Testing of different approaches for the indication of stream intermittency in the Czech Republic - the BIODROUGHT project

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The percentage of partially or fully drying streams has increased during the last decades not only in the Mediterranean, but also in the Central Europe. This gradual disappearance of formerly permanent water-courses is associated not only with hydrological alterations of anthropogenic origin, but probably also with changing climate. Regardless of the origin of this phenomenon, ecologists and water managers need an effective tool for the evaluation of the drought impact on aquatic ecosystems. Therefore, it can be very useful to develop (i) risk maps assessing stream vulnerability to drought and (ii) a hydrobiological method evaluating the presence and possibly also the extent of dry periods in stream's recent history. These two outcomes are the main goals of the BIODROUGHT project (2012-2015) www.biodrought.eu supported by the Technology agency of the Czech Republic no. TA02020395.The development of the indication method is based on a presumed "drought footprint" that is detectable in stream macroinvertebrate assemblages for a certain period of time, corresponding with the extent of impairment. Each dry period can probably act as an ecological filter eliminating sensitive taxa from the assemblage or remarkably reducing their abundances. While these taxa are depleted, other taxa (e.g. good colonizers or highly resistant or ecologically plastic taxa) are able to exploit the re-flooded habitats. Changes in proportional representation of advantageous/ disadvantageous species traits in the community can also help to detect the intermittency of streams. Potential permanency/intermittency indicators can be derived from data on the presence/absence and abundance of taxa in the studied streams. A combination of indices derived from community composition and traits' representation will enable the evaluation of the presence of dry periods in stream's history with a defined probability rate.Preliminary results, which are only available for the time of being, suggest several major trends in the analyzed data from the analysed Czech national SALAMANDER database (state monitoring 1996-2010). Apart from the expected lower abundances and number of taxa in the intermittent streams, remarkable changes in the representation of specific traits (e.g. flow velocity preferences, locomotion type, voltinism etc.) were identified too. Also some higher taxonomic groups show a high sensitivity to drought impact, for instance EPT taxa as a whole and namely Plecoptera. Potential indicators were found in many taxonomic groups; however, their drought sensitivity must be evaluated with regard to season (spring/autumn). The presence of dry periods is detectable also by some indices, for instance by saprobic index, although the separation of organic pollution from drought impact may be problematic. The combination of the presented methods can help to uncover drought in the stream's history, though the response of invertebrates may differ slightly in relation to local conditions.

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