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TREHS: a new open access software for helping managers and researchers to investigate temporary rivers hydrology and ecology

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When facing environmental or ecological questions, the hydrology of temporary rivers cannot be investigated using traditional methods designed for perennial rivers. Classical hydrology concerns water resources and its first method is through records or simulations of flow. Nevertheless, flow records, often scarce in temporary rivers, do not inform on the occurrence of disconnected/isolated pools that frequently remain in temporary rivers after flow cessation and before the eventual drying of the river bed, providing valuable refuges for aquatic life. Consistently, common river regime classifications are designed using flow chronicles and only may take into account the temporal patterns of flow cessation but not the eventual occurrence of water pools. Yet, current hydrological alteration analyses take into account flow alterations but not changes in the temporal patterns of aquatic mesohabitats after flow cessation.
Biological indicators used for assessing the quality of waters have been developed primarily for perennial rivers and therefore are inadequate for rivers with hydrological regimes as complex as temporary rivers undergo. Biological sampling calendars must be adapted to the regime of temporary streams, and the reference biological communities must be adequate to the river regime and sampling conditions.

In order to overcome these challenges using an operational approach, the TREHS open access software tool has been developed within the LIFE+ TRivers project (LIFE13 ENV/ES/000341). This software allows for the input and storage of information coming from flow simulations, flow gauging records, interviews made to local citizens, in situ observations, and interpretation of aerial photographs. River regime is then classified based on this information, using a new categorization that takes into account the frequency of the three main aquatic phases: flow, disconnected pools and dry river bed. Up to six metrics describing these frequencies and their temporal patterns of occurrence are used to determine the natural and observed river regime, and to assess the degree of hydrological alteration. Here, given the lack of agreed standards to evaluate the ecological relevance of the observed alterations, the thresholds that define quality class boundaries may be determined and updated using expert knowledge. Finally, the software characterizes the differences between the natural and observed regimes, performs a diagnosis of the hydrological status (degree of hydrologic alteration) along with an assessment of the significance and robustness of this diagnosis, and recommends the best period for biological quality sampling. The software also allows calculating biological and hydromorphological quality of a river stretch. TREHS calculates the indices and provides a classification according to present official quality boundary classes and reference conditions of official river typologies. Notwithstanding, the software allows generating additional reference site groups according to expert criteria. For instance, the user will be able to test a group of sites with similar hydrology (e.g. intermittent headwater streams) and investigate new potential reference conditions. The integration of hydrology and ecology in TREHS ultimately offers a key operational tool for advancing in the management of temporary rivers.
An open TREHS course will be held in Barcelona on the 4th. May 2018. Visit http://www.lifetrivers.eu/