

## New insights on regional estimation of daily streamflows

Taha Ouarda  
National Institute of Scientific Research, INRS-ETE, Quebec, Canada

Regional estimation of daily streamflows at ungauged sites is of practical importance for a number of activities such as environmental flow management, agriculture, urban water supply, navigation and flood risk estimation at watercourse crossings with linear infrastructure (roads, railways, etc). A number of approaches for the estimation of daily discharges and flow-duration curves (FDCs) at ungauged locations are discussed. The FDC describes the percentage of time a given streamflow was equaled or exceeded over a historical period, and represents the basis of several daily streamflow estimation techniques. The advantages of using multiple source sites and delineated regions are discussed. Once a synthetic daily historical series is generated at a given ungauged target site, it is possible to carry out the appropriate at-site flood frequency analysis procedure to estimate flood quantiles corresponding to different return periods. A comparison of this approach with the classical regional flood frequency analysis methodology is presented. The benefits of this approach are discussed and its extension to regional low-flow frequency analysis, to the non-stationary and to the multivariate frameworks are also presented. The use of functional data analysis for the derivation of FDC curves and daily streamflow estimates is also discussed