Low-flow data analysis as an input for e-flow limits selection in Slovakia

Lotta Blaškovičová , Jana Poórová , Katarína Jeneiová , Katarína Melová , Zuzana Danáčová , Viliam Šimor

Slovak Hydrometeorological Institute

Nové Mesto, Slovakia

Slovakia is a country located in Central Europe with a very complex physical-geographical conditions and hydrogeological structure and, as a result of that, with a large variability of the hydrological regime in individual areas of the country. Therefore the setting the limits of environmental flow first requires a complex analysis of hydrological regime of flows. The systematic monitoring of surface waters quantity is provided by Slovak Hydrometeorological Institute and therefore it was tasked by data analysis of discharge data in the area of low-flows. As not only the occurrence of the minimum flows but also the duration of their presence have a significant impact on ecosystems during the droughts, we focused on the analysis of monthly and daily discharges below selected hydrological limits of low-flow.  River flow data from 44 gauging stations with observations covering the period 1961-2020 were analyzed, what brought us information not only about the results in different regions and river types in Slovakia in currently used reference period 1961-2000, but also about the changes in the period 2001-2020 compared with reference period. The analyses of both monthly and daily discharge data were monthly-based, to cover the aspect of runoff distribution during the year and the aspect of seasonality in low-flow occurrence. First results show quite significant differences in occurrence of mean daily discharges lower than selected monthly flow limits in this period in comparison with the reference period, especially in the upper, mountain parts of rivers. The changes are also more pronounced in some months of the year, especially in the winter and spring months. The results of the analysis point to the need for regionalization in setting ecological limits for individual streams / water bodies in Slovakia. The results of the data analyzes are in the next step used for narrower selection of suitable limits, which are subsequently considered by other experts (biologists, ichthyologists, etc.). The aim of the whole work is, of course, to find an ideal limit candidate for nationwide implementation, if possible, applicable by the same methodology for the whole territory of the country.