Different approaches to drought capture – how do aquatic invertebrates indicate dry episode in Central European streams?

Marek Polášek[1], Petr Pařil[1], Světlana Zahrádková[1], Vít Syrovátka[2], Lenka Šikulová[2], Michal Straka[3], Denisa Němejcová[1]

marek_polasek@vuv.cz

[1] *T. G. Masaryk Water Research Institute, p.r.i., Brno, Czech Republic*
[2] *Masaryk University Brno, Faculty of Science, Department of Botany and Zoology, Czech Republic*
[3] *WELL Consulting, s.r.o., Brno, Czech Republic*

Global climate change is often associated with changes in distribution of precipitation within season and changes in temperature regime which brings to Central Europe new phenomena, like more frequent floods and drying up of watercourses. The drying up the small brooks and rivers (up to the 4th Strahler's order) and retrospective indication of dry episode are main topics of the project "Drying up of streams during climate change" (acronym BIODROUGHT).

Basically, there are several methods how to reveal the dry episode in stream history. Conventional methods use different types of measuring devices, like water level loggers and for special purposes we can use also time-lapse cameras. Other way how to indicate dry episode is to use hydrological model based on climatic and geographical data. The idea of retrospective biological indication is a novel approach to reveal abruption of surface flow in streams using the analysis of taxonomic and functional composition of benthic macroinvertebrate assemblages. This method involves metrics able to quantify the frequency and extent of drying up of streams ranging from permanent to intermittent ones.

This contribution compares these different methods for indication of dry episode in small watercourses. The dataset used for the comparison consisted of data from (i) a former state monitoring of small watercourses in 1996–2010 and (ii) an ongoing research within the BIODROUGHT project (2012–2013).The preliminary results indicate the possibility of distinguishing intermittent and permanent streams on the basis of presence or absence of specific macroinvertebrate taxa (bioindicators). In this study within macroinvertebrate community we focused on three sensitive taxonomical groups: mayflies, stoneflies and caddisflies

(so called EPT taxa). Drought sensitive species are missing in the intermittent streams and therefore they could be considered as permanency indicators. On the other hand, there are some taxa able to successfully survive the dry episode and these ones occur regularly in intermittent streams. Also representation of specific species traits and indices calculated exclusively from EPT assemblages can be successfully used for good distinguishing between drought impacted and permanent sites.

This study was supported by the Technology Agency of the Czech Republic (No. TA02020395) and Project No. MUNI/A/0888/2013.