

Estimation of extreme flood flows in a Small Carpathian River

Kazimierz Banasik¹ and Janusz Ostrowski²

¹*Warsaw University of Life Sciences - SGGW, Department for Water Engineering and Environmental Restoration, ul. Nowoursynowska 166, PL-02-787 Warsaw, Poland; Kazimierz_Banasik@sggw.pl;*

²*Institute for Meteorology and Water Management, ul. Podleśna 61, PL-01-673 Warsaw, Poland*

Seminar in Bergen 12-16.09.2009

Supported by a grant from Norway through the Norwegian Financial Mechanism

Abstract. The planning, design and use of hydrotechnical structures on mountain rivers as well as flood defense actions in their valleys usually requires the assessment of maximum flood potentials. The most common term applied to this upper limit of flooding is the probable maximum flood (PMF). The PMP/UH (probable maximum precipitation/unit hydrograph) method has been used in the study to predict PMF from a small mountainous river basin of Skawa (right tributary of Vistula river), in Carpathians – south of Poland. The river basin area is 97 km². Rainfall-runoff processes has been monitored in the basin by Institute of Meteorology and Water Management. The objective here was to estimate the PMF using the PMP/UH method and to compare the results with the 100-year flood. A new relation of depth-duration curve of PMP for the local climatic condition has been developed based on Polish maximum observed rainfall data. Exponential formula, with the value of exponent of 0.47, i.e. close to the exponent in formula for world PMP and also in the formula of PMP for Great Britain, gives the rainfall depth about 40% lower than the Wilson's formula.

The effective rainfall (runoff volume) has been estimated from the PMP of various duration using the CN-method. The CN value as well as parameters of the IUH model (derived from a cascade of linear reservoirs) have been established from the 5 largest rainfall-runoff events, recorded in the river basin. The results of the analyze have shown that the peak discharge of the PMF is 2.4 times larger than 100-year flood, and volume ratio of the respective direct hydrographs caused by rainfall events of critical duration is 1.85.

