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Response of benthic diatom assemblages to changing water regime in lowland lotic ecosystems

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We explored the responses of diatom assemblages to changing water regime in eleven lowland rivers ranging from small to large size rivers in three years with different precipitation (humid, average and dry year). The humid, average and dry years were considered as periods when high, medium and low frequency disturbances entered the systems. We found that relative abundances and taxa numbers of ecological guilds were closely connected to this scenario.

In the humid year, species belonging to the low profile guild dominated the assemblages. Motile guild taxa were characteristic for the year when the water regime was considered as average. In dry year elements of the high profile guild occurred at high relative abundance. Interestingly, changes in taxa number were the opposite of changes in relative abundances in the case of low and high profile guilds.

Cell size also appeared to be an important descriptor of the benthic diatom assemblages. It is important to stress that there were no differences in the changes of taxa numbers of the different cell size classes, while there were remarkable changes in abundances of these classes during the study years. Small-celled pioneer taxa were characteristic for the humid year, while the abundance of halophilic and eutrophic species belonging to larger size classes was higher in the average and dry years.

In contrast to the phytoplankton where based on the well-known habitat template of the species several functional groups were described, in the case of benthic diatoms only four guilds were established so far. Although assigning species in five cell-size classes, or four ecological guilds means a crude simplification of the complex ecological characteristics of species, our results demonstrated that this kind of simplification can be applied to explain the impact of harsh physical disturbances caused by the reoccurring floods in the river ecosystems.