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## Predicting un-impacted flow regime in a Mediterranean catchment with SWAT+ for setting an Environmental Flow

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The general aim of this work was to define a methodology for setting the environmental flows (E-Flows) in a temporary river with limited data availability through a case study. In the literature, there are many methods to set up an E-Flow, however, the issue is still an emerging discipline in non-perennial rivers due to the lack of specific guidelines at the European and national level and the limited availability of data (i.e., hydrological/biological).

The study area is the Locone river basin (219 km<sup>2</sup>) located in southern Italy. The climate is typically Mediterranean. The flow regime shows a pattern of low flow and zero flow in summer. The Locone is classified by the River Basin Authority as a temporary river. Upstream of the dam, streamflow was measured from 1971 to 1983. The main land use is winter wheat (64% of the total area), followed by broad-leaved woods (6.6%) and broad beans (5.4%). The main hydrological pressure in the basin is represented by the Locone dam. It was built in 1986 for agricultural purposes (approximately 5,000 hectares are irrigated) and for a hydroelectric power station (1,693,000 kWh / year).

To compensate for the lack of hydrological and ecological data, which characterizes these types of rivers, the open-source Soil and Water Assessment Tool Plus (SWAT +) model was applied. SWAT + is a completely revised version of the SWAT model, which is a physical scale and watershed model, which operates on a daily time step (Arnold et al., 1998). The model was calibrated (NSE = 0.720; Pbias = -11.514 and R2 = 0.84) and validated (NSE = 0.42; R2 = 0.45; Pbias = -12.5). The flow regime has been characterized under un-impacted conditions over a long period (1971-2020) using hydrological alteration indicators (IHAs) based on modeled daily flows. The E-Flow was set by fixing the variability range of each IHA within the interquartile (25th-75th percentile) by applying the Range of Variability Approach. For the Locone reservoir, the mean monthly flow of water releases, the magnitude, and duration of high and low flows, as well as the timing and frequency of floods and drought conditions were defined.

This work made it possible to test the SWAT+ model in a Mediterranean environment, confirming its potential. The applied method represents a first useful evaluation analysis that should be revised following ecological data monitoring actions to corroborate the eco-hydrological relationships.

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