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## **Baseflow and flash flood models of the ungaged Morgó watershed**

**Gergely Ámon**

Széchenyi István University, Faculty of Architecture, Civil Engineering and Transport Sciences, Department of Transport Infrastructure and Water Resources Engineering, Hungary (amon.gergely@sze.hu)

### **Baseflow and flash flood models of the ungaged Morgó watershed**

**Gergely Amon<sup>1</sup> and Katalin Bene<sup>2</sup>**

**<sup>1</sup>Department of Transport Infrastructure and Water Resources Engineering, Széchenyi István University, Győr, Hungary, amon.gergely@sze.hu**

**<sup>2</sup>Department of Transport Infrastructure and Water Resources Engineering, Széchenyi István University, Győr, Hungary, benekati@sze.hu**

**Abstract:** A common feature of steep-sloping watersheds is that there is a significant difference between base flow and flash floods; sometimes two or three orders of magnitude. In Hungary, these streams are usually ungaged or the available flow data is very limited. The Morgó creek watershed, located in northern part of Hungary, features steep terrain, and both urban and natural land use conditions.

In this paper, different models are applied to evaluate flash floods, and baseflow conditions in the Morgó-creek watershed. High probability baseflows can help to evaluate and monitor the current and future condition and health of the local ecological systems. Modeling flash floods with low probability can help to assess and prevent damage in urban areas.

Different types of models are required to generate baseflow and flash flood scenarios. For baseflow modelling, a two-dimensional finite element method was used while for flash floods, a finite volume model was applied. Morgó creek has a high peak flow, with a sharply increasing rising limb. As a result, the finite volume model is not sensitive to mesh density. Additionally, the impact of roughness coefficient was less than expected during calibration. The low flow analysis requires a more complex model to account for turbulence; therefore, the Shallow Water equations were used in the finite element model.

Uncertainty in hydrological model parametrization are a source of significant prediction errors. Monte Carlo simulation was applied to quantify parameter uncertainty on watershed response. The analysis was then used in the hydrodynamic model to assess the final prediction error for baseflow and flash flood conditions. While the hydrodynamic baseflow and flash flood models

have different space and time scales, the two model solutions do influence each other. Proper analysis and comparison of the selected scenarios can help to determine an optimal design for the Morgó-creek watershed.

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