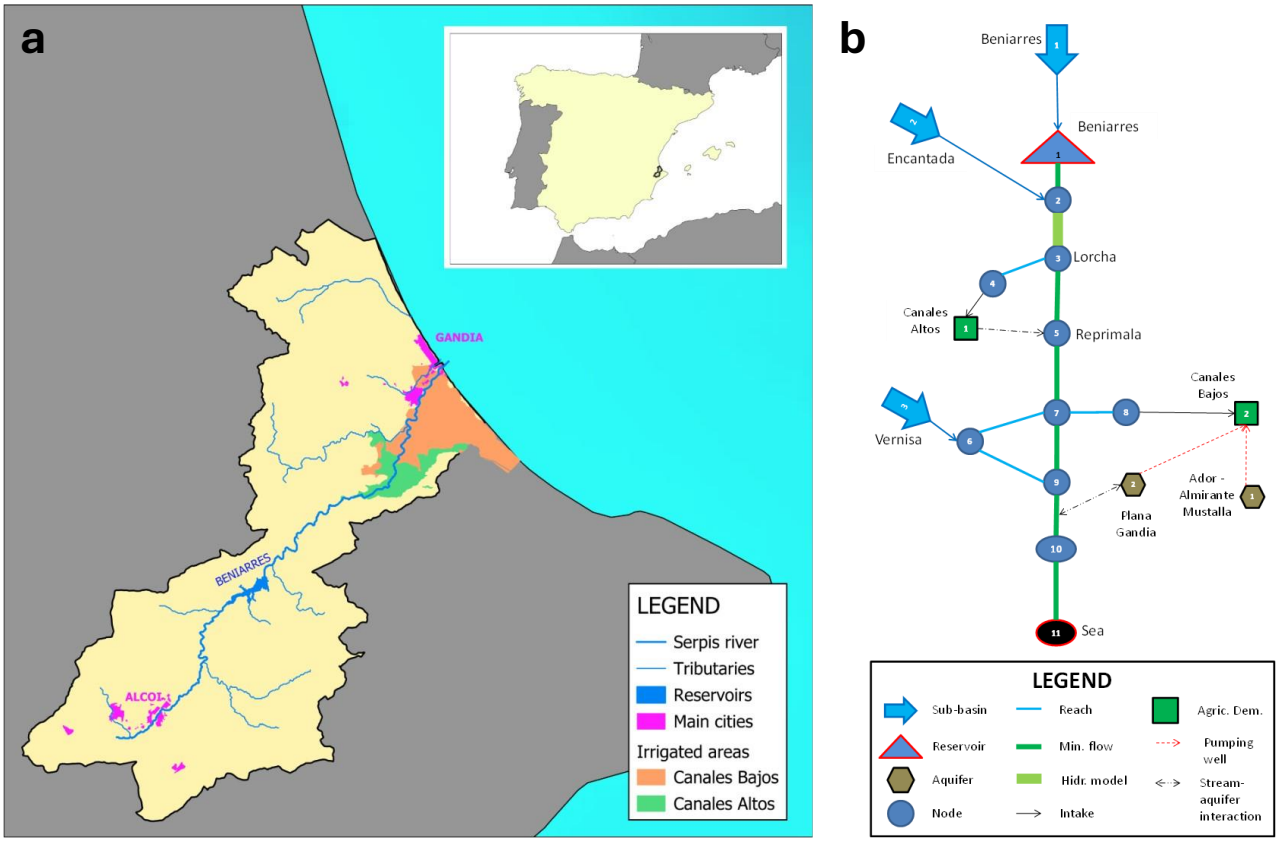
The Y axis represents how much importance would be given to economic and ecological status (e.g. 0-100 would mean that the first would not be considered important, 100-0 would indicate that the second would not be considered important and 50-50 would imply equal importance of both). Weights expressed in percentage. "Benefits" refers to the conomic performance of the system while "Habitat & Competition" addresses its ecological stauts. Pairs of dots joined by grey lines represent votes from individual stakeholders, including one in which two stakeholders coincide (0 for benefits, 100 for habitat & competition). Horizontal fill lines represent the median of all votes, colored boxes are the interquartilic range and whiskers refer to the values within 1.5 times the interquartilic range.

Supplementary Fig.2: Methodological flowchart



P: precipitation, T: temperature, JRBMP: Jucar River Basin Management Plan, stkhs.: stakeholders, GAMS: General Algebraic Modelling Software. The blue chamfered rectangle represents the iterative procedure applied to obtain Pareto-optimal dam re-operation options.

Supplementary Fig.3: Case study information



a: Map of the Serpis river basin, location of its main reservoir (Beniarres) and irrigated areas using surface resurces (Canales Bajos and Canales Altos). **b**: Schematic of the GAMS water management model. The model includes three sub-basins (Beniarres, Encantada and Vernisa), one reervoir (Beniarres), two agricultural demands (Canales Altos and Canales Bajos), two aquifers (Plana Gandia and Ador – Almirante Mustalla) and the minimum streamflows prescibed in the main Serpis watercourse. Canales Altos has higher water supply priority over Canales Bajos, which needs to complement surface water resources with groundwater.