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Effects of Environmental Fluxes on Hydrological Change and the Dependability of Water Demands

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Description

A method for quantifying the effects of environmental flow regimes on the hydrological alterations of river sections is presented in this work. The estimation of the natural flow regime, as well as the implementation and calibration of a water allocation model, forms the majority of the methodology's foundation. And the calculation, normalization, and collection of hydrological change indicators [1].

The GHAIs that show the most change are GHAIs related to the minimum annual extreme hydrological conditions in Valdesamario and Orbigo (GHAI3) and GHAIs related to the minimum flows in the Luna stretch (GHAI4). In contrast, the magnitudes of the monthly summer conditions (GHAI2) in the Valdesamario and Luna stretches and the monthly winter conditions (GHAI1) in Orbigo experience the least change; The Tuerto River, on the other hand, exhibits the least amount of change in extreme annual maximum hydrological conditions (GHAI3).

The indicators' values generally fall within the altered and moderately altered ranges in the qualitative evaluation of the state of the river sections; however, in the Tuerto river, the values that fall within the slightly altered range predominate. Of the four sections taken into consideration, the Tuerto and Orbigo river stretches have the best alteration values. This is because these river stretches are in the middle and lower parts of the basin, so they get some returns from the upper part. Additionally, reservoirs do not control all of the contributions they receive [2].

On the other hand, the GHAIs typically take on values below 0.5 along the Valdesamario and Luna River stretches, which indicate a changed state. Except for the GHAI that evaluates the magnitude and duration of the extreme annual hydrological conditions of the high flows in the Luna River stretch, the GHAIs present higher values (less variation) in the anticipated scenario [3].

Through a case study in the Orbigo River basin (Iberian Peninsula), the methodology was demonstrated. The SIMGES model was used to model three environmental flow management strategies: the base scenario, which is the current environmental flow regime; the regulated scenario, which assumes that there are no environmental flows; and the regulated scenario, which represents the initial environmental flows that were anticipated in the basin's hydrological plan for the years 2022–2027. The indicators of hydrological alteration were examined in four river stretches with distinct locations and characteristics based on the SIMGES findings: Orbigo, Luna, Tuerto, and Valdesamario.

The Tuerto river produced the highest values of the global indicator of hydrological alteration (i.e., the least altered conditions). All of the results showed that the global indicator values were higher (lower in change) with higher environmental flows values [4]. Valdesamario and Luna, which are in the upper basin, saw less of this improvement.

Additionally, the demand reliabilities' effects on the environmental flow scenarios were quantified. It was discovered that the majority of demands fail to meet the three reliability criteria in the initial scenario that was projected. The environmental flow regimes imposed restrictions on the demand reliabilities that were obtained: There are more breakdowns in demand reliabilities when there are more environmental flows [5].

The findings presented in this paper demonstrate that the proposed methodology is a useful tool for the design of environmental flow regime management strategies that enable the best possible balance between meeting water demands and improving the hydrological status of rivers. The definition of a global indicator of the hydrological alteration of river stretches, which is obtained through daily simulations with a water allocation model, is the primary contribution of this work to the existing body of knowledge. In addition to the hydrological alteration indicators analyzed in this paper, future research challenges include the definition and evaluation of indicators of potential habitat alteration in regulated river basins [5].

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Conflict of Interest

None.

References

1. Ahn, Jung Min, Heon Gak Kwon, Deuk Seok Yang and Yong-seok Kim. "Assessing environmental flows of coordinated operation of dams and weirs in the Geum River basin under climate change scenarios." Science of the Total Environment 643 (2018): 912-925.

2. Al-Jawad, Jafar Y, Hassan M. Alsaffar, Douglas Bertram and Robert M. Kalin. "Optimum socio-environmental flows approach for reservoir operation strategy using many-objectives evolutionary optimization algorithm." Science of the Total Environment 651 (2019): 1877-1891.

3. Andreu, Joaquín, Jy Capilla and Emilio Sanchís. "AQUATOOL, a generalized decision-support system for water-resources planning and operational management." Journal of hydrology 177 (1996): 269-291.

4. Monico, Valentina, Abel Solera, Rafael J. Bergillos and Joaquín Andreu, et al. "Effects of environmental flows on hydrological alteration and reliability of water demands." Science of The Total Environment 810 (2022): 151630.

5. Arthington, Angela H, Stuart E. Bunn, N. LeRoy Poff and Robert J. Naiman. "The challenge of providing environmental flow rules to sustain river ecosystems." Ecological applications 16 (2006): 1311-1318.

6. Behboudian, Massoud, Reza Kerachian and Parastoo Pourmoghim. "Evaluating the long-term resilience of water resources systems: Application of a generalized grade-based combination approach." Science of the Total Environment 786 (2021): 147447.

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