

## BIODROUGHT project – developing effective tools for retrospective bioindication of dry episodes in stream history and selection of watersheds with drought risk using aquatic macroinvertebrates

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Climate change has brought remarkable changes in hydrological regime over the last decades and causes consequent periodical drying out of water-courses (meant as the absence of surface flow) not only in the Mediterranean but also in Central Europe where the percentage of annually drying up small streams has increased remarkably. Increasing stream intermittency in this region is probably associated with changes in the distribution of precipitation and higher evapotranspiration during the season, and also with hydrological alterations of anthropogenic origin. Regardless of the cause of drying up of small water-courses, we use the analysis of aquatic macroinvertebrate community as an effective tool for the detection of dry periods in stream's recent history.

The main expected project outcomes include (i) risk maps assessing stream vulnerability to drought and (ii) a bioindication method evaluating the presence and possibly the extent of dry periods with a defined probability rate. Due to lack of long term data for the evaluation of drought-related impacts on the macroinvertebrate community structure in the Central Europe, we analyzed data from the Czech state monitoring database SALAMANDER (collected in 1996-2010) and our own data collected within the ongoing BIODROUGHT project (2012-2015), [www.biodrought.eu](http://www.biodrought.eu). We preclude that drought acts as an ecological filter which leaves its "footprint" in macroinvertebrate community structure for a certain time period and the structural changes in species composition and representation of species traits correspond with the spatial and temporal extent of drought impairment. While the drought sensitive taxa (i.e. potential permanency indicators) are depleted, the proportion of advantageous traits and

drought resistant taxa or good colonizers increases and stays on higher level for a specific time period after stream re-flooding. We want to incorporate traditional and frequently used indices (e.g. saprobic index) calculated on the basis of macroinvertebrate community composition in drought indication, but also new metrics are tested. This unique retrospective approach, which employs the combination of the presented methods (indicator taxa analysis, species traits analysis and indices), can be used not only to uncover the previous dry episodes, but also to validate the developed drought risk maps.

Preliminary results, which are only available now, show lower abundances and number of taxa in intermittent streams and remarkable differences between intermittent and permanent streams in terms of the representation of specific traits (e.g. flow velocity preferences, locomotion type, voltinism etc.). These results are very promising, although we must keep in mind that the response of macroinvertebrates may differ slightly in relation to local conditions (e.g. refugia availability, recolonisation sources or hydromorphological status of a water course). Regardless of certain variability in community response to drought, we developed useful retrospective method which provides reliable results, unattainable by conventional tools.

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