



Predicting the ungauged basin: model validation and realism assessment

Tim van Emmerik (1), Gert Mulder (2), Dirk Eilander (3), Marijn Piet (1), and Hubert Savenije (1)

(1) Water Resources Section, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, Netherlands, (2) Geoscience and Remote Sensing Department, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, Netherlands, (3) Department of Inland Water Systems, Deltares, Delft, Netherlands

The hydrological decade on Predictions in Ungauged Basins (PUB) [1] led to many new insights in model development, calibration strategies, data acquisition and uncertainty analysis. Due to a limited amount of published studies on genuinely ungauged basins, model validation and realism assessment of model outcome has not been discussed to a great extent. With this study [2] we aim to contribute to the discussion on how one can determine the value and validity of a hydrological model developed for an ungauged basin. As in many cases no local, or even regional, data are available, alternative methods should be applied. Using a PUB case study in a genuinely ungauged basin in southern Cambodia, we give several examples of how one can use different types of soft data to improve model design, calibrate and validate the model, and assess the realism of the model output. A rainfall-runoff model was coupled to an irrigation reservoir, allowing the use of additional and unconventional data. The model was mainly forced with remote sensing data, and local knowledge was used to constrain the parameters. Model realism assessment was done using data from surveys. This resulted in a successful reconstruction of the reservoir dynamics, and revealed the different hydrological characteristics of the two topographical classes. We do not present a generic approach that can be transferred to other ungauged catchments, but we aim to show how clever model design and alternative data acquisition can result in a valuable hydrological model for ungauged catchments.

[1] Sivapalan, M., Takeuchi, K., Franks, S., Gupta, V., Karambiri, H., Lakshmi, V., et al. (2003). IAHS decade on predictions in ungauged basins (PUB), 2003–2012: shaping an exciting future for the hydrological sciences. *Hydrol. Sci. J.* 48, 857–880. doi: 10.1623/hysj.48.6.857.51421

[2] van Emmerik, T., Mulder, G., Eilander, D., Piet, M. and Savenije, H. (2015). Predicting the ungauged basin: model validation and realism assessment. *Front. Earth Sci.* 3:62. doi: 10.3389/feart.2015.00062