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Contribution of the tributaries of the Sava River to its mean daily flow at the time of hydrological droughts

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The Sava River runs 945 km from northwest to southeast, rising in Slovenia, continuing across Croatia and Bosnia and ending in Serbia at its confluence with the Danube in Belgrade. It contributes approximately 25% of the Danube's total discharge and has a drainage area of approximately 96 400 km2, which represents approximately 15% of the Danube River basin. In Slovenia, the Sava River basin forms the central part of the country and has a drainage area of 11 761 km2. There are five in-stream hydropower stations situated on the Slovenian part of the Sava River and more hydropower plants are planned to be built in the near future, so knowledge about streamflow behaviour of the Sava River's tributaries during rainless periods is of high importance in the decision-making processes regarding water-related issues. The main tributaries of the Sava River in Slovenia are the Sava Dolinka, Radovna, Sava Bohinjka, Trziska Bistrica, Kokra, Sora, Ljubljanica, Kamniska Bistrica, Savinja and Krka rivers.

Analysis of the low flow hydrological situation on the reach of the Sava River from its spring to the Vrhovo Hydropower Station was performed by using two different methods. Structural contribution of the Sava River's tributaries in the Sava River's mean daily flow at the time of hydrological droughts was estimated. First method included identification of the longer low flow periods in the Sava River basin and estimation of the daily based structural shares of the Sava River's tributaries in the Sava River's mean daily flow. The other method was calculation of the characteristic low flow statistics Q95, Q90 and Q80 for all of the final gauging stations on the Sava River's tributaries and calculation of the relations between them by the means of comparing the low flow index (QLFP = (3 x Q95 + 2 x Q90 + 1 x Q80)/6).

Results were compared and useful information about the hydrological situation on the Slovenian part of the Sava River at the time of hydrological droughts was obtained. From the obtained results we can estimate that the Sava Dolinka and Sava Bohinjka rivers contribute approximately 30% of the Sava River's discharge, that the Radovna and Trziska Bistrica rivers contribute approximately 15% of the Sava River's discharge and that the Kokra River contributes approximately 5% of the Sava River's discharge during the time of hydrological droughts on the reach of the Sava River from its spring to the Mavcice and Medvode hydropower stations. On the reach of the Sava River from the Mavcice and Medvode hydropower stations to the Vrhovo Hydropower station the Sora River contributes approximately 25% of the Sava River's discharge, the Ljubljanica and Savinja rivers contribute between 35 and 40% of the Sava River's discharge and the Kamniska Bistrica River contributes approximately 5% of the Sava River's discharge during the time of hydrological droughts.