ASSESSMENT OF UNCERTAINTY IN ESTIMATION OF PEAK DISCHARGES OF EXTREME FLOODS

PETR SKLENAR, KAREL MARES and IVANA MARESOVA

Department of Hydraulics & Hydrology, Faculty of Civil Engineering, Czech Technical University (CTU), 7 Thakurova, Dejvice, Prague, 166-29, Czech Republic
(Tel: +420-2-2435-4671, Fax: +420-2-2431-0782, e-mail: sklenar@fsv.cvut.cz)

In 1997 and 2002 there were floods in the Czech Republic with peak discharges that in many cases exceeded the currently stated values of Q_{100}. During the flood in 2002, the peak discharges reached values at 15 dam reservoirs that significantly exceeded the design discharge values. Water passed through the bottom outlets and mainly over the safety spillways, after reaching a level in the dam reservoir that had not been allowed for in the project parameters.

The dams and their outlets and safety spillways, however, have represented and will probably continue to represent the main monitoring profiles where the value of peak discharges can be most reliably estimated, both in real time during a flood event and during subsequent evaluation of the flood. During the extreme flood in 2002, the gauging stations on the tributaries flowing into the dam reservoirs were destroyed or were put out of operation (instruments malfunctioned or were destroyed, power supply failed, stations were inaccessible). The total inflow therefore formed a major basis for determining the discharges into the dam reservoirs during the course of the flood. This inflow is evaluated from the increase (decrease) in the volume of water in the reservoir in a given time unit – most frequently one hour – and thus expresses the total average inflow into the reservoir within this time unit. The values of the runoffs from the dam reservoirs and the total inflows into the reservoirs are then compared with the results from other methods, in particular with discharges estimated by the "slope - area" method. These results mostly came from determining the course of the peak discharge water level obtained from the after-flood traces.

Using three real cases, this paper shows the uncertainties in evaluating the results of peak discharge using different evaluating methods adopted by Department of Hydraulics & Hydrology, CTU (2003). There are uncertainties at the overflow on the spillway of the Husinec dam on the Blanice river, uncertainties in evaluating the total peak inflow of the Orlik dam reservoirs (Fig. 1), and further uncertainties in determining the peak discharges on the Blanice river upstream and downstream from Husinec dam. With the help of these examples, the paper concludes with a presentation of differences in the presentation of peak discharges from the way in which they are stated in the final report on the flood event, prepared by T.G. Masaryk Water Research Institute (2003).

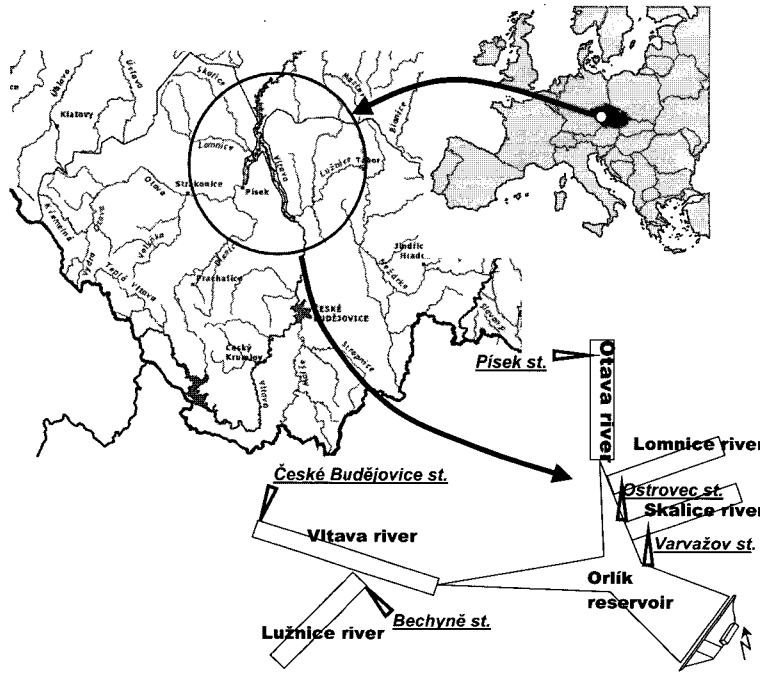

Fig. 1 Location of the Orlik reservoir and a schematic plan with description of complicated inflow situation to reservoir (the names of gauging stations are underlined)

REFERENCES

T.G. Masaryk Water Research Institute, 2003. Final report of project "Evaluation of Catastrophic Flooding in August 2002-Hydrological Assesment". (2003)., Ministry of Environment of the Czech Republic, Prague, (in Czech).

Department of Hydraulics & Hydrology, CTU, 2003. Evaluation of Peak Discharges of Extreme Flood in August 2002 at sites of gauging station maintained by CHMI division in Ceske Budejovice. CTU in Prague, Faculty of Civil Engineering, Prague, (in Czech).