



## **On the use of spot measurements for graphical flow duration curves determination**

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Flow duration curves (FDCs) determination represents the key to solve issues related to water resources engineering such as water quality management, hydropower systems design, water use planning, flood management and river and reservoirs regime estimation. FDCs graphically depict the amount of water resource corresponding to a specific river cross-section. For instance, in the hydroelectric scheme framework, FDCs permit to design a system that could cope with extreme flows, operate efficiently in the medium range of flows and operate at a low power output in the case of low flows.

FDCs are easily determined in river cross-sections provided with hydrological gauging stations. However, in ungauged basins flow duration curves evaluation remains a problem to solve, especially in small basins where calibration data are sparse and refer to larger catchments scales. This work investigates a direct method to estimate FDCs using spot measures. Specifically, a graphical regionalization approach based on the flood index method of FDCs is proposed. The approach combines a regional dimensionless flow duration curve with a direct method to estimate the flood index. This is based on the evaluation of the mean annual flow at a specific site through instantaneous flow measurements.

The optimal number of instantaneous measures necessary to minimize the error between observed and simulated curves is found. A jack knife procedure is applied to simulate the ungauged basins situation. The method gives indications about the optimal lag frequency and measurement year period.

To test the methodology, analysis are carried out in the Liri-Garigliano basin, located in Central Italy.