POTAMIC OUTFLOW FROM SMALL LAKELAND CATCHMENTS

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One of the basic hydrological characteristics is the potamic outflow from a catchment. Continuous hydrometric control usually covers catchments of an area of several tens or hundreds km^2, however in practice what is often necessary are data of the outflow from catchments of an area of a dozen or even several km^2. In hydrographic systems which comply with Horton's laws, for the determination of water resources of such small catchments it is possible to use the method of outflow reduction, which consists in using the regularities of the decrease in outflow value in geometric progression with the decreasing stream order. This methods enables estimating the total outflow for medium subordinate catchments in each order.

In areas of Pleistocene glacial accumulation, the methods of network analysis have been frequently and successfully used (Drwal, 1982; Drwal, Bogdanowicz, 1986; Drwal, 1990; Drwal, Borowiak, 1996; Fac-Beneda, 2003; Fac-Beneda, 2005). The method of network analysis has been used both in the case of ordering of a river network using the widely employed Horton-Strahler's method, as well as using the modified method proposed for young glacial areas, taking into consideration the so-called "wild streams" (Drwal's method).

The results of the research performed so far reveal (Drwal, 1982, 1990) that the total outflow in catchments of 4th and higher orders has all the genetic components, while in catchments of 3rd and lower orders it is only composed of variable outflow formed by surface and sub-surface outflow. Hence, for catchment of 4th and higher orders, total outflow can be estimated (including all the genetic components), whereas for catchments not larger than 3rd order, only variable outflow can be estimated directly.

In the paper an attempt is made to compare the outflow value estimated using the method of simultaneous reduction of area and outflow from chosen catchments, with networks ordered using both methods. For a detailed analysis, three catchments have been selected: of the Słupia (Charnowo), Łupawa (Smołdzino) and Łeba (Miłoszewo).

The method of outflow reduction can be employed providing the coefficient of mean catchment area (R_a) is determined and if the value of total outflow in the closing profile is known. In the paper, the R_a for networks ordered by two methods was determined, and then the outflow value was reduced to the order of the subordinate catchment, simultaneously comparing the obtained results with the values obtained during the field experiment.

The obtained results indicate that at the present stage of research, the reduction method can be used if certain caution in the choice of hydrological information is exercised (Mikulski, Bajkiewicz-Grabowska, 1986). More precise results can be obtained using the method of hydrological profile of a river, yet the choice of the recommended reduction method is supported by the fact that the necessary hydrological information is obtained having only the data on discharge in the control profile and knowing the hydrographic structure of the catchment. In case of a lack of measurement data, this method can be recommended as such that enables estimating the outflow value from small uncontrolled catchments.

It seems that in areas of Pleistocene glacial accumulation, where the natural environment reveals a great diversity and the hydrographic network is not completely developed and organised, the use of the outflow reduction method is especially desirable.

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